Assessment Methods and Success Factors for Digital Education and New Media

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"Education is the key to unlock the golden door of freedom." – George Washington Carver (1864-1943)

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Preface

The passing of time has determined great evolutionary or revolutionary changes in science and in the new information technologies, to improve the quality of life of humanity. In the 20th century, the modernization of science and education has been a constant in all latitudes of the world, from the expansion of personal computers to interactive multimedia telephony, through which mixed reality can be accessed, as well as home automation, telecare, virtual campus, and so on.

The technological changes of the twentieth century spontaneously brought changes in urban and rural populations, where it was easy to verify the social studies in which possible solutions were indicated and aimed at the generation of geographic, digital, labour gaps, etc. among citizens. Now, there are temporary circumstances, in which these social transformations coincide with the passage from one century to another, and even join the change of a millennium. They are those moments in which a kind of double screening of human knowledge and its technological creations takes place. That is to say, everything that is discarded for the future and makes up museum pieces. Others, on the other hand, are rescued to continue developing them for the good of the human being and his environment. Besides, and as is well known since the 20th century, health and education are the two fundamental pillars, in communities considered culturally and socially advanced.

However, in the last years of the new millennium and although we are going through the era of the expansion of communicability, we have been direct witnesses of how this temporal factor and that normality in the evolutionary process have been altered by financial, commercial, climatological, health, etc. In other words, **the modernization of science and education oriented towards the world population pyramid has been affected by three great earthquakes, in the two decades of the new millennium: First, dot-com bubble and dot- com crash, the second, with its epicentre in the great international financial or banking crisis, and the third, the pandemic.** That is, events that accelerate the metamorphosis of thought and survival actions, with greater or lesser acceptance of changes, by the inhabitants of local and global communities.

To these two events, the perennial destabilizing elements of the social balance have been added: Acceleration in the concentration of great financial wealth, restrictions on access to secular education, increase of the digital or technological gap, the promotion of the automation of industrial tasks, fractures in the private and state labour market (that is, employees subject to constant continuous training versus public employees, with little or no professional updating or evaluation), and so forth. The purpose of all this is to undermine the structural bases of the gradual and constant evolution of societies, governed by authentic democracy, which is fostered through the educational system. These two telluric movements of the new millennium, unexpected and unforeseen, by the vast majority of the population have opened new structural cracks in the two fundamental pillars of modern societies: Education and health.

And precisely, **in emergency situations, the cracks become more visible. Education is not an exception to reality, although efforts are made to make it once again have a central axis, in the communities.** So much so, that in the midst of the pandemic, in many places the routine of classes, exams, presentation of final research papers, etc., have continued to develop, thanks to the democratization of the Internet, open software and applications for text communications, voice and video over Internet (VoIP), chats, etc., adapted for group telecommunications or teleconferences, such as: Cisco Webex, FaceTime, FreeConference, Google Hangouts, Google Meet, Jitsi Meet, Line, Microsoft Skype, Skype Meet Now, Tox, Viber, Whatsapp and Zoom. Examining each one of them, we can see that they come from the software and hardware sector, commercial or not, but widely distributed worldwide: Apple, Cisco, Google, Microsoft, and so forth.

Now, regardless of the positive or negative evaluations, of millions of students, teachers, tutors, etc. that for the first time have been immersed in the e-learning process, for example, it continues to be verified that the moment of interacting with interactive systems, **the Achille's heel, was, is and will continue to be the original content, according to the local context of the user;** literacy in the use of new technologies; the varied and chaotic set of social media channels to access "serious" training content; the availability or personal access to the latest generation technological devices, to name a few examples. Here it is important to differentiate e-learning from r-learning (compulsory readings in individual or cooperative learning mode).

Today there are myriad digital or analog channels of unidirectional, multidirectional, interactive communication, etc., to emit and receive information. Although all of them have increased over time, in global emergencies, countless teachers and students fail to differentiate between information, training, instruction and education, in the continuous loop of the teaching and learning process. Consequently, the channels, the media and the communication process are negatively affecting users (students and teachers) due to a large avalanche of trivial, false, manipulative data, etc., circulating on the network, without considering the aspect of veracity of the same. Digital data that through dynamic and/or static media, could reinforce the educational process of multimedia classrooms, such as the use of augmented reality, e-book, podcasting, and so forth. This does not happen for a myriad of reasons.

One of them is that applications have been promoted with social networks that a priori are visually pleasing, but the image of banality (photos and videos) predominates over written or oral text. That is, original textual content, with a serious theoretical and experimental base, aimed at didactics. Today, the narcissism of the digital image prevails over the originality of the text. The creativity and practicality to find real and valid solutions is disappearing in the future generations, who interact with modern technological devices on a daily basis.

In the face of this reality, **many young users try to detoxify themselves from social networks, resorting to the original or first mobile models,** that is, with the basic functions for calls and receiving / sending SMS, for example. Those models are currently intended for the elderly. This temporary setback shows that the abusive use of technological means of communication requires an analysis of the consequences they bring about in human beings. Therefore, it also affects the fashion of resorting to transmedia or inverted classroom as a didactic solution in university classrooms as well as in secondary schools, aimed at ICT disciplines. These are two of the many educational consequences verified under the pandemic.

Smart smartphones, social networks, transmedia, mixed reality, the metaverse, etc., added to the latest technological innovations, remain one of the biggest problems since the origin of multimedia systems, which is the lack of educational content suitable. In other words, personalized content created

by specialized teachers, autonomously and/or collaboratively. Although the algorithms developed by artificial intelligence would already allow educational content to be produced, it is not the ideal solution due to a high number of variables that remain in the human being and that cannot be managed correctly through current computers.

Furthermore, it is a reality that endures over time and without a solution, despite the crises of the new millennium. In the first of them, the appropriate alternatives would supposedly be sought so that financial entities would be transparent in their actions, avoiding a new global debacle. In the second, alternative plans should be promoted in the face of health emergencies. In both cases, it is found that they are unrealizable hypotheses, given the power of malfunctioning systems, which are perennially cloistered in social structures, starting with education.

For this reason, it is necessary to look carefully at the sciences, from their origins and their constant evolution, over time. Analyzing in detail the fundamental components to revalue them and make them available to all, so that humanity can successfully face the new challenges. These are challenges that will surpass science **fiction,** when **quantum** computing is democratized, to cite an example. Also discover in the new media those elements that can safeguard the veracity of the information. Simultaneously, draw the attention of the new generations to the sciences, in order to create original and innovative environments, for each one of them. In other words, that they feel fulfilled in their contexts of studies and/or experiences, without the need to invade and harm other areas of knowledge, which are not within their competence.

In this sense, **the human being** must **recover his natural and acquired capacities in the** formative stage, as it was before the emergence of social networks. A stage where he manages to understand the importance and respect of the context in which he is immersed, the limitations and the effects derived from the correct use or misuse of new technologies, the new horizons of true information, etc., always based on a critical constructive analysis before the computer reason.

The present book is oriented in this sense, presenting not only the positive factors, but also the negative ones in order to avoid them. This is the primary moral duty pursued. However, **telling certain truths** for a better **future, in our** days, **is sometimes equivalent** to **the** total or partial eclipse of the ideas, experiences, results, methodologies, techniques and strategies compiled for more than four decades, in the field of education and the modernization of the sciences.

Finally, the use of humour is to de-dramatize the complexity of the consequences of the issues discussed. In addition, in other cases, some topics or examples are presented from different points of view, throughout the entire text, in order to achieve a greater degree of understanding, given the infinity of variables that make up the scientific universe, education and social consequences, derived from both contexts. Below, you will find each individual chapter as it pertains to the information laid out above.

In Chapter 1, the notion of "context" is analyzed and included as a new category when designing interactive systems, efficiently communicative, with the latest generation of technology. That is to say, the distance and interrelation of the designer with the real world, particularly, from the sociological and computer point of view, with a special emphasis on the development of content for education, in emergency situations. In it, the notion of communicability is updated and the main successes and failures are presented, given the use of new concepts belonging to the field of new technologies, the communicability and design for the quantic-nanotechnological-self-sufficient era. The main errors in the one-to-one relationship between meaning and signifier of these new concepts in the field of human-computer interaction and all its derivations, from the 21st century, are also disclosed. Finally, the social factors of humanistic computing that harm the heuristic and neutral evaluation of the new millennium are listed.

In Chapter 2, we analyze the importance of the evolution of the notion of perspective and communicability between engineers and artists. In addition, some digital and interactive practical cases are investigated in the 3D reconstruction of innovative and old inventions and/or mechanisms, based on stored designs, on paper. There is a review of digitized personal designs, with a high degree of creativity and originality, between Western and Eastern culture. Simultaneously and independently of the STEAM knowledge (Science, Technology, Engineering, Art, and Math) of the potential users of interactive systems, the main advantages of including computer animations for educational purposes are presented. Finally, it is verified how the contents related to human ingenuity and that belong to the universal cultural heritage, serve to promote the latest advances in new technologies among the various generations of users that range from hypertext to the metaverse.

Chapter 3 investigates the importance of "visual reality", formative and informative, in multimedia systems. In addition, the emulated and simulated representation of the real world is examined, through computers and art, until the generation of the so-called "empty reality" for the metaverse. A historical study is also carried out on the bifurcation of a divergent modality between contemporary elitist fine arts and experimental ICT artists. At the same time, the main advantages of graphic design in visual communication and interactive systems are revealed through the works of Escher. Finally, there is a heuristic evaluation with users of Escherian works, in the field of social media and interactive systems, aims at education, entertainment and video games.

Chapter 4 reviews the new horizons of the main components of new network technologies. The analysis begins using the technique of the inverted pyramid that ponders the commercial aspects in the evolution of information technology, with the human being as the central axis. A human being, who is considered in his various roles in front of the computer devices that go from the end user, through the programming of interactive systems to the direction and management of the resources of new technologies. Finally, the use of a new technique called "inverted cornucopia" (analysis of the abundance of neologisms and their metamorphosis) is disclosed to examine in scientific information portals the professionalism of the representatives of the educational context, who are related to ICTs, from a transversal perspective of sciences.

Chapter 5 presents the bidirectional triad of competence, knowledge and capacity (CKC) is analyzed in the final users. In the study of the various generations of users, the various objectives pursued when using interactive systems (online and off-line), whether intelligent or not, are detailed, and which range from consulting generic information through training to entertainment or pastime. In addition, a historical and project analysis is carried out towards the immediate future, of the present triadic interrelation, in order to maintain a successful and qualitative educational process, considering as fundamental variables the end user, emerging technologies, information technology, interactive design, gamification, entertainment and tourism.

In Chapter 6, we present the main current limits and future challenges in science education, specifically, through new information technologies (IT) and new social media. In addition, the social factors that positively and negatively influence science education, from childhood to adulthood, are disclosed. Simultaneously, through a historical analysis, a parallelism is established between the past and the present, with a projection towards the future of technological innovation and engineering, resorting to the Renaissance, as a generator of new synergies, in the face of global crises. It also examines some of the main linguistic aspects in the new media, as instruments of quality in scientific education, considering the alphabet as the basis of Western civilization.

Chapter 7 presents the main areas of science that will impact the social diffusion of quantum computing are analyzed. The analysis begins by outlining some of the fundamental notions of this new technology and its need to be adapted to the common knowledge of citizens, in order to understand its potential, from the perspective of communicability and informatics. The educational aspects that must be reformed and / or improved to increase interest in the study of science, and in particular towards this new paradigm of digital and interactive information, are also disclosed. Finally, the results of a heuristic experiment based on science fiction and with users of new technologies belonging to generation Z are disclosed.

Chapter 8 presents the true and fictitious components are presented, which humanly underlie the metamorphosis between opportunities and challenges related to the context of new technologies. A guide and an effective heuristic evaluation mechanism are also developed, based on communicability, to quickly detect the degree of veracity of information on the Internet related to university education. In this first investigation, the examination is carried out in the "human capital" of educational entities. Besides, in the field of challenges, a first set of challenges is established that derive from the experiences of global and local crisis situations. Finally, the consequences of concentrating the power of action and digital transformation in few and small groups are presented.

Chapter 9 presents a novel quadrangular and bidirectional interrelation in the field of science and the modernization of education: ESIHISE (Evolution of the Sciences, Informatics, Human Integration and Scientific Education). To this evolutionary interrelation we add a diachronic and synchronic vision, always placing the human being as a user of new technologies, at the centre of all these interrelationships. In addition, we describe the origin of these interrelationships in the sciences, their evolution or revolution, over time, until currently known, the tactics used for the loss of human capacities (natural and/or acquired) in the face of the infodemic of intelligent networks, as well as the generation of divergent parallel lines, between scientific theory and the reality of research and teaching environments. Finally, cases of analysis compiled over three decades are presented, through the use of storytelling, to avoid the phenomenon of "fleeting kites", which never provide practical and real educational solutions, in normal and abnormal teaching situations.

In Chapter 10, we present the first set of strategies called "CFC" (comics for crises) to encourage the use of comics in emergency situations (health, extreme weather events, seismic events, wars, among others) that prevent face-to-face classes. The purpose is to maintain the group contact of the students and as a means of information, training, entertainment and creativity. Furthermore, an instrument of catharsis of lived experiences. The research promotes the critical-constructive analysis of the evolution of the comic through time to investigate the evolution of design and content, in the various media of social communication, from the 20th century. Finally, an experimental methodology and results obtained in the tasks that go from the systematic analysis of the main components of the comic to the creation of a comic strip, through the use of analogical and/or computerized supports, are disclosed.

Chapter 11 presents research work consists of a revision of the main components of the evaluation methods, from the educational, technological, and scientific perspective. It highlights the interrelation of mathematics, the media, and the social sciences in the generation of new educational paradigms. The advantage of diachronic and synchronic storytelling is also disclosed, to confront historical and current realities, in secular European institutions, which have an international projection and are aimed at education. Finally, the contributions of the formal, natural, and social sciences are investigated in the generation of evaluation methods, techniques and instruments that range from usability engineering, through user experience to the expansion of communicability.

The book concludes with Chapter 12 presenting work about the evolution and involution of some pedagogical, sociological, technological and neuroscientific aspects related to the role of pre-university teachers, in nursery schools, schools, institutes, high schools and high schools are investigated. The purpose is to establish the existing limits in school performance and analyze some of the causes of school failure at an early age. Simultaneously, some of the main human factors are presented, which increase the existing divergences between the university and pre-university context, resorting to visual synthesis, with the use of keywords. Several true examples are also analyzed that reflect the lack of merits and human talent to carry out the work of a teacher and that constitute educational anti-models. Finally, it is emphasized that the reality examined, described and verified in the work is mainly focused on European borders, with extension to some countries of the American continent.

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Introduction

In the dissemination of interactive systems aimed at education, teachers, pedagogues, programmers, designers, among others, have been incorporating their wealth of knowledge and experiences, through cooperative work, in order to obtain excellent results. Various disciplines of the social sciences and the new information technologies converge in these tasks. The contents of the various scientific disciplines are accessible from interfaces with their corresponding metaphors, cognitive models, interactive information, presentation strategies, and so on.

Today, there are a lot abstract models which are related to the transversality of education, and made from the union and/or intersection of various disciplines. However, from the didactic point of view and in emergency situations (health, citizen security, weather, and so forth) all this lacks a methodology or set of techniques to evaluate them and adjust them to the contextual reality. A contextual reality is related to the training centre and the students' home.

These emergency situations are usually one of the fundamental reasons for failure in online teaching, from home to the school (and vice versa), even though it is based on super advanced technological devices for interactive communication (mobile telephony 5G multimedia, interaction in 3D scenarios, computing devices with artificial intelligence, among others). In unforeseen events, which impede human and face-to-face communication, the main aim should be to satisfy new user requirements in an intelligent and efficient way. That is, without resorting to the rhetoric of finding solutions, in totally virtual or non-face-to-face education, either through virtual classrooms or campuses, intelligent tutors, three-dimensional holograms, etc., already developed, thanks to modern information technology and all its derivations.

However, many university teachers are more concerned with replicating banal or trivial content to social networks than in creating original content, multimedia or not, to mitigate emergencies. It is enough to observe measure and analyze the increase in the content of the messages (images, texts, music, etc.) in the Twitter, Facebook, TikTok accounts, and so on, since the beginning of 2020. In short, the main managers of the educational process do not quickly resolve the failures and errors in interactive communication, through new media, nor the fragmented and superficial knowledge of hypermedia content. Without guidelines for control, evaluation, verification of results, and so forth, these shortcomings and failures could be transferred to the development of future intelligent and next-generation systems. These errors in educational systems and structures only generate dysfunctions. In educational applications, they range from the design of the system interfaces, through the process of preparing and evaluating suitable theoretical and / or practical content, in the teaching-learning interrelation (inside and outside the classroom), until reaching the final user (student and teacher).

Considering each of the members of the educational process, with the current available technologies, there are no universal guidelines and metrics for qualitative evaluation to be followed by each of its actors (that is, programmer designers, teachers, students, organizers of plans of studies, among others), in unplanned or unforeseen situations. This lack requires a **"constructive critical" vision of "computer reason", based on the efficiency and quality of the interactive transmission of educational and scientific knowledge.** The knowledge resorts to the daily use of new technologies, inside and outside the classrooms of schools, secondary schools, universities, professional training centres, and so forth. There is also no correct orientation of valid and lasting content over time, for the better use of potential professionals, locked in the software and hardware of technological devices and used in the continuous process of teaching and learning. Inexorably, the need to overcome the mosaic culture or fragmented and superficial knowledge derived from the use of hypermedia / interactive systems and social networks. Here is the triadic set of components that interrelated with each other, make up the core of this research work.

The disciplines that will be discussed and following an alphabetical order are: Cybernetics, education, heuristics, human-centered design, information and communication technology, social communication, and statistics. The main and secondary topics, which do not exclude others, related to them, are grouped as follows: Heuristic evaluation, elaboration of metrics, methods and techniques; face-to-face education, distance education, new media, users and emotional satifaction, interaction with 3D reality, virtual classroom, virtual campus, open software, educational and creative content, metaverse, communicability, and usability engineering.

In our days, a diffuse way of promoting the education of new technologies is through the quantification of data, many of which are superficial for didactics, such as indexes of references, access counters to web pages, total of views of the videos on YouTube, among others. Some data are presented as magnets to attract students to educational courses. In other words, the education is a commercial product and it is not a public good and freely accessible to all. This is an attractive format in offline and online communication channels but it lacks metrics to build and evaluate knowledge and experiences, with a critical perspective.

Quantitative measures that a priori favour their enrolment and participation, depending on the modest cultural heritage of potential attendees of courses, seminars, masters, etc. and the persuasive effectiveness of advertising campaigns in the various media. It is a commercial marketing strategy, followed by the educational staff. Succinctly, individuals belonging to universities, industries, companies, banking or financial foundations, among others, whose mission consists only of attracting superficial and quantitative attention, using labels such as: Total of millions obtained in projects; online citation rates; roles or positions of president, director, expert, etc., national and international awards, rigged in advance; members of conference committees; editorial board of journals; among others. However, all of them do not address the "real qualitative factor" of the knowledge and experiences to be developed.

All this information is not useful to analyze and measure the quality of the promoted course. As a rule, the most important data are not presented for future students, such as the detailed program, the basis of the theoretical concepts, the practices being developed, the technical information of the software and/or hardware used, the verification of the experimental results in the laboratories, complete citation of information sources or bibliographic references, and so forth. That is, the basic or epistemological principles of the development of scientific knowledge, including education and learning, of everything that is related to the new information technologies, in the new millennium.

In a few words, our intention is to analyze and evaluate the efficiency of the teaching-learning process, to make the most of the potentialities coming from new technologies, examining the theories and

practices of interactive content, under the formula of **"constructive criticism."** All this based on the lessons learned and a set of works, belonging to the educational and computer field. Each of the chapters presented will serve to achieve this objective, since they will not only indicate the way forward in the face of unforeseen situations, but will also serve as a compass for the immediate future, keeping a look at the past, in order not to repeat the same mistakes.

Besides, innovative evaluation strategies, methods, techniques and metrics will be detailed to overcome fragmented, superficial and banal knowledge, promoted by the incorrect use of social networks, and that are directly and indirectly influencing the normal educational, cultural, and educational development as well as social, economic, etc., of the members of local and international communities. To this end, it is intended to achieve a wealth of knowledge and experiences, in universal guide format, to obtain better original results, in the realization of educational content, adjusting to the context of the participants, respecting equality and human dignity, promoting the process through continuous training, motivating the end user of information technology (inside and outside the classroom), and including intelligent systems as a reinforcement in the continuous cycle of learning and teaching.

In this continuous cycle, **it is necessary to be** very **attentive** to some new **problems due to the rise of** social **networks. One of them, and perhaps the most important, is the theft of identities by hypothetical colleagues. However, it is not about digital or virtual identities** as **one might think a priori. It** is **about** the **cloning** of **profiles of real human beings to quickly** climb the pyramid of social, **educational, political,** financial power, and so on. The tactic used consists of resorting to the temporary hiring of highly qualified people, from a theoretical- practical point of view, to solve highly complex educational, technical, scientific, social problems, etc., for the duration of the contract. Once the strategies of the hired expert have been detected and learned, the process of cloning their personality automatically begins, ranging from work aspects to the most trivial such as clothing, cultural preferences, hobbies, and so forth. The main mission of the "friendly and empathic" clone will be the lifetime destruction of the qualified expert, from whom he has learned methodologies, techniques, strategies and humawtechnological experiences, for problem solving. This phenomenon is not exclusive to the educational field, but also industrial, commercial, business, sports, etc. Therefore, many of the examples included in this work tend to prevent this new phenomenon that future ICT professionals and all its derivations must know how to deal with.

The examples that accompany these pages are true and verifiable cases. Some of them have required more than four long decades to be discovered. They are examples that do not tend to generalize situations but rather to describe particular cases in certain regions of our planet. Specifically, the reality described and analyzed extends over two continents: America and Eurasia.

Finally, which does not mean that it is the least important, is to defend the right of **the human author of texts, excluding in the immediate and distant future that artificial intelligence is in charge of writing books, manuals, news, and so on. Simultaneously, protect copyright, although there are realities in large** areas of the **old** and new world, **where books, magazines, newspapers, etc., claim to be totally** free, **using** electronic media **(analog or digital) for illegal distribution.** Although it is true that some civil servants in southern Europe receive subsidies from the State to write books, this is not the common denominator in the rest of the culturally developed world. These are functionaries of a kind of superior caste and are at the service of "pseudo-democratic" states, where freedom of the press, for example, leaves much to be desired, in countless cases. They continue to guide themselves in a camouflaged way by the totalitarian models of the 20th century. In our days, theoretically they dedicate all their time to teaching, as it supposedly happens in the main universities of the Iberian Peninsula.

However, when push comes to shove and in emergency situations, these personnel and the educational systems that contain them are authentic sieves of failures and embarrassments for the "serious" academic and scientific world, when compared to the rest of civilized nations. Apart from those infamous contexts and painful realities, guided by envy, ignorance, greed, lies, deception, betrayal, mockery, pedantry, narcissism and an infinite etcetera, it is repeated once again, that **the main goal of future generations must always be the modernization of science and education.** These are emergency situations where those basic human and technological aspects that serve for survival and daily coexistence are highlighted.

So much so that the compilation of these reflections and experiences began in the middle of a pandemic and ended in the middle of a war in the centre of Europe. Many of the considerations made have shown how culture and nature continue to be two valid elements that overcome by far the dark clouds that sometimes temporarily obscure the horizon. However, it is necessary to never forget that above those dark clouds, there is always a very bright Sun, which does not make any distinction between all the living beings on our planet, and its energy is totally free.

Chapter 1
Communicability and Heuristic Evaluation:
The Context as a New Dimension for Assessment of Interactive Design Categories

ABSTRACT

In this chapter, the notion of "context" is analyzed and included as a new category when designing interactive systems that are efficiently communicative with the latest generation of technology, that is to say, the distance and interrelation of the designer with the real world, particularly from the sociological and computer point of view, with a special emphasis on the development of content for education in emergency situations. In it, the notion of communicability is updated, and the main successes and failures are presented, given the use of new concepts belonging to the field of new technologies, the communicability and design for the quantic-nanotechnological-self-sufficient era. The main errors in the one-to-one relationship between meaning and signifier of these new concepts in the field of human-computer interaction and all its derivations, from the 21st century, are also disclosed. Finally, the social factors of humanistic computing that harm the heuristic and neutral evaluation of the new millennium are listed.

INTRODUCTION

The intention of this work is to present an updated vision of "the modernization of science and education", framed in the context of the changes derived from the first great pandemic of the new millennium. From now on it can be anticipated that it is a diverse and complex vision (Lee & Kim, 2022), since it places all the members of the global village once again at a crossroads not at all similar to those suffered during and after the two world wars of the 20th century. Besides, with a recent past of another global e-commerce / virtual companies, and financial crisis at the beginning of the 21st century, it has shaken and modified various components of the structures of the human community. In this new complexity

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of interconnections between human beings, their daily activities, their wishes and desires for the immediate future, the interactive communication media and other technological devices that allow access, understand and interact with the local context, play a fundamental role and global. Along with the four cardinal virtues of the human being, the key word in these situations of great changes and unknowns, in the information society, is communicability (Cipolla-Ficarra, 2010a; Cipolla-Ficarra, 2014; Cipolla-Ficarra, 2018; Cipolla-Ficarra, 2021).

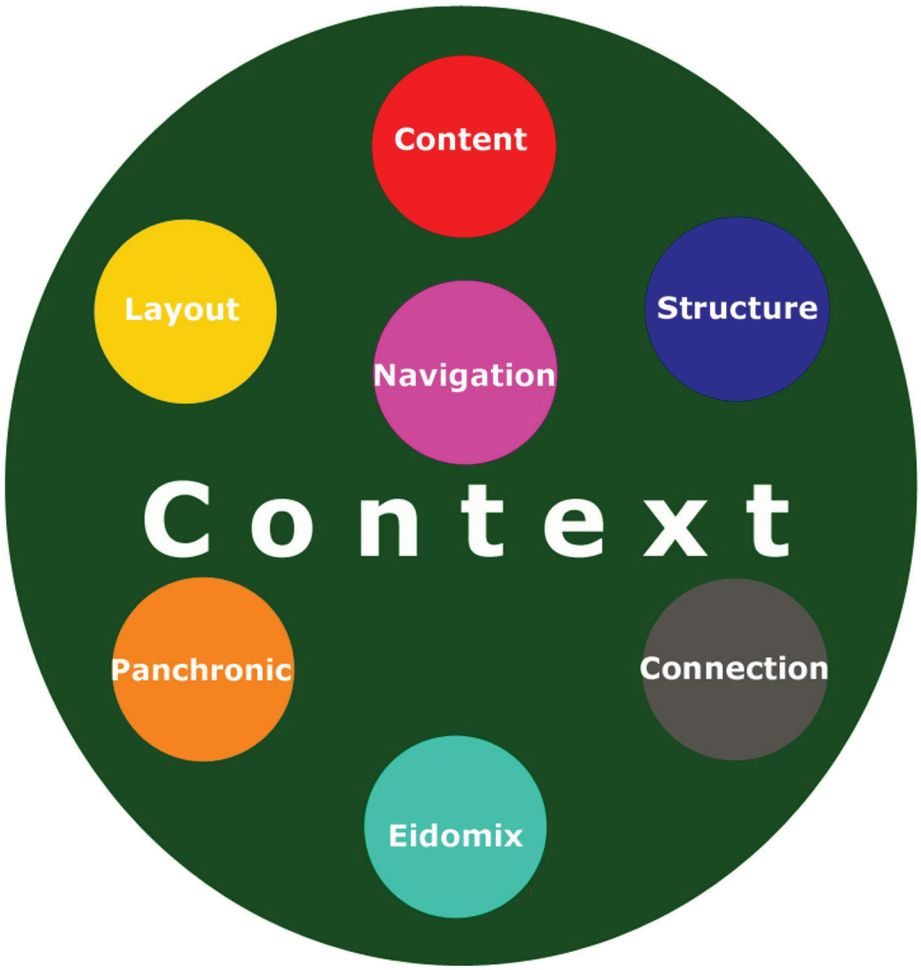
In the evolution of design for online applications, **the cost-quality equation of software has always been present in the generation of methods and techniques that speed up this task** (Jones, 2007; Cipolla-Ficarra, 2021). Some of them (innovative and creative) due to the intersection of formal, natural and factual sciences, with reduced costs for implementation, high qualitative results and in record times. All of this, with high precision and reliability in development, set-up and implementation. The core of this event lies in dividing the design into several categories, encompassing each of the main quality variables in software engineering, interfaces, HCI (human-computer interaction), and communicability. These are categories that have been updated and expanded as new advances in software, hardware and end user requirements (Carroll, 2003; Nekipelov & Wang, 2017; Ruoti, et al., 2020; Fresneda, Hui, & Hill, 2022). For example, at the beginning of the phenomenon of the democratization of the Internet there were four: Presentation, content, structure and navigation. Subsequently, there is a synchronism between dynamic and static media (Cipolla-Ficarra, 2005b).

In the new millennium and with the inclusion of the expansion of quality in interactive communications, that is, communicability, connectivity was added. A connectivity that considers the interfaces for the latest intelligent devices in IoT (Internet of things), the new types of interactive plasma displays ranging from personal computers, tablet PCs, multimedia mobile telephony, to the digital pulse clock or glasses for 3D viewing, among many other examples. Eidomix was the new category of the second decade of the 21st century. In short, the mental idea those designers have before potential new users for the new generation of systems (i.e., quantic-nanotechnological-self-sufficient). Readers interested in each of these categories can consult the following bibliographical references (Cipolla-Ficarra, 1999a; Cipolla-Ficarra, 2000; Cipolla-Ficarra, 2002; Cipolla-Ficarra, 2017). In this decade, it is necessary to incorporate a new category that encompasses the rest and which we call the "context." Graphically, these interrelationships are represented in figure 1.

CONTEXT: DESIGN AND CIVILITATION (R)EVOLUTION

Traditionally, the context is very fundamental in the design of interfaces, interactive systems, advanced interfaces for virtual systems with international users, and so on. Each of the components of an interface, such as metaphors, icons, symbols, colours, typography, photographs, etc. (Apple, 1992); generally have different meanings, depending on the geographic location of the potential users (Fernandes, 1995; Zaphiris & Ang, 2009). In this sense, computer manufacturers tried to establish ergonomic guidelines, etc., it was related to the notion of cultural or intercultural factors at the time of generating universal style for their operating systems such as Apple and Microsoft, to name a couple of examples. They made the necessary adjustments, in order to adapt to local cultures. That is, they generated several versions of it, using languages as the main cultural factor like (Apple, 1992). They explained the different ways of representing the figures on computer screens, the meaning of certain gestures of approval or not, the

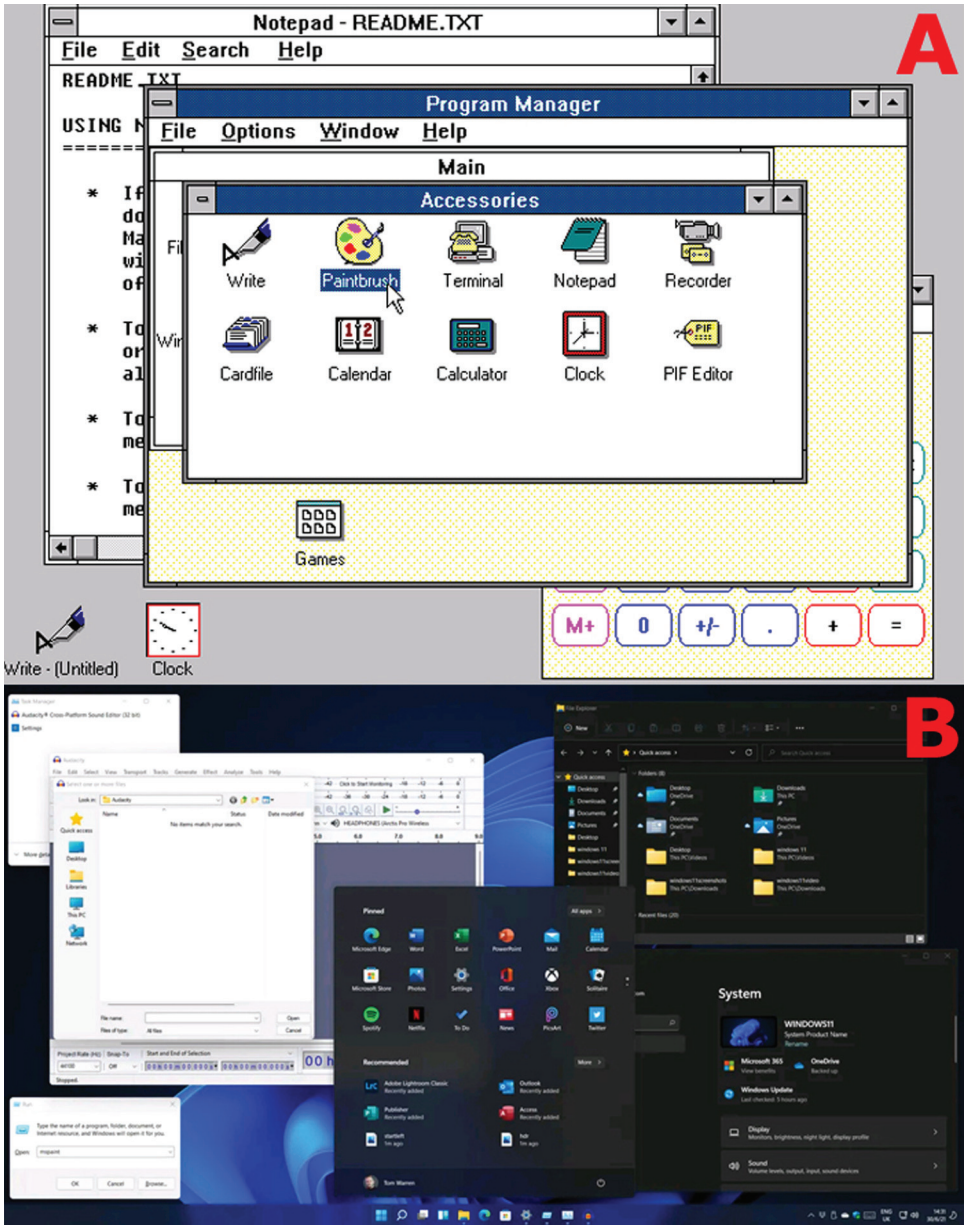
Figure 1. Interrelationships of design categories for interactive, efficiently communicative systems in the so-called quantic-nanotechnological-self-sufficient era.



cultural value of the different colours, etc., in order to avoid rejection or mistakes on the part of the users. Some examples are in figure 2.

All these studies influenced the interactive interfaces. In this direction, manuals and research were directed, such that although they belonged to the fields of cultural systems, social communication, linguistics, etc., they were encompassed in computing under the notion of software quality or human / social factors, at the time to make the first interactive systems for personal computers. Later, they would move on to usability engineering (UE), HCI and UX (user experience). Until reaching our days, where these last two areas chaotically include the human being, not only from the point of view of interactive audiovisual communication but also mental. That is, an infinite loop of errors, where precision is practically non-existent. These errors represent the lack of a clear differentiation between the disciplines, in terms of the domains, fields and specialties that compose them.

Figure 2. A set of classic elements of intercultural factors related to operating system interfaces. In section A, the interface of an operating system (initial release date: May 22, 1990) and in section B, the interface of the same operating system (initial release date: October 5, 2021). Throughout time, designers have taken into account the meaning of colours, icon symbols, etc., between Eastern and Western culture; the different units of measurement, monetary, and so on, the way of writing / reading the dates, the direction of reading the screens (from right to left and vice versa), among many other variables.



In our case, we consider the context constituted by four elements that interact with each other: The social, geographical-temporal, informatics and environmental component. The social component includes the notion of Aristotle who considered the human being as "a social animal." He argued that the human

being is by nature a social animal; an individual who is unsocial naturally and not accidentally is either beneath our notice or more than human. Society is something that precedes the individual (Aristotle, 2020). To a certain extent, how the human being influences the society, to which he belongs and identifies more comfortably, in the local and global village. Simultaneously, how this social context bi-directionally influences the human being in the process of endoculturation and transculturation (Herskovits, 1948). Clearly, the geographical coordinates and the synchronous vision imply a kind of photograph of that moment. Therefore, the diachronic vision entails changes even if we are in the same geographical coordinates. In other words, this temporal factor is important to consider when conducting a historical review of the facts. For example, keeping the industrial activities invariable, in the occupied countries during a warlike invasion, as happened in the central-eastern European countries –Second World War. In brief, the industrialists, engineers, technicians, etc., in those occupied countries continued working the next day, as if nothing had happened. Here is a case of the dissociation of the human being from the context. A phenomenon that is repeated cyclically in the history of humanity, as occurs with certain educational sectors in the face of global financial crises or a pandemic, in the new millennium.

Now, in the computer field we have social networks as a multiplier phenomenon of virtual human interrelations, through interactive multimedia communication, where numbers prevail, through the notions of counters and accumulators. In both cases, if they are not manipulated by special algorithms in the programs, they reflect the sum of a constant value, such as the number one, each time a user accesses a web page (counter). Meanwhile, the accumulators add variable values. However, **due to human factors, social media counters and accumulators are not 100% reliable as in early computer systems of the last century.** Readers interested in the loss of reliability in the programming and security of computer systems can consult the following bibliographical references (Saydjari, 2004; Kurth, 2004; Peisert, 2017; Phan, et al., 2020). Other consequences are in the environmental / ecological / green informatics context, with the abusive use of dynamic and static media in social networks.

The abusive use of high definition audiovisuals on social networks, such as photographs, video, audio, etc., implies a high traffic of information on telecommunications networks. Companies that manage intranet, extranet and internet services need a large number of equipment, such as servers, routers, modems, engine-generator, refrigeration equipment, etc. In the context of green informatics all this implies consumption of electricity and water (Watson, Boudreau & Chen, 2010; Anderson, Lee & Menassa, 2012; Morley, Widdicks & Hazas, 2018). Hence, the geographical dilemma of certain cryptocurrency, e-commerce, web hosting and domain registration companies, etc., to locate the headquarters of their servers (Ofounye, 2008; Eyal, 2017; Farley, 2019; Kugler, 2018; Vranken, 2017). So much so, there are studies that state that social networks are currently affecting the environment more than air traffic. **Precisely, aviation generates 2% of the global carbon dioxide or carbon dioxide (CO_2) in the atmosphere (the greenhouse effect of climate change), while the web 4%, of which 50% is directly related to the social networks.**

A message with 8 static images (photos, illustrations, graphics, etc.) on Facebook Messenger, WhatsApp, etc., is equivalent to 400 grams of CO_2. That is, the gasoline consumption of a car, in 2 kilometres. Another parallel in the environmental context is the example of attaching photos of more than one megabyte on Twitter, which is equivalent to leaving a 40-watt lamp on for half an hour. If this happens with a photograph, the progression increases exponentially on YouTube, since every minute that currently passes, 500 hours of videos are incorporated into that platform. The contextual reality denotes that digital information, through multimedia mobile telephony, has grown more than 50% since the start

of the pandemic and 300% on the Internet of Things (IoT). However, this contextual component is not taken into account in the educational field.

For example, if we analyze the social networks related to the field of training, we find that the responsibility for these deviations in the use of new media has its origin at the top of the educational pyramid: Teachers. That is, students follow and pursue bad examples from teachers and the rest of those responsible for the educational system. The narcissism of images, the power of dynamic persuaders in the new media, the dizzying speed in spreading false information, the destruction of the credibility of professionals resistant to pressure groups, among many other educational components, affect the social and ecological context, as can be seen in Appendix.

DISTANCE EDUCATION IN A MULTI-YEAR EMERGENCY CONTEXT

The coronavirus pandemic has revealed the inefficiency of a myriad of methods, techniques, strategies, etc., presented in the last three decades (Burden & Byrd, 2018; Halverson, 2009; Schloss, 2006; Dooley, Lindner & Dooley, 2005). This set of resources has not served to face distance education, through the use of computer and telematic systems. It is enough to analyze the bibliography of the so-called works presented under the titles of "literature review." These titles refer to what is traditionally known in the European Mediterranean area, as a "compilation", "catalogues", "albums", etc., of works. That is, it is a simple accumulation or classification of papers in conference proceedings, book chapters, magazine articles, and so on. Therefore, scientific work is practically scarce or non-existent in the content of these reviews, presented as unpublished or original research works. However, **it is a way to rapidly increase the rates of misinformation and misintelligence of artificial intelligence, such as Google Scholar and other similar portals, which work with analogous algorithms** (Cipolla-Ficarra, 2022). This is an example of the quantification of online information, given its qualitative reliability.

The reality of the problems derived from distance education can be read in the daily press (local, regional, national and international), on paper or digitally. A means of communication, in which professionals integrated in work groups still persist, governed by laws, norms, uses and customs, codes of ethics, and so forth. Something non-existent or rapidly disappearing, in social networks or other areas of knowledge, related to education and science, for example. It is in the written press where the greatest general discontent with distance education is verified. A discontent that goes from the students to the teachers themselves, passing through the parents or guardians of the students. This is a phenomenon that also affects virtual universities. That is to say, some universities specialized in distance training, from the beginning of their educational activities, through their classrooms, campuses, virtual courses, etc. In essence, academic institutions that have been granting academic degrees with virtual and/or distance education for several decades. The different study centres, regardless of the age of the students, have been affected by the pandemic, drastically declining the qualitative level of the service offered, at the time of being evaluated by the end users. Educational services that theoretically had the latest technological advances for distance learning (Woolf & Hall, 1995; Ling & Ling, 2016; Keating & Nourbakhsh, 2018; Torro, Jalo & Pirkkalainen, 2021).

Indirectly, all this denotes the implausibility of certain scientific information stored and indexed in databases, such as ACM, IEEE, DBLP, SCOPUS, and so on (Cipolla-Ficarra, Quiroga, & Ficarra, 2018), especially, in topics related to e-Learning; Education and Virtual Agents; Educational Methodologies; Sharing Learning; Children-Computer Interaction; Serious Games, etc. At the same time, it shows that

certain collective or group work is not a guarantee of 100% reliable results applied to reality, from the point of view of the multi-method coming from the notions of inter, intra, trans, multi, pluri ... disciplinarity of the formal and factual sciences. Lastly, another problem that is observed is that professionals in the written, radio, television press, etc., and even the professionals of the formal and factual sciences, begin to **use the statistics of Google Scholar as a kind of plus ultra status of professionalism or a 100% reliable source of information when in fact they are not. All these data are easily manipulated, even if they use the latest technological resources in artificial intelligence. The Achilles heel of such data and information is truthfulness and objectivity.** Objectivity is constantly one of the main problems in information, be it online or offline. Besides, the objectivity allows us to bring the real world closer, while subjectivity leads us away from it.

In the field of social communication, one of the main goals is to eliminate the subjective factor when transmitting information. Evidently, there are types of information where it is accepted, such as opinions, comments, criticisms, etc. However, it is easy to detect the differentiations between the various journalistic genres in the traditional media, such as the written press, radio, television, etc., but this task is complicated on the Internet, especially in the field of social networks.

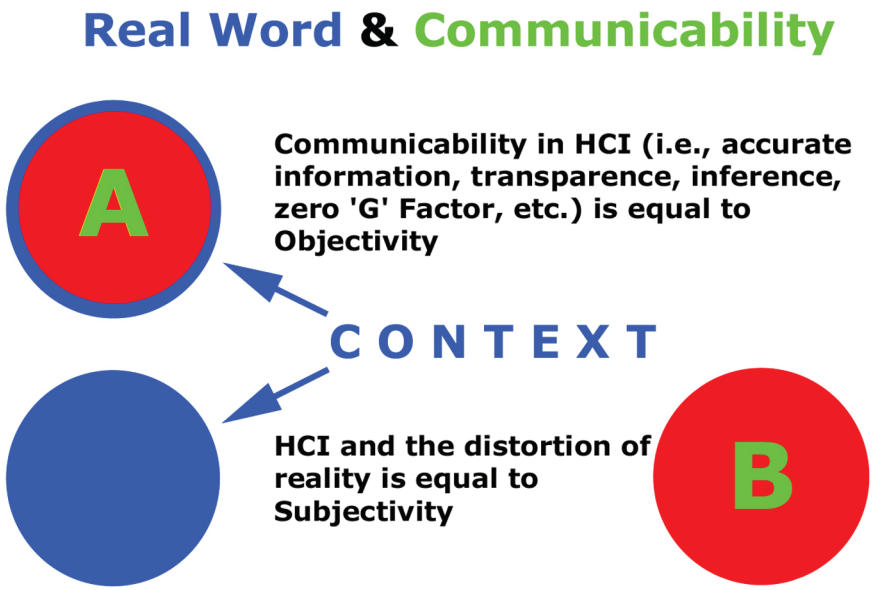
In our days, from interactive design, HCI, UX, UE, DH (digital humanities), UCD (user-centred design), ergonomics, cognitive sciences, and the rest of disciplines that are united or interrelated with each other, through the different domains, fields and specialties. All these disciplines have been including the notions of affective computing, emotion, empathy, creativity, innovation, etc., to enhance the dispersion towards infinity of the notions of HCI, VR (virtual reality), AI (artificial intelligence), for example. This dispersion impairs communicability even if inter / trans / pluri / ... multidisciplinary work teams are used, among many other names, where multimethodology applied to education is used, for example. While communicability approaches objectivity, the inclusion of subjectivity, in a myriad of areas related to HCI generates a distortion of reality. Schematically, a representation of these failures in the interpretation of reality can be summarized in figure 3.

METHODS AND TECHNIQUES OF EVALUATION OF THE FACTUAL SCIENCES: USES AND ABUSES OF HEURISTICS AS AN INSTRUMENT OF PRECISION

In order to reduce subjectivity in research, a myriad of techniques applied for decades in the social sciences can be used, especially in the field of sociology such as surveys, interviews, questionnaires, tests, content analysis, etc. (Matsudaira, 2017; Billinton, 1992). Some of these techniques are currently used on a recurring basis in the marketing of goods and services online, to know the opinion of customers, for example. The intelligent automatons of online sales as it exists in portals such as Amazon, eBay, etc., usually send messages requesting an opinion, scoring, writing reviews, etc., once the purchase service has been used. Theoretically, stars ranging from 1 to 5 (simulating hotel stars, where 5 is the highest category) are objective and subjectively influencing potential users to purchase goods and services.

Some users who trust those opinions or stars, instead of reading the technical characteristics of electronic products, observing the impact of the ecological context that surrounds hotel facilities, examining the transparency and breadth of educational information, in the university offers of doctorates, masters, specialization courses, etc. (detailed programs of the subjects including bibliographic references, evaluation of the individual works of the professors, the level of inbreeding of the university staff, etc.), among many other aspects related to society. A reader interested in this topic can find some guidelines in the

Figure 3. Real world circles and communicability tend to overlap when objectivity exists, the main elements of which are listed in the right margin. On the other hand, it is verified how both circles move away when subjectivity appears. The arrows indicate the context (geographic, temporal, social, economic, etc.) that influences reality and its representation. We call the distance between the real and the virtual.



following references (Cipolla-Ficarra, 2017; Cipolla-Ficarra, Ficarra, & Cipolla Ficarra, 2011). In all these cases it is necessary to remember that all these online scores can be manipulated, and therefore, the degree of reliability is low or null. In the past, that manipulation was carried out by individual agents from the anonymity of the network. Today, they are actions carried out by specialized professionals or amateurs. They are grouped in the submerged part of the pyramid of the web and that is called the "dark web" (Cipolla-Ficarra, Quiroga & Cipolla-Ficarra, 2021). The purpose is to manipulate and distort the transparency / objectivity of the online information.

For example, in the '90s, the ISO (International Organization for Standardization) quality standards for electronic products forced manufacturers, distributors, merchants, etc., to write instructions for their use. Some instructions or recommendations, little by little, and due to the phenomenon of infinite expansion in the formal sciences, became part of the fields of study of usability engineering. UE was developed from the first commercial hypertext, multimedia and hypermedia systems. Designers and developers, who based much of the evaluation of those early interactive systems on heuristics.

Heuristics is a Greek word that is commonly related to two verbs: Invent and discover. Although there is a difference between an invention (creating something new and non-existent) and a discovery (finding or locating something that existed), the colloquial expression "eureka" is still used in both cases, and refers to the past perfect of the verb. Also, the term heuristic can be used as a noun and an adjective. The meaning as a noun refers to the discovery of something (Cipolla-Ficarra, 2021). Instead, as an adjective it refers to the concrete aspects of certain actions followed to achieve a goal, such as tactics, rules, lessons learned, conclusions, etc. In the context of the design of the first interactive systems, such as hypertexts, human factors, next-generation user interfaces, in the '90s, the term heuristics was used interchangeably

as a verb, adjective and noun, especially in the field of usability engineering. This lack of precision, coming from the professionals of the formal sciences, is negatively affecting the future of the design of interactive systems, in the quantic-nanotechnological-self-sufficient era (Cipolla-Ficarra, 2018).

The origin of these inaccuracies is binary. On the one hand, the intention is to implement mathematical paradigms in the social sciences, without a prior analysis of the existing state of the art. On the other hand, it is wild marketing within the scientific / educational field, for the inclusion of almost all humanistic disciplines (digital humanities + ideologies), in usability engineering and human-computer interaction. In the first area, it can be seen how mathematicians and engineers presented as novel in the context of ergonomics, human factors, interfaces, etc., techniques and methodologies for data collection, had already been used for decades in sociology o social communication, for example. In the second, the transfer of graduates from fine arts, anthropology, business, etc., to usability engineering, for example, has only generated distortions in the evolution of the Internet, and all its derivations. These distortions come from inverting the pyramid of the communication model defined by Claude Shannon and Warren Weaver (1949), where communicators were at the top of the pyramid and mathematicians and politicians were at the bottom. In our days, to mathematicians and politicians, we must add religion (Cipolla-Ficarra, 2021b). This is one of the central axes of the failure of distance education, in emergency situations such as a pandemic, verifying that there is no suitable pedagogical content for local education, in the field of primary, secondary and tertiary education (see an example in Annex #1).

It is enough to analyze the impact equal to zero, on the agents participating in the distance educational process, with regard to the creative use of podcasting in higher education, webinar in digital humanities, remote teaching for deaf pupils, augmentative interaction on tablet to help teenagers with severe disabilities, transmediality in didactics and special education, among many other examples. Some examples, fraudulently increase Google scholar counters, readings in ResearchGate, Academia, etc., but do not provide real solutions to the community, in emergency situations.

All this can be verified in the medieval religious castes and groups of anti-democratic political powers, supposedly dedicated to technological innovation and educational creativity, located in countless banking foundations, government organizations, professional associations, small businesses and universities in the western Pyrenees, for example. Today, the spread of this educational failure is oriented towards Latin America, through usability engineering, human-computer interaction, web accessibility, accessible user experience, and so on. The interested reader can deepen this topic in the following link (www.pirateando.net).

Another of the professional contexts where inaccuracies can be verified is in the interrelation of mathematicians in design (graphic, industrial, architectural, educational, etc.) for the search for models or patterns to follow, when it is desired to evaluate the quality of the design. For example, in the case of interfaces and usability, the usability engineering mentor originally argued that it was not feasible to measure the usability of an interactive system through its design. That is, considering the operation of the system at the time of interaction with the end user. This denial denotes the lack of knowledge in the area of the intersection between formal and factual sciences, particularly in the field of heuristic evaluations of the first interactive systems, by mathematicians and/or computer scientists.

Furthermore, it is a dogmatic denial because it came from the main mentor of usability engineering: Jakob Nielsen (Nielsen, 1990). That is, the pioneer and guru of usability engineering. His role was to guide and guide the contents that this new engineering should study. In short, it is facilitating the use of personal computers for millions of potential end users, throughout the planet, through five cardinal

principles of usability: Ease to learn, efficient to use, few errors, easy to remember, and subjectively pleasing (Nielsen, 1993).

Guidelines that were periodically presented through opinion columns, articles, editors, etc., in the traditional media of the 20th century, such as specialized magazines on paper or digital media, with worldwide distribution: ACM SIGCHI Bulletin, ACM Interactions, Communications of ACM, IEEE Software, IEEE Computer, and so forth. Nor is it currently, when a great influence is exerted on the followers in the network. It is enough for the guru to say that Flash animations are not welcome on the home pages of portals, so that millions of designers do not use this software on the web. This implies not only millionaire losses for the commercial firm that develops this software, but also the marginalization and elimination of its teaching in web design courses, until its disappearance, as has happened at the beginning of 2021.

Charlie Jackson and Jonathan Gay, in 1993 had created Flash to generate and display 2D animations (Cheung & Bryant, 2006). The democratization of the Internet and multimedia systems in the 1990s made it possible for millions of users to enjoy previously unthinkable movement, interaction and video games, for example. Therefore, countering a dogma for measurement is not an easy task, particularly when there is a lack of a kind of "standard meter", such as that established centuries ago in France, for the international metric system. This is a task that requires time and the use of certain instruments and techniques of heuristics, starting from direct observation, which was practiced as an inspection method in ancient Greece.

The first usability inspection works were born in the context of two IT multinationals, such as IBM and SunSoft. In the first we find Robert L. Mack, and in the second Jakob Nielsen (Nielsen & Mack, 1994). Both authors related to work experiences in the computer industry, whether in human factors engineering, user interface technologies, user interface design, etc. In other words, there is a commercial context at the origin of usability engineering. From these work areas, the notions of "usability inspection", "heuristic evaluation methods", "qualitative user interface methods", etc., are established, and resort to the comparison of various methods and techniques (cognitive walkthrough, pluralistic walkthrough, user testing, consistency inspections, standards inspections, etc.) aimed at user interfaces. The purpose is to experiment with prototyping techniques or to consider the cost/benefit equation in the user interface. That is to say, basically some studies targeting what we call in interactive design the layout component, excluding navigation, access and architecture / structure of information in databases, connectivity, content, and so forth.

The content of those first works highlighted the importance of obtaining benefits in the software industry, through usability engineering (Nielsen, 1990; Nielsen, 1993). Implicitly, use was made of pre-existing techniques and methodologies used in some of the disciplines that made up social communication in the 1980s and 1990s on the American continent, such as sociology, statistics, psychology, communication theory, cultural systems, linguistics, semiotics, logic programming, and so on. **A Hispanic-American social communication that is not synonymous with mass communication as it used to be in the US.** Some of these techniques and methods were used at IBM and SunSoft for the formation of the first data collection teams in usability laboratories, the training of users in the use of computers, the writing of lists of questions for interviews, the structuring of questionnaires, etc., the filming of the interaction of users with computer devices, the processing of the results obtained through the preparation of tables, graphs and final reports, etc.

Nielsen and Mack initially established a definition of the basic concepts, the objectives of the inspection, the methods used (many belonging to the social sciences), the validity of the results, the cost-

benefit analysis, and so forth (Nielsen & Mack, 1994). In a broad sense of the reality described, they responded to the rhetorical questions typical of data collection to transform it into information, of the media: What? Who? When? Where? How?, etc. However, the initial conceptual definitions in the set of usability inspection methods were redundant, ambiguous, inaccurate or lax, in the significant and signified relationship. This initial lack of precision for the measurement is transferred to the present day. Not only are the limits of study infinite within usability engineering, HCI, UX, interface design, etc., due to the inclusion of experts in "copy and paste."

There are pseudo experts who omit the original context of the notions and do not make the effort to adapt them to their uses and abuses. It is enough to analyze the content of missing references or plagiarism for decades, in rehashed studies related to AUX (Accessibility User eXperience), when talking about content, structure, navigation and presentation, for example. That is, the MEHEM (Methodology for Heuristic Evaluation in Multimedia), MECEM (Metrics for the Communications Evaluation in Multimedia), HEDCDEH (Heuristic Evaluation Disk for Communication and Design in Hypermedia), HECHE (Heuristic Evaluation of Colours in HomepagE), and so on, in the generation of quality attributes and metrics for usability engineering, evaluation of multimedia systems, communicability, etc. (Cipolla-Ficarra, 1999b; Cipolla-Ficarra, 2005a; Cipolla-Ficarra, 2008), but those references are omitted, for a quarter of a century. Other references of this "AUX" deny the origins of applying semiotics in the design of interactive systems, resorting to the barbarity of semiotic engineering (Cipolla-Ficarra, 2010a). The purpose of all that barbarism of plagiarism denotes the provocation and indirectly connotes the destruction of science and authentic scientists, in emerging technologies, during the last three decades.

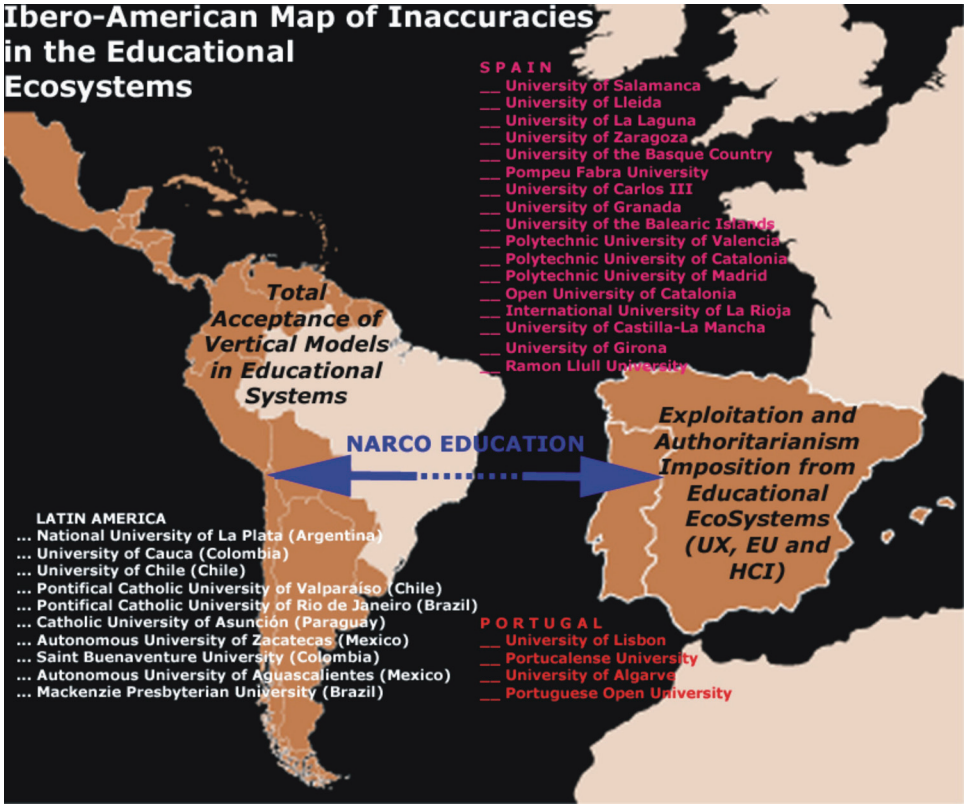
Now, if we consider the cost-benefit equation, as established by Jakob Nielsen and Robert L. Mack in their work "Usability Inspection Methods" (Nielsen & Mack, 1994), the economic damage caused by usability engineering in some places is immeasurable. For example, in the Iberian Peninsula, in the temporary bridge of the old and new millennium, it involved the closure of multiple companies and industries due to the momentum of the e-Commerce bubble. In the first decade of the new millennium, the expansion towards banking services and traditional media to promote their social networks brought about the bankruptcy of numerous small interactive design entrepreneurs, in the face of the global financial crisis. In the second decade of the millennium, the ineffectiveness of all educational strategies based on emotions, gender ideology, etc., which is "*vox populi*" in the new media.

In brief, at present, the costs will always outweigh the benefits. The origin of all this dysfunction is easily observed in the bibliographical references. It is trivial and incompetent to resort to Spanish royal decrees, European legislation, ISO standards, questionnaire techniques used by sociologists, journalists, etc., the barbaric notion of "semiotic engineering", the perennial plagiarism (through the omission of the pioneers, for decades), among others. Besides, this mixture of legislation with technical issues in usability engineering, HCI, UX, etc., commonly implies the presence of illegal actions. In short, these practices point to shortcomings in ethics, knowledge and professional skills. Therefore, there is a kind of medieval barbarism of usability engineering, which prevails unassailably in the western Pyrenees (in figure 4, a representative map of this barbarism). This geographical / temporal contextual example highlights the importance of content analysis in qualitative measurement.

The list of original (o) + additional (a) usability inspection / evaluation methods and techniques can be summarized as follows (alphabetical order):

- Beta-testing (a),
- Cognitive walkthroughs (o),

Figure 4. Ibero-American map of the epicentre of inaccuracies in the educational field of usability engineering, user experience and human-computer interaction. The continuous lines determine the imposition and acceptance of vertical models in the rest of the Spanish and Latin American regions. The dotted lines indicate bidirectional interrelationships for the increase in inaccuracies and educational authoritarianism.



- Consistency inspections (o),
- Focus groups (a),
- Formal usability inspections (o),
- Guided interaction (a),
- Guideline reviews (o),
- Heuristic evaluation (o),
- Interview (a),
- Logging actual use (a),
- Observation (a),
- Performance measures (a),
- Pluralistic walkthroughs (o),
- Questionnaires (a),
- Standards inspections (o),
- System benchmarking (a),
- Talk-aloud protocols (a),

- The Wizard of Oz technique (a),
- Think-aloud (a),
- User surveys (a), and
- Videotaped sessions (a).

The reader interested in these techniques and/or methods definition can consult the chapter "Reviewing the Components of Evaluation Methods." In contrast, today, there is a long list of distortions (i.e., objectives of study / research, content, methods, and techniques) under the notions of human-computer interaction and/or user experience from usability engineering (UE). There is a graphical representation in figure 5.

THE IMPORTANCE OF CONTENT ANALYSIS

To establish criteria, attributes, metrics, evaluation procedures, verification of the results obtained, the profile of professionals to execute the tasks, cost-benefit equations, etc., in the qualitative field of interactive communication (where today prevails usability engineering), the production of educational software, the generation of content for students and teachers, etc., you can start with the analysis of design models for interactive systems, review of the state of the bibliographic art, content analysis related to the topics of study, the online examination of the academic information of the authors and the study centres, to which they belong, among other strategies. In few words, it is an analysis of the content. This is a technique of the social sciences and that since the 20th century allows an objective, systematic and quantitative description of the manifest content of communication, as Bernard Berelson maintains (Berelson & Steiner, 1964). Here, the participation of specialists in communicability is necessary, whose profile has been described since 1999 (Cipolla-Ficarra, 1999a). These specialists allow us to overcome the dysfunctions of usability experts, either at the time of establishing precise limits in the fields of study, or in the definition of concepts, to cite a couple of examples.

Content analysis allows inferences to be made from the message. An analysis that aims to examine the message through the topics covered, the ideology, the manifest or latent meanings, and so on. The object of analysis can be divided into two main groups: Those without a grammatical basis, as is the case with static or dynamic images, such as photographs, movies, computer animations, etc. And those that have a grammatical base, resorting to texts from magazines, newspapers, books, and so on. This last group is the one that is frequently associated with this analysis technique, but it is necessary to exclude what is related to the expression styles of the words. Therefore, based on this binary division and following the guidelines established by Berelson (Berelson & Steiner, 1964; Duverger, 1961). He established three primary subsets of content analysis: First, based on the characteristics of the content. Second: the producers of said content. Third: the recipient of the content with its corresponding effects.

In the first subset, among others, are included the readability of the resources used in communication, the reduction of cultural differences in international communication, the description of trends in the content of communication, displaying propaganda techniques (here refers to the political and non-commercial aspect such as advertising), inspection of stylistic forms. Some of the components of the second subset related to content producers are: The examination of the intention or purpose of the communication, the detection of the presence of propaganda or ideological manipulation, the determination of the psychological state of people in isolation or group, and so forth. Finally, the third subset contains

Figure 5. An umbrella with the first set of current notions and terms that distort / trivialize the original fields of study and research of HCI. Besides, there is a direct and/or indirect undervaluation of the UX and UE, for example.

actions such as showing the attitudes and interests of the population (local, national and international), reflecting behaviours in the face of certain communications, detecting the elements that attract attention and therefore motivation, etc. The analysis of the components of these three subsets, their bidirectional interrelationships with each other and the context continues to be valid with social networks and allow reliable, fast and low-cost results to be obtained through experts in communicability.

Some examples of content analysis without a grammatical basis and that are related to images, can be works of art, themselves. That is, without its inclusion in propaganda (political posters, for example) or advertising (promotion of new products or services, for example). If we start from the primary colours: yellow, blue and red and represent them with a triangle, circle and square respectively, we can analyze three-dimensionally. Some examples of content analysis without a grammatical basis and that are related to images, can be works of art, themselves. That is, without their inclusion in propaganda (political posters, for example) or advertising (promotion of new products or services, for example).

If we start from the primary colours: Yellow, blue and red and represent them with a triangle, circle and square respectively, we can three-dimensionally analyze some of the Impressionist paintings, from the observer's point of view (figure 6). For example, in the painting Self-Portrait with Gray Felt Hat (1887/88) by Vincent van Gogh (figure 7), we can see that the beard has the shape of an inverted yellow triangle, while behind the hat there is a blue sphere (Schaefer, 2009). The lines of the circular figure are centrifugal, while the lines of the triangle are centripetal. This combination of the forces of the strokes (centrifugal and centripetal), the shapes (circular and triangular) and the colours (blue and yellow + red) makes the human figure get closer to the observer and creates a space or distance with the background blue. That is, the presence of the 'Z' coordinate.

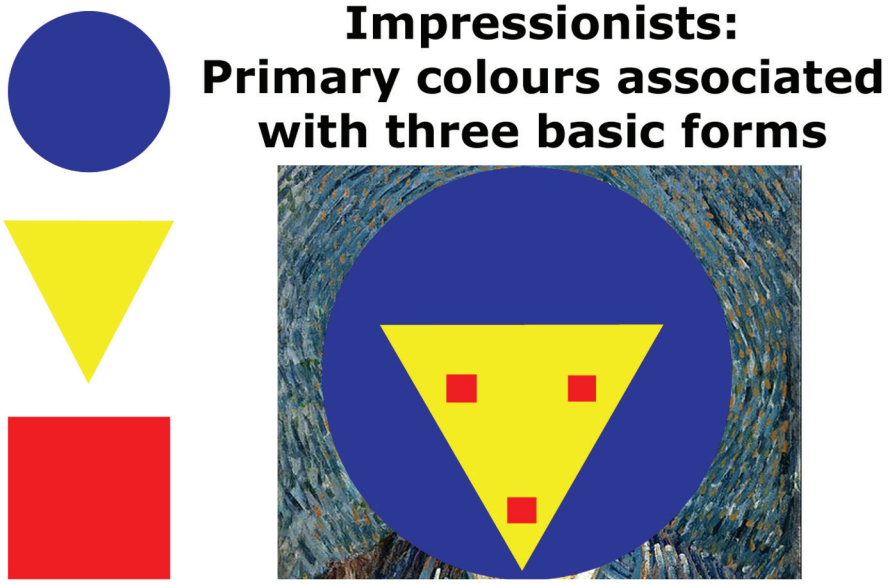
Continuing with the yellow and red colours, in the work of the artist Mark Rothko (White, Yellow Red on Yellow, 1953), the red rectangle that is under the large yellow rectangle is like a kind of base that supports it from behind of the yellow (figure 8). If we rotate it 180 degrees, the red rectangle will be in the foreground, while the yellow one will be in the background (Herman, Cooper & Rothko, 2012). To turn a painting in countless cases is to change its meaning, given the multitude of interpretations. Something similar happened with the origin of "abstract art", in Vasilij Kandinskij (figure 9), when we look at his work "Improvisation" (1913) rotated 180 degrees (Whitford & Kandinsky, 1999). On the other hand, from the point of view of 2D (X and Y coordinates), in graphic arts and Western culture, there is a tendency to place dark colours at the top of a vertical rectangular image, while light colours at the bottom where the title is inserted to make it stand out and draw the viewer's attention (generally the colour gradation technique can be used), such as the cover of a magazine (figure 10).

Examining colours diachronically from the point of view of meaning and geographical context, we have red and yellow or gold, in flags, banners, noble coats of arms, etc., widely spread in southern Europe. A widely spread interpretation in vexillology and European heraldry is that the colour red is related to blood and the colour yellow represents fidelity to the Vatican (figure 11). In a few words, that the analysis of content in the case of an image, from the tracing of shapes to the use of colours, implicitly entails an infinite semiosis (Barthes, 1977). This infinite semiosis has been transferred in the engineering of usability, from the moment that fine arts graduates were included in the production teams of multimedia systems. The ambiguity of the design already appeared in the first navigation icons, for the interfaces of off-line multimedia systems at the end of the 20th century, to the detriment of the usability and communicability.

The main tasks within content analysis related to communicability and emerging technologies aimed at education can be grouped into the following groups:

1) Establish the skills, knowledge and abilities of the people who will carry out the analysis.
2) Consider each of the contexts related to the content to be analyzed.

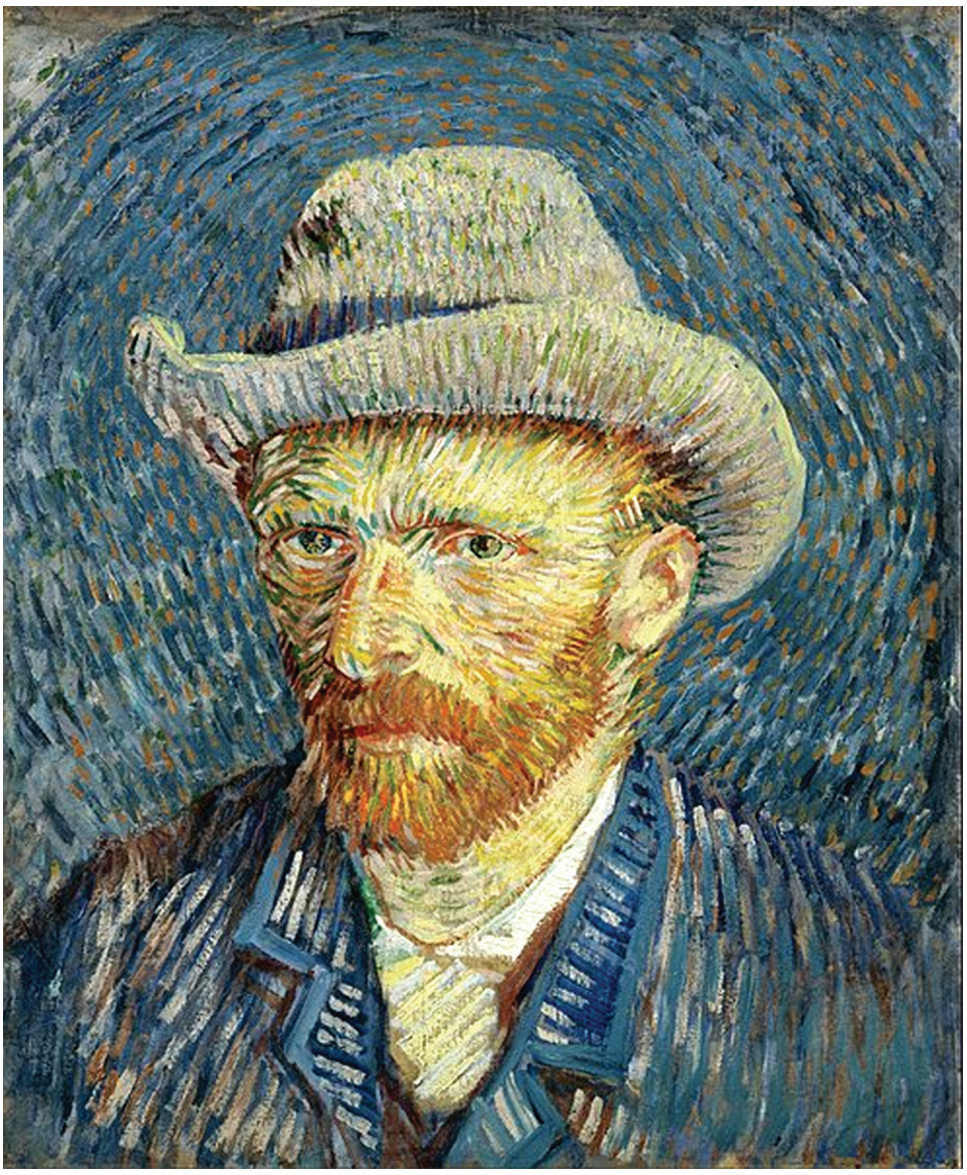
Figure 6. Primary colours associated with three basic forms, which are repeated figuratively in the painting of the Impressionists.



3) Resort to suitable techniques and methodologies, belonging to the intersection of formal and factual sciences, to achieve precision and verification of the results, depending on the support of the information used.
4) Determine the units of analysis (total or partial content), their categories, qualitative attributes, metrics, data collection and transformation of data into quantitative information.
5) Implement error control and resolution mechanisms.
6) Present the results in detail (use of tables, graphs, etc.) highlighting those aspects that have had the most impact on the evaluation.
7) Set future lines of action.

A priori, these sets may be trivial, however they are not when a communicability professional can detect plagiarism just by analyzing the title of a work, whether it is scientific or not; identity theft in academia; the persecution and illegitimate theft of ideas and/or publications; the lack of experience or professional training in education (virtual or face-to-face), and an extensive etcetera. For example, when the terms "communication" + "quality" + "usability" are used, the use of the word "communicability" is actually being avoided. In the case that these three words are used, in a book title, method, evaluation, etc., without citing the existing original sources, or carrying out a diachronic inspection of the combination of those words, we can establish or not, the presence of a criminal action such as plagiarism. A plagiarism that is verified through the elements that makes up the first set of analysis. In brief, it generally comes from people who do not have the skills, knowledge and abilities to guide these issues, such as a nuclear engineer, resident in Lugano (Switzerland) / Milan (Italy), or a graduate in fine arts, resident in Mallorca (Spain), independently, that both present themselves in social networks, as experts in multimedia, virtual reality, social communication, usability engineering, user experience, etc.

Figure 7. The work Self-Portrait with Gray Felt Hat by the impressionist Vincent van Gogh, generates an approach or distance with regard to the observer, from a three-dimensional perspective.



COMMUNICABILITY

Over time, it has been verified that in the field of interactive systems and through social networks, two forces have been exerted: One centripetal and the other centrifugal. Within the centrifugal force is the overcoming of the notion of usability, through the emergence of the use of the smartphone, in the new millennium (in our days, children are already users of multimedia contents, before they learn to read and/or tell); The consolidation of the global village, through national and international interactive communi-

Figure 8. The importance of the arrangement of colours in a rectangular space and the change in meaning with rotation, as in the work "White, Yellow Red on Yellow" by abstract expressionist Mark Rothko.

cation, with free or low-cost multimedia services; The increase in realism in 3D images; The expansion of communicability, through artificial intelligence and quantum computers, and so forth.

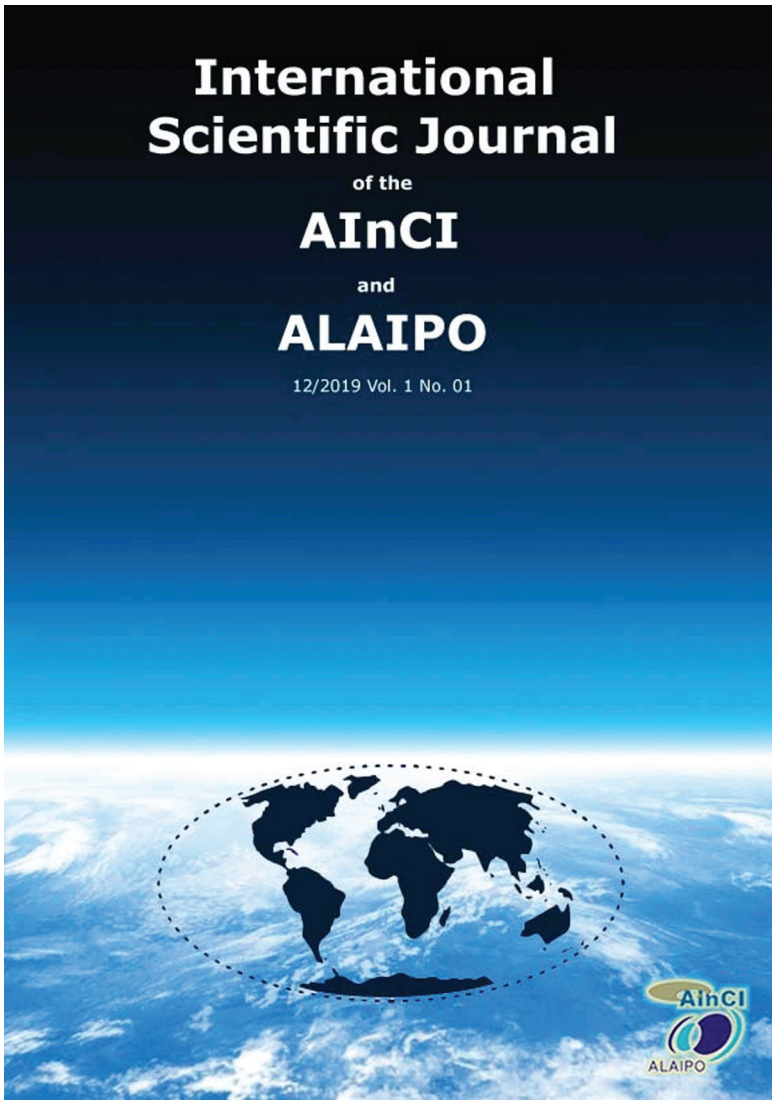
In the centripetal force is the loss of the epistemology of the sciences; The mercantilism of knowledge; The trivialization and manipulation of everything related to human subjectivity, through conceptually distorted notions or pertaining to passing fashions, such as ecosystems, gamification, emotions, empathy, inference, induction, creativity, innovation, another look, gender ideology, inclusive language, childhood, elderly, disabled, handicapped, blind, obesity, among others; The disproportionate rise to control the contents in the new communication media; The insertion of the bidirectional interrelation between politics and religion for the establishment of future lines in education; the disappearance of ethical and professional values for R&D, in the field of education and health, whether public, private and/or hybrid; Irresponsibility in the face of the alienation of humanity; Legal immunity from damages caused by associations or organizations to commit crimes, and so on.

Figure 9. The origin of abstract art by rotating 180 degrees the work of Vasilij Kandinskij, entitled "Improvisation." A multitude of interpretations implies the presence of infinite semiosis.

These two forces have prevented experts in evaluation and auditing of interactive systems, for example, from being defined in university curricula for three decades. The reasons for this lack are widely described in the following references (Cipolla-Ficarra, Nilson & Alma, 2018; Cipolla-Ficarra, Quiroga & Alma, 2013; Cipolla-Ficarra, et al., 2017; Cipolla-Ficarra, Nicol & Cipolla-Ficarra, 2010; Cipolla-Ficarra, 2021; Cipolla-Ficarra, 1999a; Cipolla-Ficarra, 1999b).

Communicability is located in an intersection area of various areas of knowledge of formal, natural and factual sciences, such as design and categories, usability, design and emotion, software system quality, UCD, HCI, participatory design, critical design, cognitive models, human factors and ergonomics. An intersection where emerging technologies fit the profiles of potential local and international users. This intersection is not synonymous with an infinite union of new disciplines with their corresponding domains, fields and specialties, as occurs in UX, human-computer interaction, children-computer interaction, robot-computer interaction, and so on (Cipolla-Ficarra, 2022). In addition, it overcomes the current interpretation error, which is made of the "subjectively pleasant" notion, in the use of new technologies. This concept comes from one of the five basic principles of usability engi-

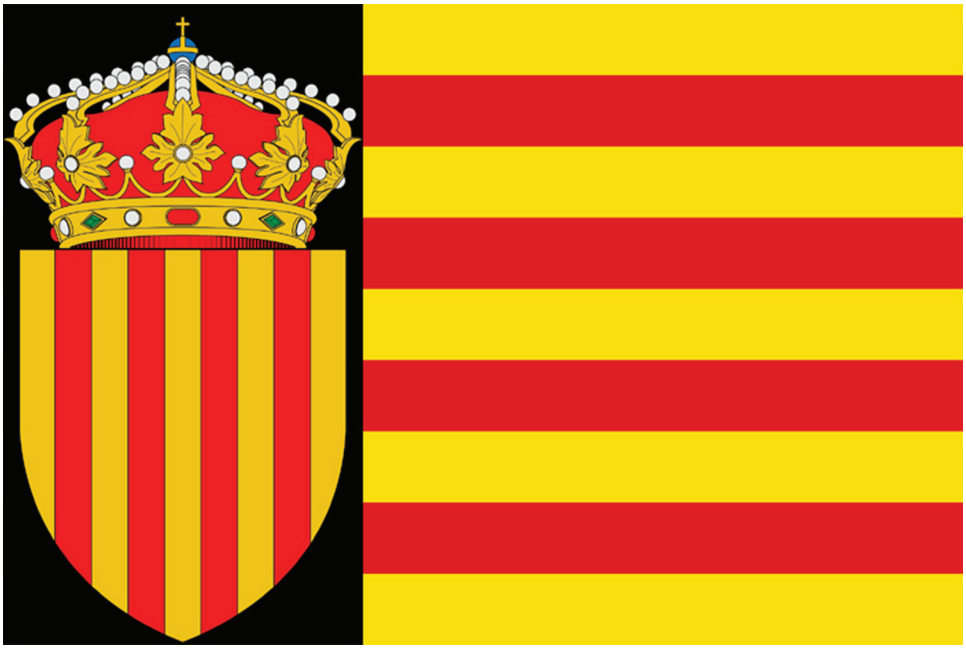
Figure 10. Cover of digital magazine (www.ainci.com & www.alaipo.com)



neering (Nielsen, 1993). This interpretation error entails the erroneous use of endless new terms, such as empathy, emotion, playability, serious games, etc. And without considering separately the fields of study and professionals related to communication, entertainment and education, to name a few examples.

Just as an electronic technical engineer is not an expert in building architecture, pedagogy, graphic design, etc. (although the Google scholar index misleadingly indicates the opposite), on the contrary, an expert in communicability, since the 20th century, has well defined his / her priority functions. Therefore, he / she is a specialist who does not need to expand his radius of action to other areas of knowledge, not related to his knowledge and/or experiences. Nowadays, communicability, based on emerging technologies and the potential requirements of future users, includes the new horizons of quantum computing and artificial intelligence, for example. Simultaneously, it excludes all those human and social factors. Nowadays, these factors are grouped under the concept of "digital humanities." (Gold, 2012). This is a

Figure 11. From the chromatic point of view (vexillology / heraldry), some flags and coats of arms of the European Mediterranean, related to the historical and religious context of the Vatican. For instance, the Catalonia flag and coat of arm, in Spain.



new notion that contradicts scientific principles and norms, such as savage educational mercantilism, in public / private / hybrid / religious / politicized universities. The reader interested in communicability and its evolution over time can consult the following references (Cipolla-Ficarra, 2010a; Cipolla-Ficarra, 2010b; Cipolla-Ficarra, 2014).

Communicability is the basis of the process of user interaction and state-of-the-art computer devices (intelligent or not), surpassing the usability engineering stage of the 1990s. However, from the field of engineering, physics, mathematics, etc., there is certain exclusion towards it and a return to usability engineering, through notions that make up an attribute of quality within the design of interactive systems, such as accessibility. That is, referring to it as accessibility for all, web accessibility, accessibility to user experience, among other expressions with a strong impact on educational marketing. Historically, at the beginning of the 20th century, instead of considering and promoting communicability, the notion of user experience was used. In simple words, the user's viewing angle was changed in the context of interactive communication. In this process, their mentors and promoters of the UX excluded the measurement of the quality of communication. It is a repetition of what already happened with the appearance of the notion of usability engineering, applied to the first interactive systems of the 1980s: Hypertexts.

In short, qualitative communication involves software, hardware, designers, programmers, evaluators, end users, endogenous and exogenous factors, contexts that influence the rapid transformation of data into information. This information can be a new data for a new communication process. That is, the continuous loop called feedback. This feedback tends to leave the classic mechanical processes of interaction, of computer devices through hands, voice, sight, etc., to interact directly with brain impulses. Medical

examples are treatments to combat alcoholism or smoking, through transcranial magnetic stimulation –TMS, (Oluwaponmile, et al., 2020).

LESSONS LEARNED

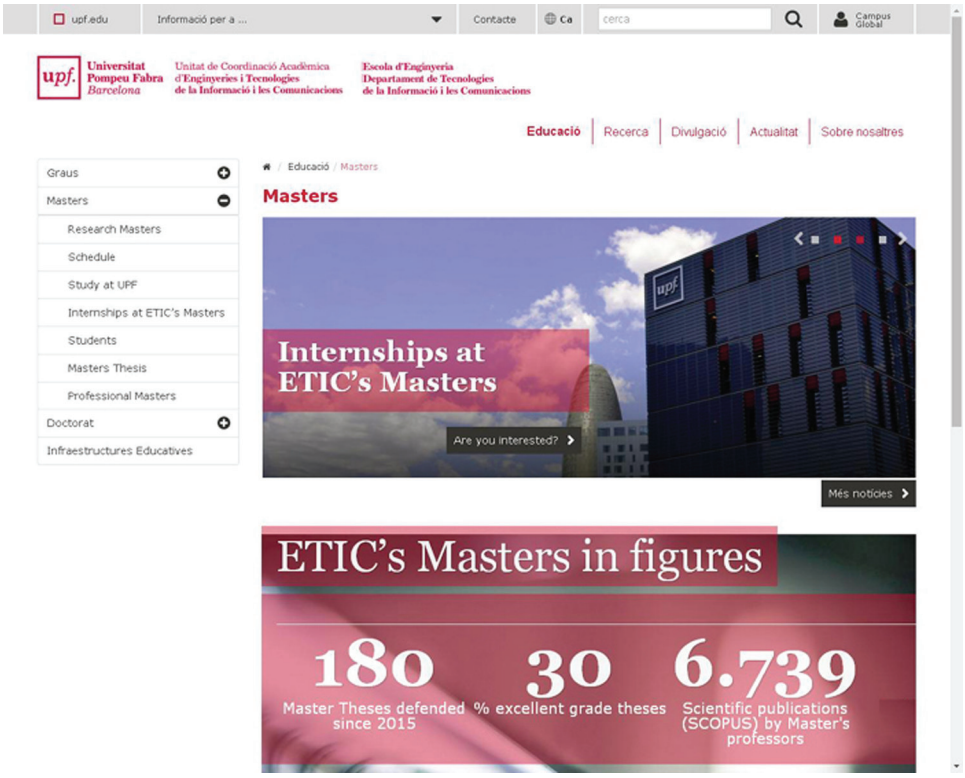
The global crisis derived from the pandemic has shown that the methods, techniques, strategies, etc., in the field of distance education, have not satisfied the end users, connected to virtual classes, through PC's, tablets, smartphones, and so on. In other words, the financial resources invested in the design and methodological optimization of interactive distance systems to improve university teaching has not worked. In the old continent, this problem focuses on education being considered as the means to obtain a post for life. And some officials used, use and will use the university structures for their personal gain, and at zero cost. For example, the activation of small businesses, the promotion of a propaganda and advertising showcase for future political positions such as deputies, senators, mayors, governors, and so forth. The latter is easily demonstrable through the power of narcissists and dynamic persuaders (Cipolla-Ficarra, 2010b). That is, the training of future generations, with human and professional quality, is non-existent in the cognitive models of these officials. Consequently, with the two global crises of the new millennium, the decline of the fragile European educational system has been radicalized and enhanced. New technologies by themselves cannot change this context, since a change in the structural and labour paradigm is necessary in the activities carried out within the academic units.

The constant changes introduced in study plans and the temporary reduction in obtaining degrees have reduced the academic and professional level of future graduates, engineers, masters, doctors, etc., before the rise of gender ideology. Statistical information is used for commercial and propaganda purposes, excluding current and future problems, starting with the professional training of teachers.

In addition, theoretically, the financial crisis of the first decade of the 2000s would force online transparency of information on the granting of university degrees, access to life places, the use of available financial resources, sources of financing, etc., in the EU institutions. However, this transparency is still a pending issue in many European universities. In those where there are specialized sections in this regard and that have free online access, they do not stop containing partial, manipulated and non-updated information, as can be seen in the figure 9-10, belonging to a young university in the Mediterranean, whose statistical data supposedly would place it at the "peak of educational quality" in the Iberian Peninsula.

Finally, academic evaluation must be considered as an activity of constructive criticism, understanding first of all each of the contexts in which it is developed. It is a bidirectional formative evaluation in which the evaluator and the evaluated must converge in academic and social development. An evaluation reduced to the use of tests, questionnaires, video cameras, etc., implies a metamorphosis of social factors towards the pedagogical field. Simultaneously, this abnormal change leads to the dichotomy of generating successful or unsuccessful professionals. However, inspecting in detail the group of successful professionals in record or meteoric times, we find the presence of the "G factor" (Cipolla-Ficarra, 2021). That is, the function of obtaining qualifications predominates without worrying about learning, knowing and doing ethically. For decades, ethics has been non-existent in the environments of the educational elite (regardless of all certifications of ISO (International Organization for Standardization) quality standards or academic excellence), including educational quality control agencies, external to educational institutions. In summary, a quality control carried out from outside the evaluated entity is not an absolute guarantee that there is impartiality, transparency and objectivity in the results obtained.

Figure 12. A detailed analysis of the content on this portal of scientific production and masters would reveal the presence of a long list of illegal actions ranging from plagiarism, the gift of university degrees, the accumulation of prizes rigged in advance, etc., passing by narcissism, xenophobia, paedophilia, inbreeding, human trafficking, the promotion of political and gender violence, among others, up to workplace mobbing and lifetime stalking.



It is resorted to so that lifelong officials of education discharge the responsibilities of their actions to third parties. This is one of the existing mechanisms to enjoy eternal immunity from illegal actions.

CONCLUSION

Establishing software quality metrics for state-of-the-art, interactive systems is not an easy task, due to human and social factors. Neither is trying to use the available resources from the pre-existing methodologies and techniques in the social sciences towards the natural sciences. Opening pioneering lines of research from linguistics and semiotics, in order to improve the quality of the design of interactive systems, has not been accepted from the perspective of the social sciences. More specifically, it is a resistance, run by its mathematicians, physicists, industrial engineers, telecommunications engineers, nuclear engineers, fine arts graduates, anthropologists and psychologists, directly and indirectly related to computing, software engineering, architecture and information technology, Iberian computers, for example. Only, creating a Brazilian nonsense such as "semiotics engineering" and placing the MIT editorial seal, apparently, it is accepted and promoted in the Iberian HCI.

An acceptance that is born from the context of mathematics and computer science, excluding historical experts in this area of human / social / communication / education knowledge such as Charles Sanders Peirce, Ezequiel Ander Egg, Ferdinand de Saussure, Julia Kristeva, Mario Bunge, Marshall McLuhan, Maurice Duverger, Roland Barthes, Umberto Eco, and so forth. That is expert scientists contrary to the provocations of originating / deformed authors in religious educational institutions. The purpose of these individuals is to generate dissonances and divergences in the epistemology of the sciences and infinitely expand HCI, UX, usability engineering, etc. and destroy the public education system (secular and free). For this reason, in times of crisis, such as a pandemic, it is found that all the research carried out previously does not solve local problems, since the self-styled "researchers or scientists" and specialists in digital humanities, HCI, UX, etc., have been busy safeguarding the interests outside the community to which they belong. One place where such a statement can be verified is the exaggerated increase in Google scholar, DBLP, ACM, IEEE, Scopus, and so forth databases and indexes (i.e., h-index, i10-index, and g-index), while distance education did not work, without considering the millions of victims of the pandemic.

The methods and techniques proposed by the new and supposed specialists in technological education, whose academic qualifications are not related to the pedagogical foundations and the rest of the social sciences. Therefore, they usually resort to standardized evaluations, through software, in order to measure complex processes such as the acquisition of skills, knowledge and abilities by students. That is to say, there is a constant and continuous error that has its origin in the conceptual model of evaluation that tends to be minimalist, following the norms of interactive design and educational mercantilism. That is, there is a use of simplified techniques and strategies, where the context, for example, does not exist. One such technique can be seen in the exaggerated use of video on social media. However, nobody considers the impact in the ecological context, of moving or static images, with high definition, to cite an example.

Therefore, heuristic evaluation should not only pursue the objective of measuring, but also understand the reality of the context in order to improve systems. All this requires qualitative research carried out by experts in communicability. Consequently, it is important to consider aspects such as: Local context, social networking and the ecological impact, didactic contents made by main responsible of the training courses, and so on. In short, it is the modernization of science and education but without negative human and/or social factors. Some aspects that will be expanded in the next research works, resorting to various tactics that range from presenting the results of the laboratories to storytelling, of true and verifiable cases.

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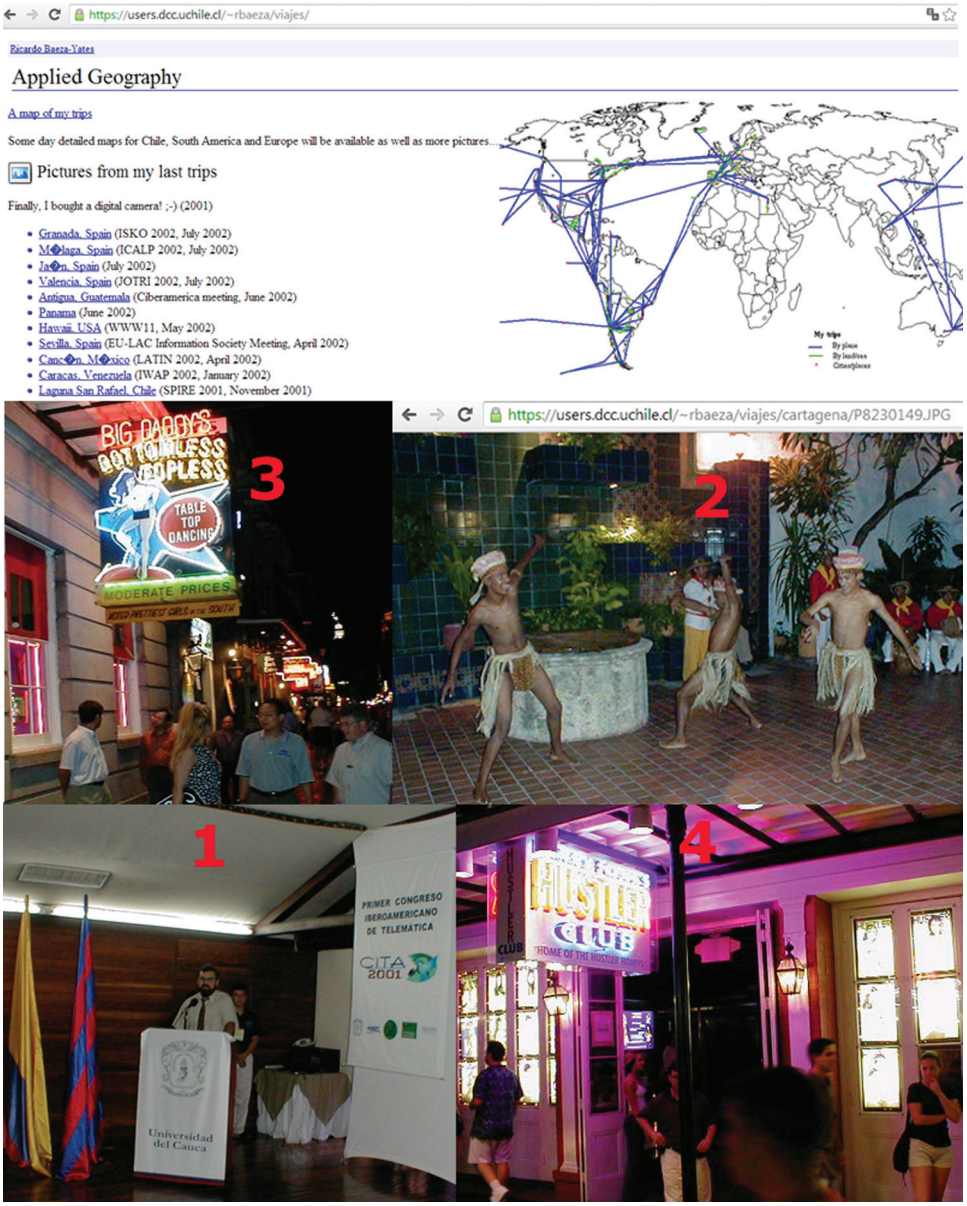
ANNEX #1: ANTI-EDUCATIONAL EXAMPLES

Figure 13. Using information technology and computer science as a means to promote narcissism and free international tourism.



In the upper left part of the image in figure 13, you can see a map with the route of the trips made by "**air, land and sea**." **Using these three terms, the photographer indicates strong military ties, that is, non-democratic governments, in the South American region**. In the upper left area, the list of the cities visited, the dates and the names of the events. Theoretically, he has participated in one, two or

Figure 14. List of images taken during international events related to computing, for the narcissistic self-aggrandizement of the photographer, before the rise of related applications in social networks.

more international conferences per month. Therefore, the rhetorical questions that arise naturally are: When do you dedicate yourself to teaching and/or research? Who writes your articles and presentations? In figure 13, we can observe that the photo #1 shows the extremely poor scientific level in some Latin American universities, as is the case of the University of Cauca (Cauca, Colombia). Furthermore, from that country, a stereotyped promotion of clichés is made with reference to the local culture, when comparing the new world and the old world. It is a denigrating vision towards the first nations of the American continent, promoted in this case by the University of Chile (Santiago, Chile) and the Pompeu Fabra University (Barcelona, Spain). Besides, there is a convergence and divergence of forces towards narco-education within Latin America. In photo #2, we can see local dances that hypothetically represent the pre-Colombian indigenous people. Finally, photos #3 and #4 show the tourist level of the supposed Chilean expert in security, artificial intelligence, algorithms and data structures, information, retrieval, web search and data mining, data science and visualization, and an extensive etcetera, in Chile, Spain, and USA. Those last two photographs that refer to the typical places, on Bourbon Street in New Orleans, USA. Figure 14 shows the photo listing system used. The interested reader can consult other photos (freely and for free), to get an idea of the low educational level that is reached, in countries with large

cultural and social gaps in the population, from the portal of the University of Chile, in the following link: https://users.dcc.uchile.cl/~rbaeza/viajes.

Chapter 2
Three-Dimensional Images, Computer Animation, and Communicability:
Pro and Cons of Interactive Design Into the "Codex Atlanticus" Interactive System

ABSTRACT

The author analyze the importance of the evolution of the notion of perspective and communicability between engineers and artists. In addition, some digital and interactive practical cases are investigated in the 3D reconstruction of innovative and old inventions and/or mechanisms, based on stored designs, on paper. There is a review of digitized personal designs, with a high degree of creativity and originality, between Western and Eastern culture. Simultaneously and independently of the STEAM knowledge (science, technology, engineering, art, and math) of the potential users of interactive systems, the main advantages of including computer animations for educational purposes are presented. Finally, it is verified how the contents related to human ingenuity and that belong to the universal cultural heritage serve to promote the latest advances in new technologies among the various generations of users that range from hypertext to the metaverse.

INTRODUCTION

A study of 3D images requires examining the evolution of hardware, rather than software (Aho & Ullman, 2022; Lu, et a1., 2017; Cipolla-Ficarra, 2021). One way to do this is through video games, for example, the ping-pong simulation. In the middle of the 20th century, users used the television screen connected to two joysticks as a monitor. The TV screen was divided by a vertical line down the middle. Two other smaller vertical lines were moved with the joysticks to catch the ball and make it bounce to the other half of the screen. Each time the ball was not saved by the other player, a point was added and at 15

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the game was won. That is to say, a very simple video game but it was the genesis of domestic graphic computing. It is possible to generate and modify images on computers to later be printed in colour, on traditional plotters, or, creating objects, on modern three-dimensional printers. This whole process has its origin in the study of lines, shapes, colours, design, etc. (Laurel, 1990; Carroll, 1991; Sutcliffe, 2013; Cipolla-Ficarra, F. et al., 2010).

Evidently, in CAD / CAM (Computer-Aided Design / Computer-Aided Manufacturing) the precision of the design is fundamental since the production of goods and services will depend on it (Frazelle, 2021). Precision that can be excluded in the current notion of computer art, since many graduates in fine arts who experiment with ICTs (Information and Communication Technology), at an amateur level consider that "everything is art." However, in its origins, the computer art of these amateurs represented a rather distant, passive and non-interactive computer graphics, since the function intended for the viewer of these contents was merely contemplative. This function continues to exist today, as were the first anarchic virtual art galleries (1990-2000), where the user was only immersed in a hedonic world, rejecting the eudaimonic paradigm. The purpose of these experimental computer art artists in Barcelona, Spain (i.e., www.upf.edu) was to test the commercial hardware and software of virtual reality, as a simple anarchic pastime, without any theoretical and epistemological basis (Cipolla-Ficarra, Ficarra & Kratky, 2011).

Meanwhile, in the field of CAD / CAM, computer graphics was growing in the industry to design mechanical, electronic, architectural objects, etc., with the possibility of introducing last- minute changes (Groover & Zimmers, 1997). The costs for these modifications were very low compared to paper support. Synchronically, in the tiny digital and interactive artistic context,

the aim was to transfer what existed in museums, libraries, archives of audiovisual media, etc., to the 2D and/or 3D sphere. In other words, **the era of digitization** was **beginning to conserve existing cultural assets and hypothetically to reduce paper consumption. However, the consumption of paper has been growing in geometric proportions since the democratization of the Internet.** In other words, in the origins of computer graphics and the use of interactive systems, we can see the engineers behind the notions of accuracy, transparency, veracity, reusability, interactive or bidirectional communication (user — computer and vice versa), and so on. It is in contrast to the *"laissez faire"* of experimental artists for the promotion of unidirectional and vertical communication. This duality between both professionals has been a constant in the evolution of the digital culture of the 20th century, from the first interactive systems (hypertext, multimedia and off line / online hypermedia), through virtual reality, augmented reality, mixed reality, and reaching the current metaverse of Microsoft and Facebook (Dionisio, et al., 2013; Terdiman, 2008; Cipolla-Ficarra, et al., 2015). Fortunately, there are exceptions. For example, **throughout international geography and the history of mankind, there are transcendental artist-engineers who serve as models for future generations, such as Ali Ibn Khalaf al-MurñdI and Leonardo** Da **Vinci** (Al-Jazari & Hill, 1974; Veltman & Keele, 1986).

Now, just as in the 10th-11th and 15th-16th centuries, when al-Murädï and Da Vinci, respectively, gradually designed their innovative devices, computer graphics also required years of research. So much so that in 1950, a graphics monitor connected to the Whirlwind I computer was used for the first time at MIT (Massachusetts Institute of Technology). This was a US Navy project to deal with the so-called cold war. To this we add that the first two-axis electric joystick, was apparently invented in Germany (1944). The purpose of the joystick was to manually control a guided bomb when it was dropped from an aircraft. Therefore, the genesis of computer graphics and the bidirectional interrelation (user — computer, and vice versa) is related to the war component.

On the other hand, something similar occurs in the sciences and the arts. From the Iron Age (X), also called the end of the Dark Ages (the capital was the Andalusian city of Córdoba in Spain), to the Middle Ages (XVI) and the beginning of the Modern Age (the city of Florence was the epicentre of the Renaissance) wars were repeated in continuous cycles. Therefore, in both historical periods, the war component has always been present in technological evolution, although there was a renewal and interest in culture. In short, war is a kind of common denominator throughout the centuries of inventions and genius creations of the human being (Cipolla-Ficarra & Cipolla-Ficarra, 2018).

The other common denominator in the evolution of computer graphics is the university educational context. Particularly, the one that takes place in geographical regions where there is a pioneering and/or consolidated hardware industry over the decades, such as the west coast of the US, Japan, South Korea, China, etc. In these areas, doctoral thesis arise that mark paths to follow for future generations, both in the industrial and business fields. One of them is the doctoral thesis at MIT by Ivan Sutherland (1962), with the title: "Sketchpad: A Man Machine Graphical Communication System." From that time on, computer graphics began to develop a growing synergy between MIT and certain industries and multinational companies, such as General Motors, Lockheed Aircraft, Bell Telephone Laboratories, and so forth (Newman & Sproull, 1979).

The 1960s highlight the first research works that were pioneers in generating programming languages and commercial applications. This transfer of knowledge between the academic and industrial fields in the US and Canada allowed the first commercial software companies to be founded, either for static and/or dynamic graphics. Ten years later, the results of these investigations allowed the generation of a new software, where the textual and numerical information could be accompanied by 2D and/or 3D graphics. This new typology of commercial applications began to spread internationally, in the offices of companies and industries (1980- 1990), from the operating system of personal computers to office automation and CAD (Autocad, 3D Studio, Paintbrush, Lotus 1-2-3, Lotus Symphony, Excel, WordStar, WordPerfect, and so forth).

Some commercial applications of that time, such as 3D Studio, already included special algorithms to increase the realism of the final images called synthetic or virtual. Since its first version, the drawing of spline shapes (flat curves), lofted surfaces (surfaces generated from 3D curves), geometric primitives, mesh editor (combined with the frame editor at object level), to name a few, was allowed, to mention some examples. In other words, starting from a 2D drawing, the designer could add the 'z' coordinate, something non-existent and complicated to solve in the case of the Book of Secrets. Then, with the new versions, among so many other options and improvements, the following can be briefly listed: Expansion of the material libraries; IPAS interface (Image processing, Procedural modelling, Animation, Surfaces) for 3D pluggins; Supports OpenGL, VRML (Virtual Reality Modeling Language), ActiveX script execution, Pelt mapping, Motion mixer, C for graphics (CG) shaders, etc.; Customizable GUI (Graphical User Interface); Global illumination module (Light Tracer); Render to texture; Graphite modeling all; Quadify mesh modifier; Orbaz particle flow all; ProSound with support for 100 simultaneous stereo audio tracks; Character animation tools; Quicksilver hardware renderer (based on DirectX technology); ShaderFX editor; Stereo camera, Blended box map, and Motion paths. All this set of improvements is based on the evolution of algorithms for multimedia systems, in order to adjust to the continuous advancement of hardware (Spinellis, 2012; Boehm, 2017; Veltman, 1997).

The synthesis has enhanced its range of options and use, through desktop publishing software, such as Photoshop and digital cameras today. Thus, the notion of synthesis comes from the graphic arts and is when a figure simplifies its original form, preserving the use of planes and lines but in less quantity.

This implies using various methods, such as line drawing, contour, silhouette, anchored, shading, negative, fragmented, rectilinear or geometric, among others. The result of applying these methods produces a different visual effect on the recipient of the message, although the general outline of the message remains. This variation of effects from the morphology in the design has been used for centuries, in communication between human beings, whether for educational, commercial, propaganda, etc. (Zaphiris & Ang, 2009; Shneiderman, Plaisant, & Cohen, 2009; Cipolla-Ficarra & Cipolla-Ficarra, 2010; Cipolla-Ficarra, Cipolla-Ficarra & Alma, 2011). Some of these methods have served to safeguard the inventions of engineers and artists, which we present in this work and today make up the cultural heritage of humanity. In addition, they can be used as a pedagogical strategy to motivate future generations towards STEAM learning (Areepattamannil & Khine, 2019; Cohen & Morrison, 2017; Stewart, Tippins & Mueller, 2021).

THE EVOLUTION OF REALISM IN 2D AND 3D: TECHNOLOGY AND ART

With the rise of off-line and online interactive applications since the end of the 20th century, there has been a trend in the ICT sector to revalue the historical legacy of images, in their various media: stone, wood, metal, papyrus, paper, cloth, and so on, transporting it to the binary or digital system. One of the objectives is to generate ecosystems in the metaverse, for example. However, in those first analog and historical images, the representations of objects related to daily life or other technological devices were flat or two-dimensional. That is, there were only the x and y coordinates. Therefore, many of these in-

Figure 1. Clock face. Each elapsed hour is soundly announced with the fall of a sphere, which comes out of the mouth of the statue. At the top of the statue is an astronomical disk to simultaneously indicate the degrees of the heavenly bodies.

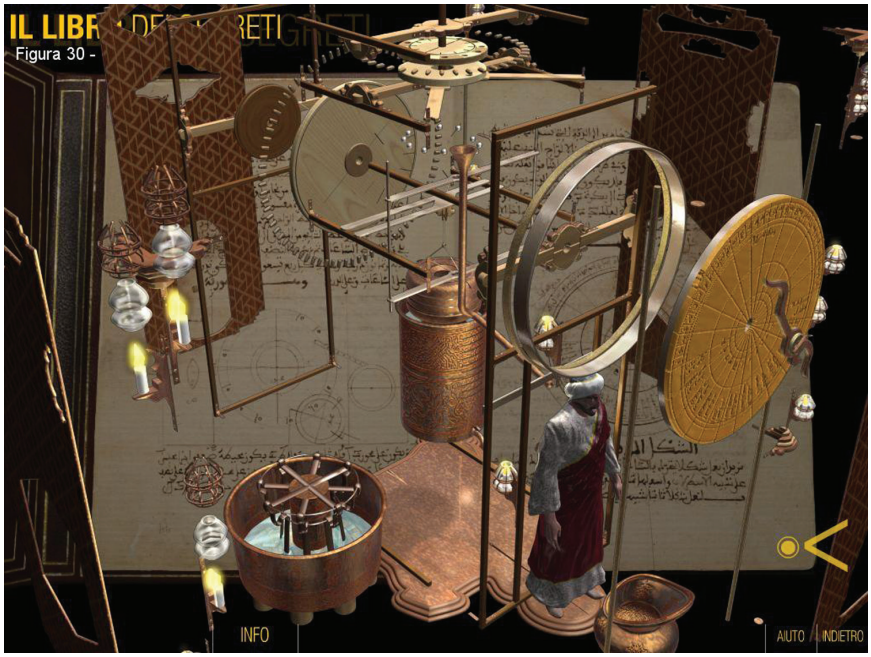


Figure 2. Clock with calendar. There is a statue with a bird on its arm, from which some balls (between 1 and 2 centimeters) fall into a container, where the elapsed hours can be counted. In addition, there is a calendar that indicates the day and month.

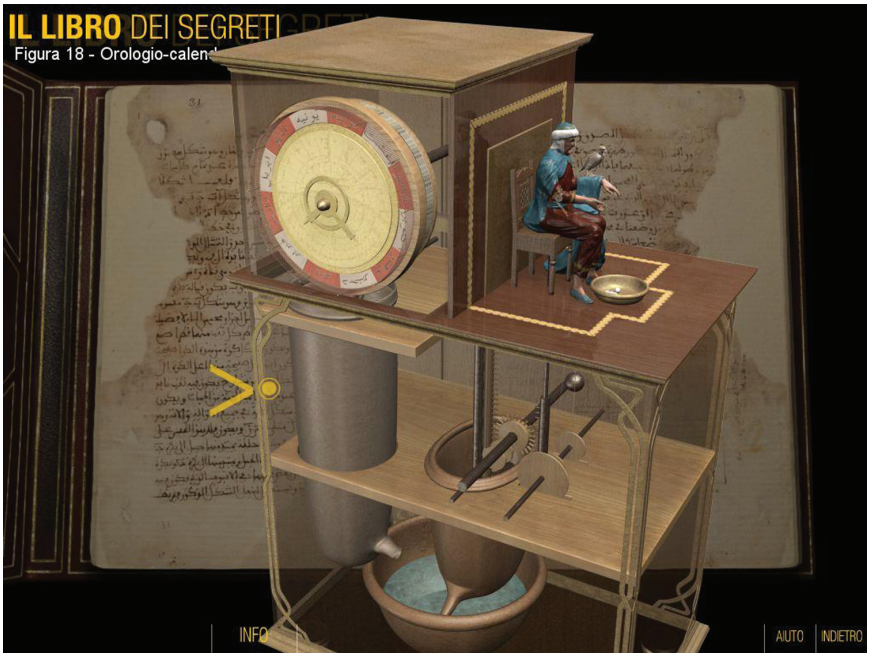


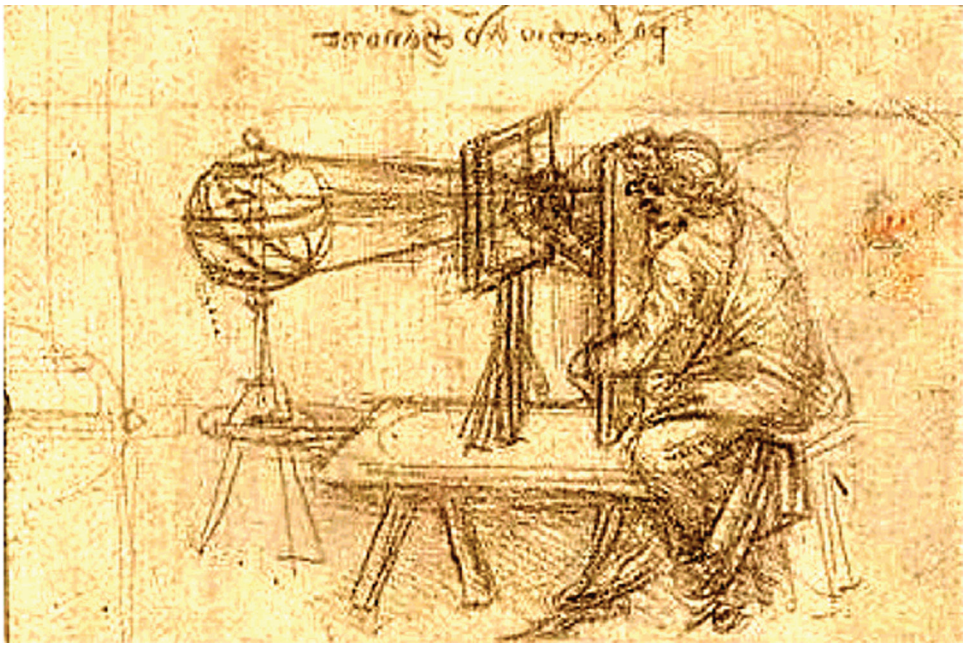
Figure 3. Extendable crane. Warriors can be raised on a wall to attack from the outside and at the same height as defending warriors on internal walls.

novative objects, described in the books of the time, do not have any additional reference on the type of materials, the organization of the components, the system for operation, etc., by the author or authors.

Such is the case of AH Ibn Khalaf al-MurãdT, an Arab engineer and scientist from the 10th-11th century, based in Córdoba (Spain). In Andalusia, he drew a set of exceptional automatisms, in his work "Book of Secrets" (Al-Muradi, 2008). **The precision in the design of these inventions was remarkable.** Centuries later, his work was translated into English as: "The Book of Knowledge of Ingenious Mechanical Devices" (Al-Jazari & Hill, 1974). In the 48 original pages of the book, bidirectional / flat drawings can be seen, such as water clocks, machines to extract water, musical automats, pumps which turned the rotating of a mil into the to-and-from movement of a piston capable of pumping water at great pressure, etc. Some examples are in figures 1, 2 and 3. In the following reference (Cipolla-Ficarra & Cipolla- Ficarra, 2018) there is an extended description of this work and the three-dimensional reconstruction of some of the ingenious objects, with their corresponding mechanism.

In the Renaissance, Leonardo Da Vinci, along with other artists, greatly overcome this limitation of 2D with the notion of perspective (Veltman & Keele, 1986). In this sense, he was an innovator of the Renaissance by working with his "perspective windows" (figure 4), also called "Leonardo's Perspectograph." This device was adopted and adapted by various artists over time (Veltman & Keele, 1986). Leonardo learned the rules of perspective and practiced using a window as a device for drawing perspective correctly while he was an apprentice in Verrocchio's studio (Kemp, 2004). Andrea Del Verrocchio (1435-1488) was a Florentine sculptor, painter, and goldsmith. He in turn was an apprentice to another Renaissance artist who was also born in Florence: Donatello (1386-1466). Verrocchio, worked at the court of Lorenzo de' Medici (Florence), and influenced the works of Michelangelo. Others of his students or apprentices were Botticelli, Ghirlandaio, Perugino, etc.

Figure 4. Design of Leonardo's perspectograph.



In his notebooks, Leonardo wrote and sketched his ideas, and described his experiments and observations (Kemp, 2004). He maintained that: **"Perspective is nothing else than seeing a place or objects behind a plate of glass, quite transparent, on the surface of which the objects behind the glass are to be drawn"** (Veltman & Keele, 1986). Some of these notions would be fundamental for computer graphics, 3D computer animations, mixed reality, to name three examples. With regard to the Perspectograph there is a very interesting didactic activity at the Museum of Science, (Boston, USA), which is experimented in many places on our planet to verify Leonardo's claims, as can be seen in the following link: www.mos.org/1eonardo/activities/open-window

CREATIVITY AND NATURE

The creativity shown through the arts and sciences have allowed the elaboration of bidirectional interrelationships (Edmonds & Candy, 2002; Shneiderman, 2007; Cipolla-Ficarra, et al., 2012; Cipolla-Ficarra, et al., 2014; Cipolla-Ficarra, 2018a). Such interrelationships have been enhanced to a greater or lesser degree, depending on the temporal and geographical contexts, in which the activities of artists and scientists were developed. On in these activities, a greater or lesser rapprochement with the context and reality can be verified.

In artistic works, such as paintings, engravings, woodcuts, etc., the notion of perspective includes other physical aspects of nature, for the representation of reality such as the diffusion of distant objects due to factors of nature. For example, the humidity of the air present in the atmosphere, the change in colours, the combination between natural light and artificial light, and so forth. These effects have been reflected in the works of impressionism in the nineteenth century. In many of the works, the objects represented tend to reinforce the notion of architectural perspective, the fusion of the background of the image, the diffusion of the colours of light, the passage of time, and so on.

One example is the work of the Danish-French impressionist and neo-impressionist painter Camille Pissarro (1830-1903), in the city of Paris, during the day and at night (figures 5 and 6). In his series of creations "Boulevard Montmartre" (1897), "Rue Saint Honore" (1898), "Avenue de l'Opera" (1898) and "Place du Theatre Francais" (1898), there is a large number of natural phenomena, on the same set of buildings: Sunrise, sunset, night, winter, spring, summer, rain, drizzle, snow, and so forth (Schaefer, 2009; Thomson, 2005). Figure 5 shows the technique used to represent snow and figure 6, the combination of artificial light generated by traditional gas street lighting and the new electronic system. In figure 7, there is the natural effect of sunlight, in the play Rue Saint Honore Morning Sun Effect, Place du Theater Francais (1898). Figure 8 is a painting from the series of oil paintings made by Claude Monet in London. He takes as his central axis the Palace of Westminster (seat of the British Parliament) and its mist.

All these effects of nature denote a certain obfuscation of the Impressionist painters. All these effects have involved years of research in the field of computer graphics, since the mid-20th century, generating special algorithms for their simulation in three-dimensional scenarios. Algorithms that have evolved with the advancement of hardware and that had to take into account endless variables of the objects in the scenes: Textures, colours, reflections, transparencies, opacities, directional lights, global illumination, and so on. Objects, shapes, colours, etc., that included in certain contexts, tend to digitally and faithfully represent 100% of reality, as is the case of computer graphics who work in medicine (DeFanti, et al., 1989; Cipolla-Ficarra, 2018b).

Figure 5. "Boulevard Montmartre on a Winter Morning" is the title of the painting and it is exhibited at the Metropolitan Museum of Art, in New York (USA).

Figure 6. Night version of the oil painting "Boulevard Montmartre" and is in The National Gallery (London, UK).

Figure 7. It is the daytime version of the painting: "Rue Saint Honore Morning Sun Effect, Place du Theater Francais." The painting can be visited at the Ordrupgaard Museum in Copenhagen (Denmark).

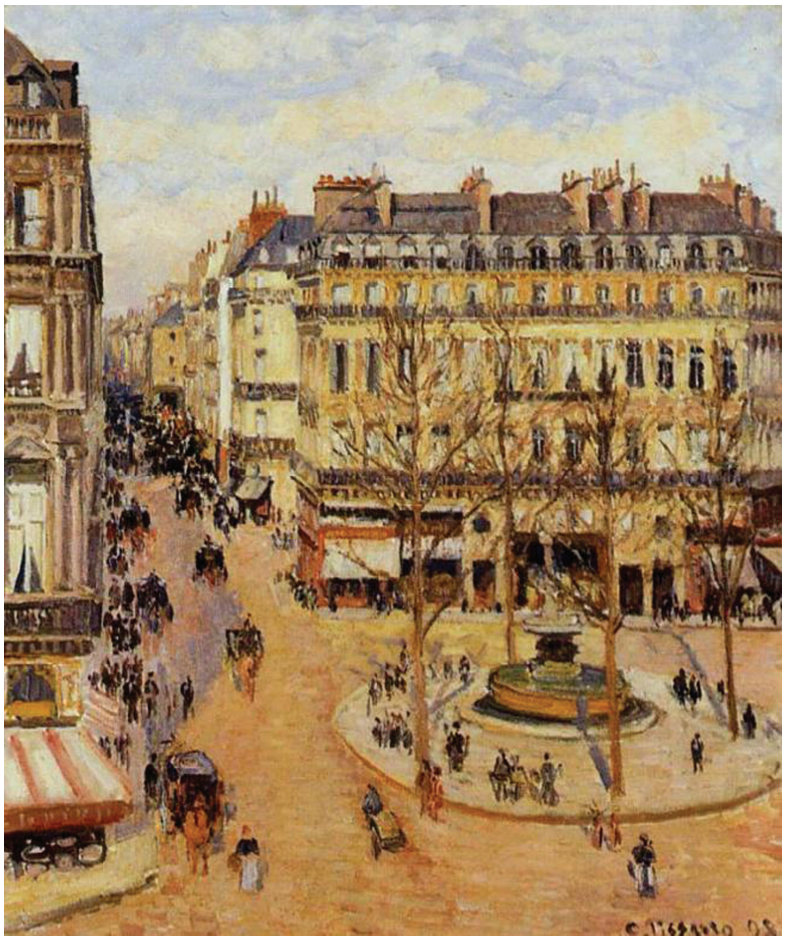


Figure 8. "The Thames below Westminster" (1871) is in The National Gallery (London, UK).

THE METAVERSE VERSUS THE HISTORY OF ART, COMMUNICABILITY, TECHNOLOGIES, AND ECONOMY

Now, the Renaissance artists, the Impressionists, Escher, to cite three examples, have tried to represent the real world, in the best possible way. In other words, there was an effort to understand, represent and emulate it first in 2D, and then in 3D, carrying out previous studies, generating new methodologies and techniques, special instruments, and so on. This is a real world where nature and architecture were a constant source of inspiration for his work. Currently, there is a departure from reality in digital culture, although apparently not so, in the intentions or public or narcissistic manifestations of artists, researchers, teachers, students, financial benefactors, etc., in virtual or real communities.

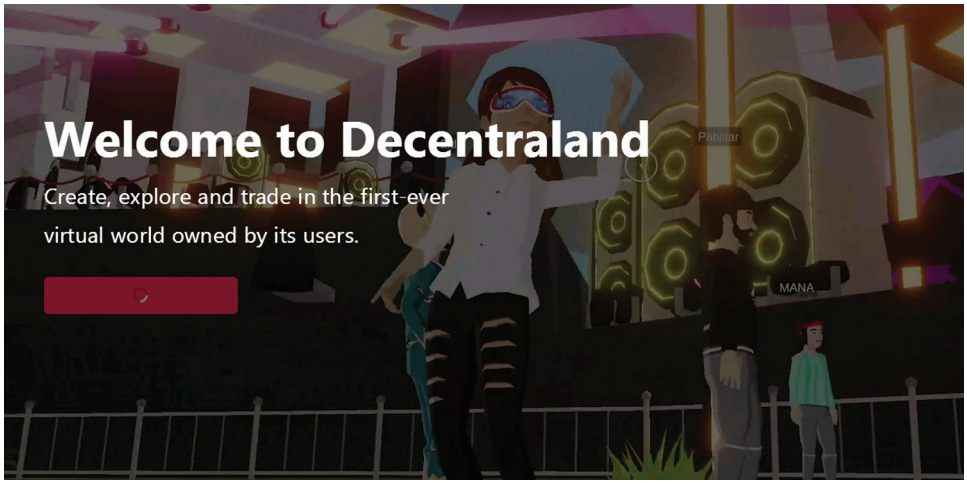
They are the ones who resort to social network applications (the spectrum of communicative influence is 360°, ranging from Wikipedia to Meta Platforms) and are betting on a sui generis online combination of virtual reality, avatars, cryptocurrencies, and so forth (Riek & Watson, 2010; Obaid, et al., 2012; Weaver, 2018). It is precisely in the combination of cryptocurrencies and the metaverse, where one of the main objectives of current R&D and software multinationals and social networks such as Microsoft and Facebook are concentrated. That is, to establish links between cryptocurrencies, investments and great short-term financial benefits (more than 100%), in the field of online interactive systems, where the 3D and animated pixels plays a fundamental role (Harrell & Lim, 2017; Dionisio, et al., 2013; Terdiman, 2008).

Once again, video games are the primary key to attract the attention of end users (actually potential customers or cryptocurrency investors) of these virtual environments. Online virtual environments such as: Decentraland (www.decentraland.org), Alien Worlds (www.alienworlds.io), Axie Infinity (www.axieinfinity.com), Enjin (www.enjin.io), Sandbox (www.sandbox. game), Start Atlas (www.play. staratlas.com), Illuvium (www.illuvium.io), etc. Some of these virtual scenarios do not have optimal 2D / 3D image quality. The same goes for the quality of the movements or the presentation of the avatars themselves. However, all of them are sources of millionaire transactions online. Analyzing one of

Figure 9. The interactive design of SimCity has marked a milestone in simulation video games.

Figure 10. The Sims video game is the simulated inhabitants of virtual communities.

Figure 11. Home page of the Decentraland portal where the avatars trade cryptocurrencies.



those virtual environments such as Decentraland, we can see a certain similarity with "The Sims", an annex or extension of an excellent Simcity video game, both from the point of view of communicability and three- dimensional simulations (Cipolla-Ficarra, et al., 2018). In the different versions of Simcity, geomorphology (mountains, plateaus, plains, rivers, lakes, and so forth) to houses, schools, libraries, shops, squares, parks, etc. can be created. The difference is that the Sims virtual characters do not trade with cryptocurrencies as in Decentraland and the rest of the examples cited here. Through those virtual currencies, avatars can buy land and build something on it.

Another of the negative elements is the disorderly combination of the typology of the avatars that range from human, mythological, or historical characters, to real animals, imaginary combinations of insects, reptiles, mammals, and so on. In the metaverse it is intended that the user can have and manage their own avatar. An avatar that is similar to himself / herself, either fully or partially. In the latter case, the face is chosen. Although facial features are very complex to simulate, especially when they are in motion, such as the hair, the opening and closing of the eyelids synchronized with the movement of the eyes, lips, mimetic muscles, etc. All the errors in this sense are due to the lack of knowledge in

programming if they are managed or created by the little artists or to the lack of knowledge in fine arts if they are programmed by computer scientists. This is a bipolar dilemma that harms the reality and the final quality of moving images.

It is a historical problem that in many places in the northern hemisphere has its origins in the first interactive systems of the '90s and in the job opportunities in the field of fine arts. Not all fine arts graduates went into sculpture, painting, drawing, restoration, etc. In few words, the natural field of their studies, but in many cases they became specialists in social communication, journalism, usability engineering, user experience, robotics, virtual reality, children-computer interaction, and a very long etcetera. The same thing happens in the field of computer science, where a computer science graduate can automatically become a computer engineer, without taking any kind of prior exam. These are typical Spanish cases, in the validation of university degrees, between Spanish-speaking countries in the Americas.

With the passage of time, these anomalies of the bipolar dilemma end up being a source of conflicts and delays in the peaceful evolution of science, education, new technologies, the quality of life of human beings, etc. Implicitly in all these inconsistencies is the economic factor. Therefore, the metaverse empowered by the large multinationals finds in this historical dilemma a key point for its unlimited expansion. In short, **the metaverse will generate a new exclusive domain of those who are dictating the rules of the game on the Internet, but it will also distance millions of users from reality, with skills, competencies and knowledge impoverished with the culture of the "fragmented tile."** Although it is true that a large part of these metaverses are under construction, and so perhaps there is still time to correct conceptual, structural and systematic errors. If not, the metaverse will strengthen the mediocre quality of audiovisual content on social networks, in new times where image and text have totally lost the value of truthfulness.

TIMELESS TECHNOLOGICAL GENIUS

Through the software and hardware industry, it can be seen how two multinationals are trying to impose new areas to be developed in the field of entertainment that affect the new online media, the educational system and the historical legacy of the Renaissance, for example. On the one hand, there is Facebook's wireless "Oculus" headset for virtual reality (figure 12). It was presented to the international market in 2014 and since then, it continues to develop new versions. On the other hand, we have the Microsoft firm for software development in the metaverse. Between both multinationals, they try to rejuvenate and relaunch or reestablish the paradigm called "Second Life" (2003), created by an American physicist (Kushner, 2017).

Transversally, this paradigm covers the main areas where human creativity is manifested: Art, training, architecture, music, cinema, video games, programming, etc. Removing the computer component and going back to the Renaissance, we find in a work by a single author something similar. Anatomy, zoology, botany, engineering, mechanics, art, architecture, mathematics, geometry, astronomy, physics and weaponry / military strategy, are the main topics dealt with by Leonardo Da Vinci (Kemp, 2004; Zollner & Nathan, 2017), over forty years (1478-1518), in his work: "The Codex Atlanticus."

A work composed of 1750 drawings with explanatory texts. The name derives from the format of the sheets, typical of texts or geographic atlases. The 1,119 pages were grouped into 12 volumes. These and other pages with Da Vinci's sketches and studies have witnessed the ups and downs of European wars, to the point that they are currently on display scattered throughout the US, UK, France, Italy, Russia,

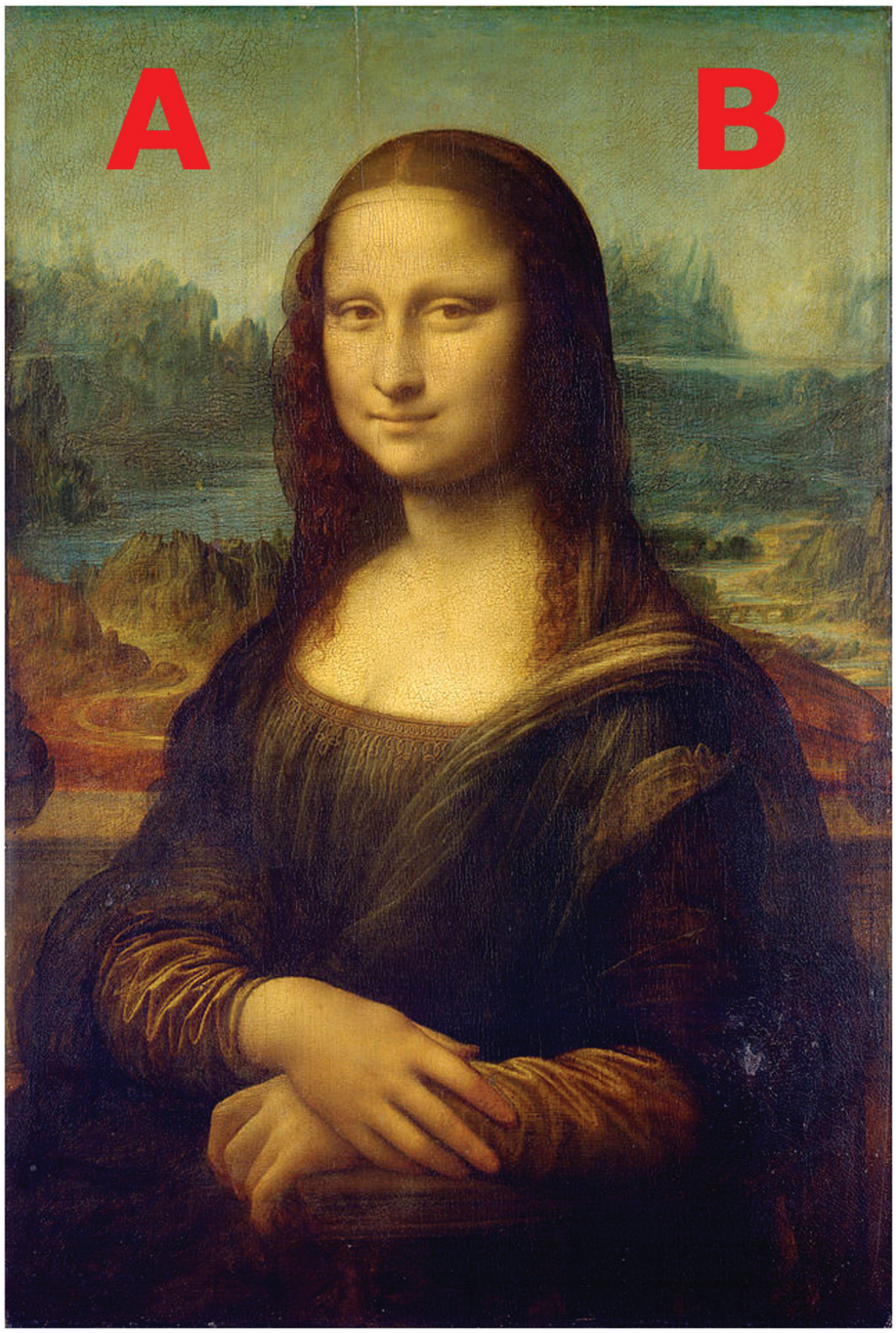
Figure 12. "Oculus" —headset for VR.

Poland, etc. Throughout its pages, resorting to endless techniques, methods and observation instruments, he tried to approach the human being, considering him individually or in community, to provide the best solutions stemming from his studies. That is to say, in it there is an approach to the context, while with the current structuring of the metaverse, promoted by multinationals, and endorsed by the international scientific community, there is a moving away from that real context, in which the human being is immersed. So much so that in one of Leonardo's most famous works: "La Gioconda." She is immersed in the landscape (letters A and B, in figure 13).

Analyzing this context, it is possible to detect how he dealt with the notion of perspective, through colour, shape, atmospheric factors, etc. Also, there are elements of flora, cartography, architecture, etc. In the right area (B), there is a bridge (architectural construction on which he will develop various models in the Codex Atlanticus), a mountainous relief, a forest and a river, which has the shape of an inverted 'S'. That "S" is repeated on the left margin (A) in the form of a dirt road, between the mountains and the forest. Therefore, there is a symmetry, as in the works of Escher (although from the semantic and historical point of view, those two letters together carry a nefarious meaning in the European twentieth century). The effect of blurring the background is due to atmospheric factors that generate the predominance of light blue and blue over the horizon, the vegetation, the river, etc. In the left zone, there is also a fading of the figures in the background, as the colours change, due to atmospheric factors and the notion of aerial perspective. Aerial perspective is a way of representing reality, considering the fading or blurring of the image of objects that are far away, due to humidity (at the time there was no air pollution or smog) and the change in colours. The modification of the tonalities of the colours in a landscape that is linked to the area perspective is called chromatic perspective.

It is precisely the change of colours in the paper support of the album due to the passage of time and the poor conservation conditions (oxidation of the ink, mould, etc.) until the middle of the 20th century, which has led to the process of restoration of Leonardo's manuscripts, including the Codex Atlanticus. On the one hand, and at the end of the 1990s, it was stored in security vaults, avoiding exposure to light, air, etc. In shows and exhibitions with the public, duplicates of his works are usually exhibited. On the other hand, the digitization of the work and the creation of off-line / online interactive systems are ac-

Figure 13. The area and chromatic perspective in the landscape in "La Gioconda."



tivated. Although CD / DVD media do not allow the inclusion of 100% of the content, due to the space that high-definition images would occupy, all the three-dimensional simulations, their corresponding animations, the use of various languages in the content, among many other communicability variables, which are related to the categories of interactive design, can be found.

POSITIVE AND NEGATIVE COMPONENTS IN THE INTERACTIVE SYSTEM OF THE "CODEX ATLANTICUS"

In the first place, putting together some of **Leonardo's works in an interactive format has been a good business since the origin of the first commercial hypertext systems.** As the hardware allowed the inclusion and enjoyment of more multimedia content, it has been a source of inspiration for designers, programmers, historians, restorers of artistic works, etc. For this reason, in interactive systems ranging from floppy media to DVD, Leonardo Da Vinci-related content has always been used, such as a design model, heuristic evaluation, an example of didactic content, etc., from hypertext to multimedia and hypermedia.

In the commercial sphere, Microsoft stands out as a pioneer in this sense (hypertext on floppy media). To the extent that one of its founders (Bill Gates) acquired in 1994 a Leonardo Da Vinci manuscript with 36 pages (dated 1506-1510), called the "Hammer" or "Leicester" code. In this case, the name of the code refers to the surname of the last former owners or to the place where it was found. That is, Harmand Hammer or Thomas Coke (an Earl of Leicester, in the UK).

There is still no interactive off-line / online system where all Leonardo's works are catalogued, their state of conservation, the place where copies or eventual originals, models, scale reproductions, etc. can be visited. Although, it is true that several exhibitions have been developed with replicas of Da Vinci's inventions. These replicas or scale reconstructions make up the content of permanent museums in various European cities. One of these places is in the city of Milan and which refers to the analyzed multimedia system "Codex Atlanticus" (DaVinci, 2006). It is the "Leonardo" Museum and Research Centre (www.1eonardo3.net) that annually exhibits Da Vinci's works in Italian cities and others around the world. The main advantage of this interactive system is the possibility of accessing each of the pages that make up the compendium. In addition, you can see its state of conservation and the effects caused by the passage of time. In other words, the content component is exceptional in this system, since it is about the digitization of an important part of Leonardo's designs, which belong to the cultural heritage of humanity.

From the point of view of interface design, the quality criterion called "metaphor naturalness" has been respected (Cipolla-Ficarra, Cipolla-Ficarra, & Harder, 2008). It is an ideal criterion to reach the largest possible number of potential users. At the beginning, the virtual book is closed and there are special animation effects to prompt the user to view its content. Once opened, the main menu appears with the six options in the upper bar to consult: Leonardo's biography, the history of the multimedia project, the representations of the three-dimensional machines (some of them with animations), the original compendium, the help and the credits. In figures 14 and 15 you can see the two menus of the book and the 3D representations of the different inventions (here called machines) of Leonardo. Each of them with their corresponding references to the original text (there is an alphanumeric coding in the relationship between the page and the design to which it refers). The list of three-dimensional objects is as follows:

- Multi-cannon gunship,
- Three odometers,
- Double-boom crane with 26 buckets,
- Pump with bellows and perspective machine,
- Drawing machine,
- Weighted triple-strand rope-making machine,

- Grinder for concave mirrors and steering system for wheeled vehicles,
- Automatic roasting spits,
- Tube cutters with endless screw,
- File-making tool,
- Hydraulic pumps,
- Exploded view of a reciprocating motion machine,
- Spingarde - field artillery gun,
- Mortar for fragmentation bombs,
- Spring compasses,
- Trestles and roped joints,
- Self-supporting bridge and water chamber,
- River and flying machine,
- Study on multiplying the motion,
- Device for mirrors,
- Piano-viola,
- Fortress,
- Fortress - circular plan,
- Defense for castle walls,
- Spool and sling-type catapults,
- Crossbows and giant crowssbow,
- Artillery hoisting and cannon barrel transport,
- Multi-barrelled machine gun,
- Ship's cannon with protective shield,
- Machine for lifting water to an aqueduct,
- Geometry and the icosahedron,
- Navigli locks (Canal locks),
- Compasses and squares,
- Three-dimensional solid,
- Mazzocchio,
- Studies for flying machines,
- Self-propelling cart,
- Mechanical wings,
- Mechanical drum,
- Articulated wings,
- Swing bridge,
- Pooton bridge,
- Paddle boat,
- Printing press,
- Mechanical and perpetual motion pumps,
- Assault bridge and pump,
- Bridge for storming walls,
- Auto-centering chuck and drill, and
- Complex pulley.

Figure 14. Partially displayed menu of the original book layouts, arranged sequentially from left to right. Below the bar you can see the total of 10 sets of pages, which can be accessed in each selected screen.

Figure 15. Mechanisms menu in 3D with alphanumeric reference to the original text.

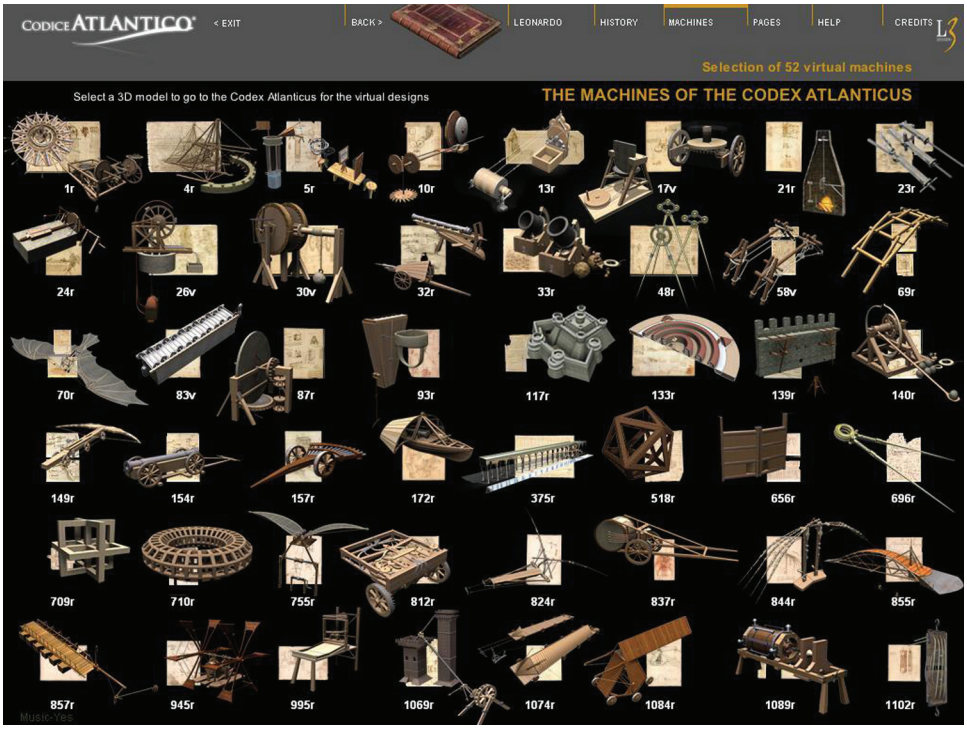


Figure 16. Internal mechanism of the paddle boat that automatically allows the alternating movement, which is transformed into continuous movement for the paddles of the boat.

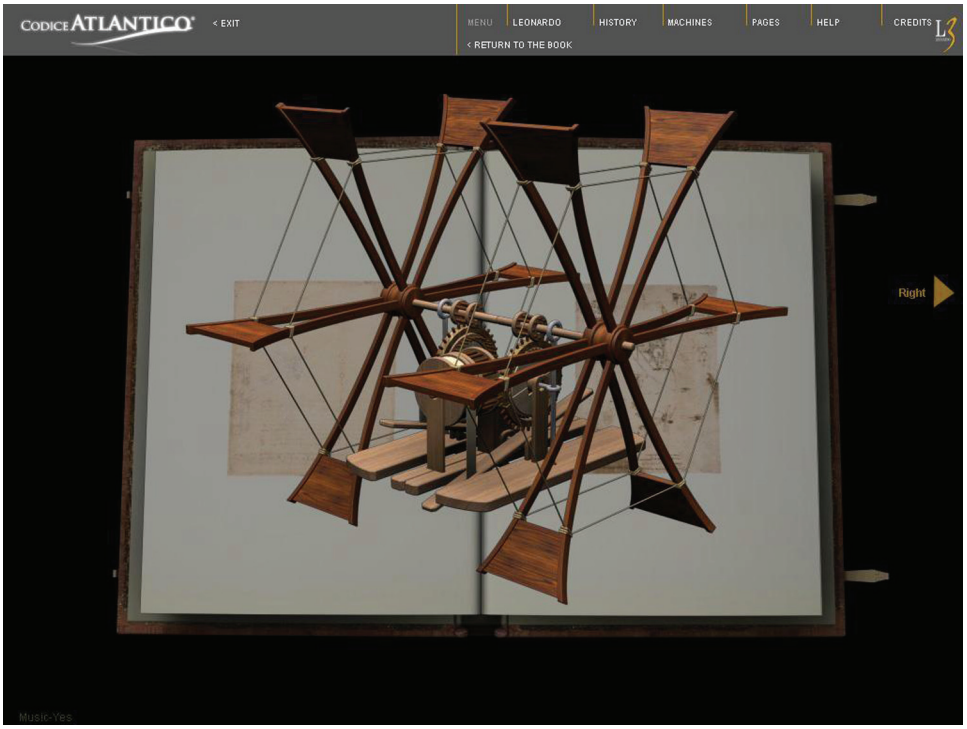


Figure 17. Complete representation of the paddle boat with the pedalling mechanism.

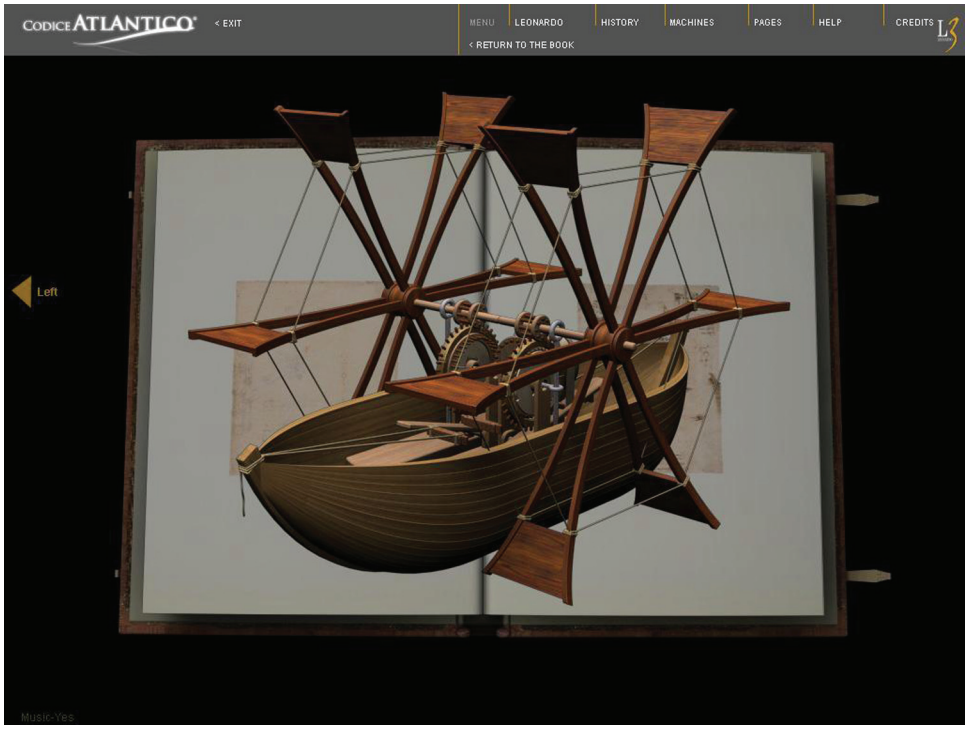
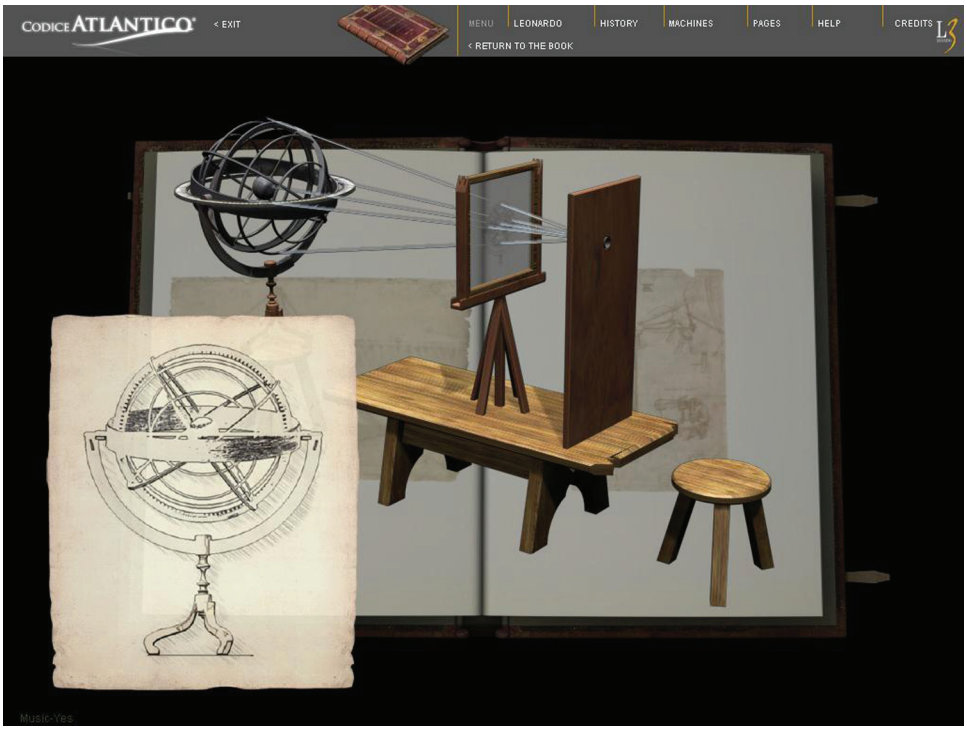


Figure 18. Animation of Leonardo's Perspectograph operation



From this list, the richness and varied content of the compendium can be inferred (Cipolla- Ficarra, 1999). Each of the objects has the original design as background and in some cases, allows a rotation of the 3D reconstruction, for observation from different angles, as well as the animation that refers to its operation. For example, in figures 16 and 17 we have the right and left perspective, respectively; of a paddle boat (the two pedals activate its movement). In the case of Leonardo's Perspectograph, the original design appears at the end of the animation (figure 18).

The figure of the perspectograph is very small compared to the pump with bellows (hydraulic pump of great dimension that is activated with a huge bellows) that occupies practically 3/4 of the page. Hydraulics is a recurring theme in Leonardo's studies. He invented various mechanisms to collect water from a river and show how it was possible to raise them to the height of the towers of his time (more than 50 meters), as can be seen in figure 19. There is also the construction of a swing bridge so as not to impede the passage of boats (figure 20) or the transportable bridge (figures 21 and 22).

Finally in this collection of examples, it is worth mentioning the bridge for storming walls to cross the moats with water in the walls (figure 23). It is interesting to compare the two solutions to this problem, from the Eastern culture as Ali Ibn Khalaf al-Muradi did in the 10th-11th century (figure 3), and the Renaissance and Western solution, through Leonardo's design in figure 24. The theme of bridges in Leonardo has allowed the development of another interactive system (2006), called "Da Vinci's Bridges", with ten models of bridges. This interactive system also includes three-dimensional animations and can be considered as an extension of the Codex Atlanticus work. From the Codex Atlanticus pages it is possible to view the 3D animations of all those that are in the "Machines" option. An example is the automatic drum, mounted on a car and allowing its percussion between both sides. The original design has to be rotated 90° for better compression (figures 25, 26 and 27).

Figure 19. In this figure there are 6 systems to pump the river water to the towers. It is also a completely autonomous mechanism.

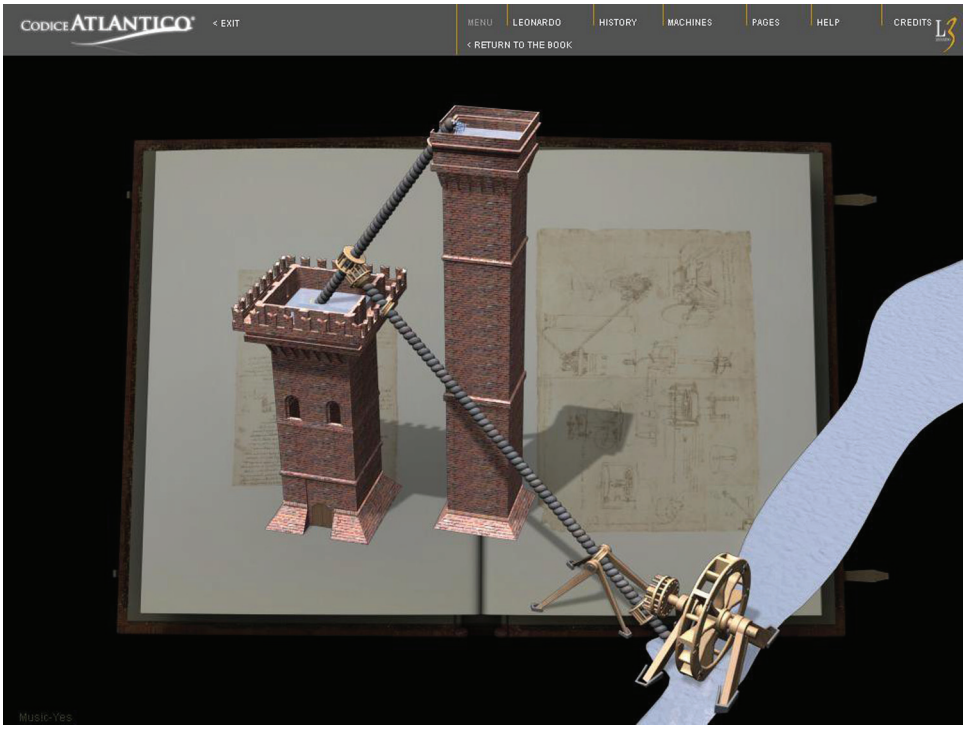


Figure 20. The swing bridge is shaped like an arch and rotates around a bolt.

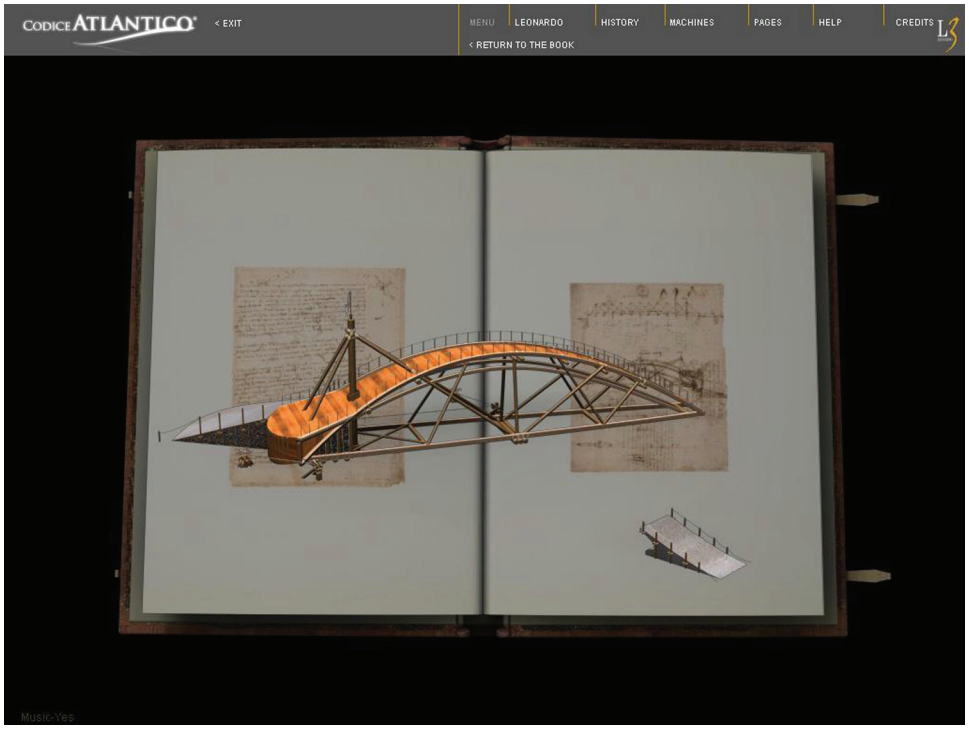


Figure 21. The various components of the transportable bridge, which can support the weight of people, animals, cars, etc.

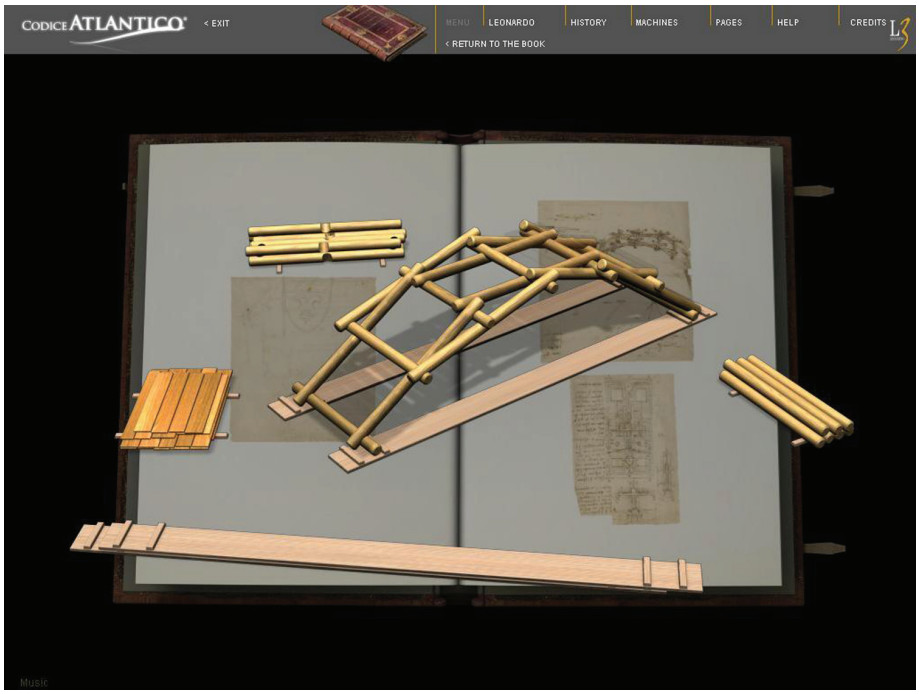


Figure 22. It is a bridge that is joined without any type of material. The parts are put together like the pieces of a puzzle.

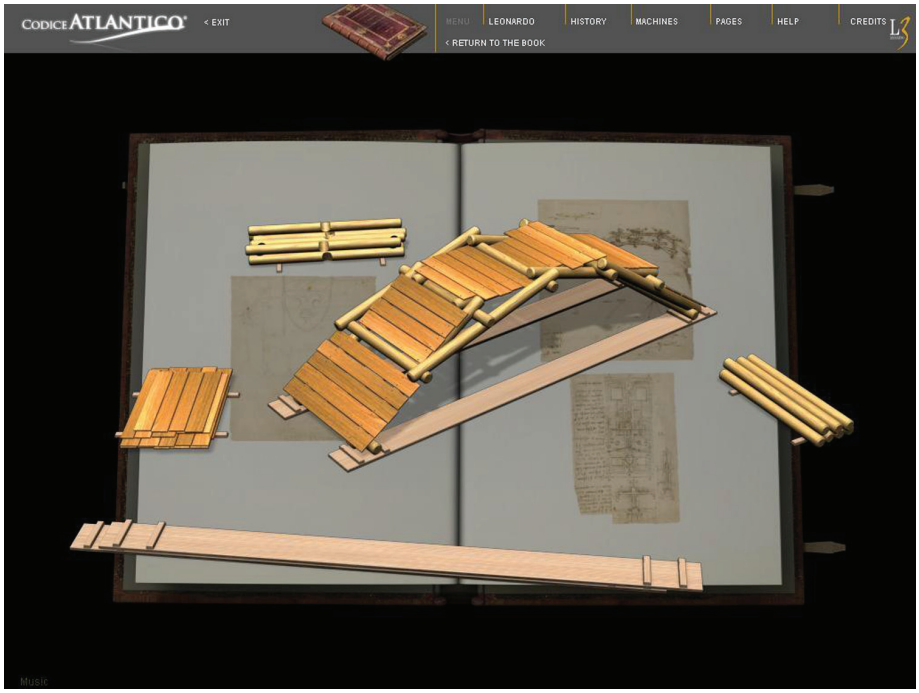


Figure 23. Three-dimensional representation of the bridge for storming walls. In it, the fact that it allowed the protection of the attackers, with a triangular-shaped roof, while they crossed the moat, is verified.

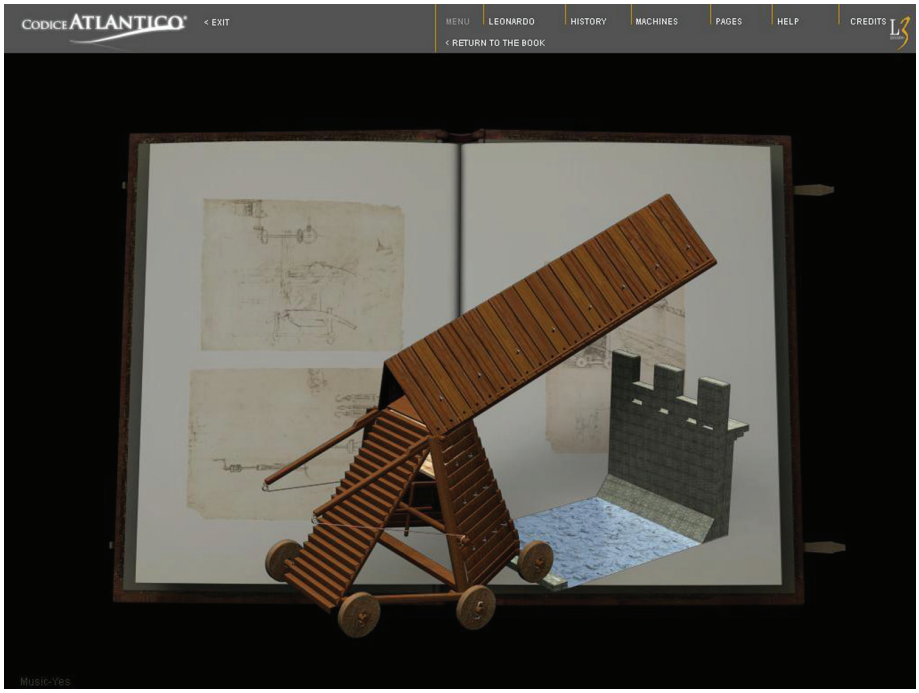


Figure 24. The original of the bridge for storming walls is in a very good state of preservation.

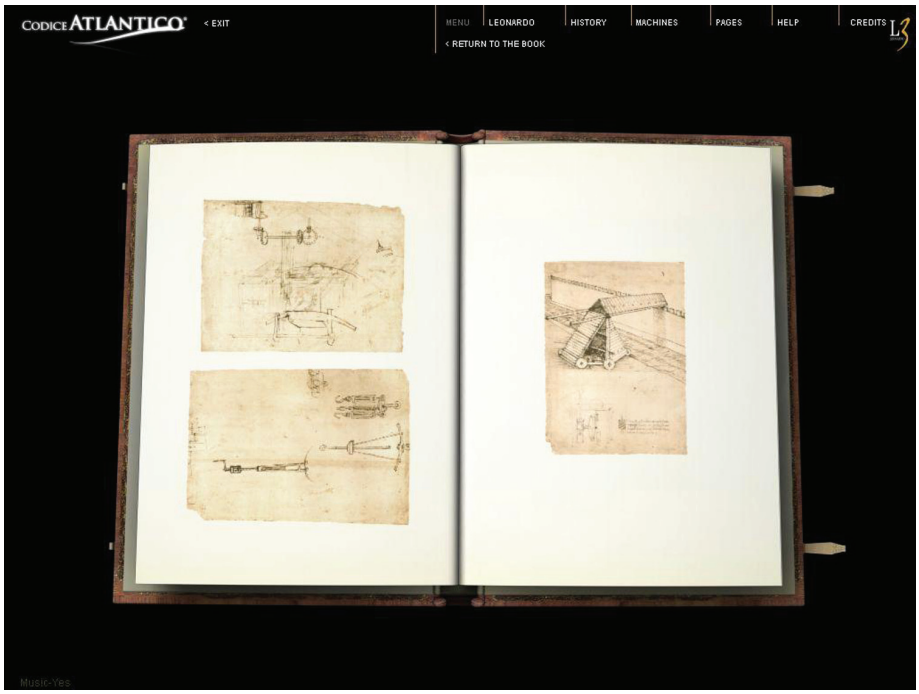


Figure 25. The user has to select which design to consult, that is, the front page or the back.

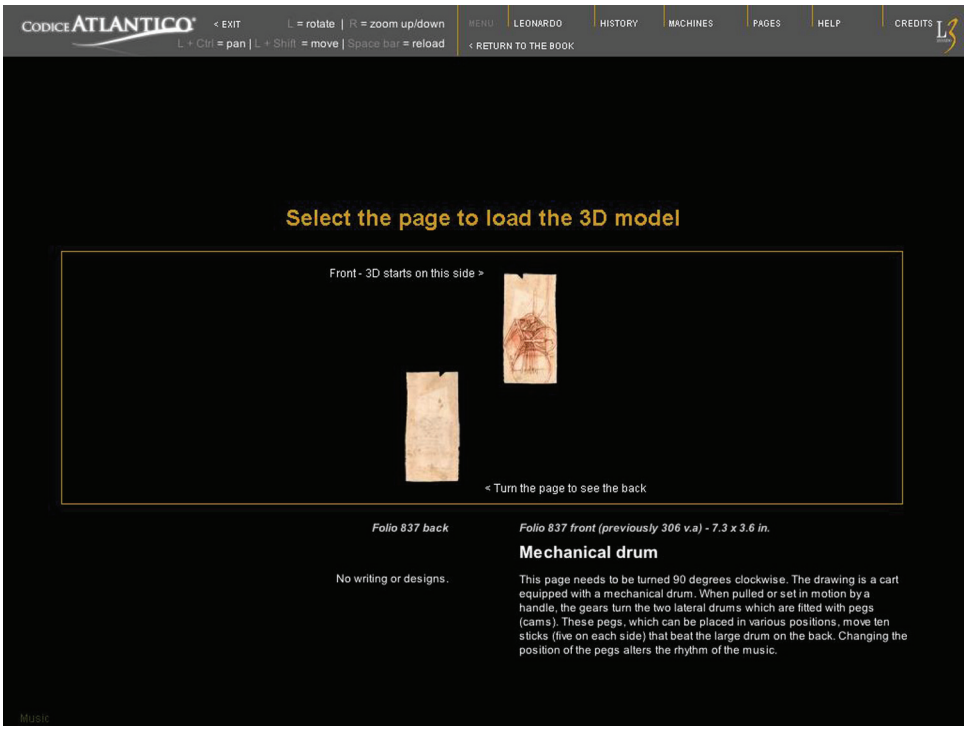


Figure 26. Original page of the design of the cylindrical and automatic drum, in the Codex Atlanticus, after the 90° rotation.

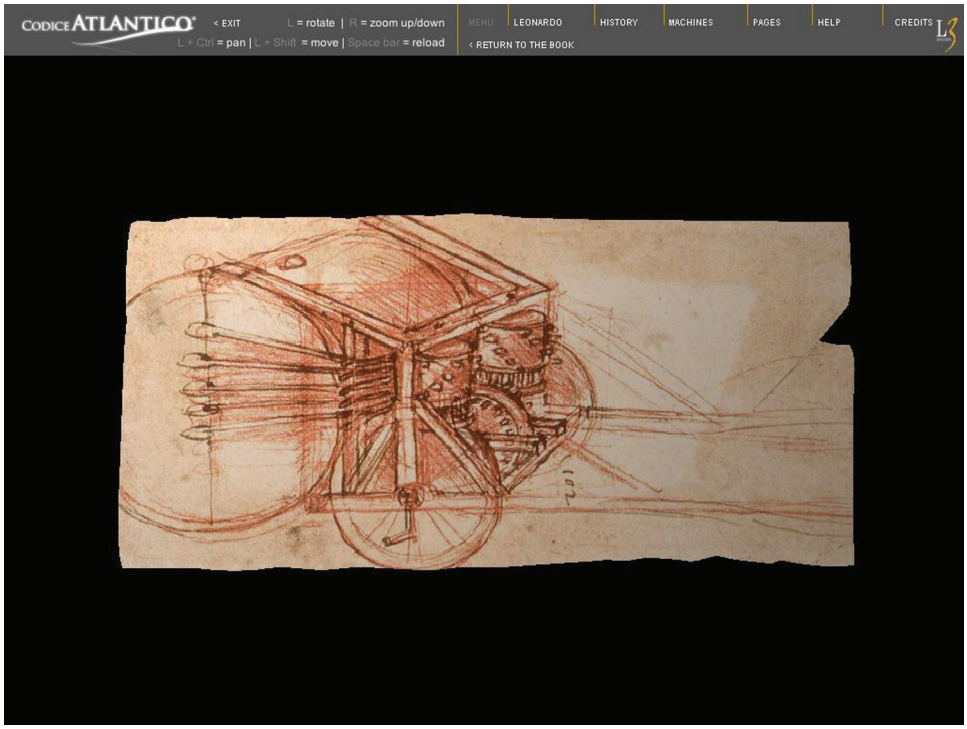
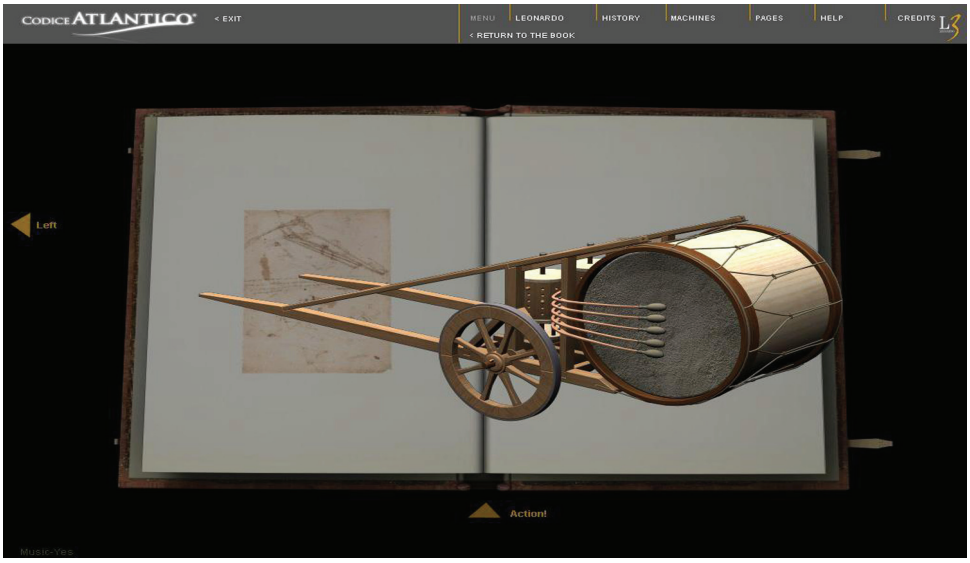


Figure 27. Animation of the three-dimensional representation of the car with the mechanical drum, with its five drumsticks on each patch. In the internal mechanism you can see a kind of chime for the movement of the drumsticks.



Summing up, the **positive components and/or aspects** of this interactive system from the perspective of design and communicability are:

- The excellent level of scientific, innovative and creative content, which is totally timeless and serves to motivate students to carry out research, hobbies and/or games (r ea1 and virtual), etc., in periods of compulsory distance education, as well as boosting the study of science and the arts.

The freedom of enjoyment that an off-line system has, without depending on Internet connections and/or the payment of additional services for accessing cultural content.

Minimalist interactive design.

The consultation of all the designs of the compendium in a sequential and/or indexed manner.

Real verification of the state of the art, in the conservation of those original works by Leonardo.

- Visualization of the operation of some mechanisms, through 3D reconstruction.
- A very good quality in the use of computer graphics, through the good modelling of 3D objects, the correct use of shadow effects and appropriate colour combinations, that is, according to the materials used.

Generation of new interactive systems, maintaining the same design style and increasing communicability, based on some themes included in this work, such as bridges or Leonardo's flying machines, for example.

The **negatives components and/or aspects** are:

- The textual poverty: Bilingualism. Only two languages: English and Italian. Non-existent titling of the designs once the originals have been presented, in 2D as well as the virtual ones in 3D.
- The lack of updating of the off-line interactive system, due to the evolution of software and hardware, in the last decade.
- The detection of failures in the architecture of the information / content, which entails a lack of heuristic evaluation of the system at the time of realization, as well as a disorientation to solve the problem. For example, figure 34.
- The impossibility of seeing all the objects those make up the Codex Atlantis in 3D format, with their matching animations.

Furthermore, we must remember that we are analyzing some of the creations of one of the geniuses of humanity. Therefore, it is necessary to make a diachronic evaluation considering the passing of the centuries. The materials that Da Vinci's mind used for his ingenious innovations were mainly ropes, wood, metal and stones. The degree of his originality is such that he went so far as to design an automatic machine to make ropes (figure 29) and devise a flying machine (figure 30). This denotes his high degree of autonomy in the work and his interest in raising the vision and horizons of human beings. A non-existent quality in the current state of the art of computing, robotics, education, metaverse, and so forth.

Figure 28. Difficulty in seeing the precise content of the design, as well as the solution to that problem. This has been the only error within the interactive design used by the authors, in the commercial version of the interactive system analyzed.

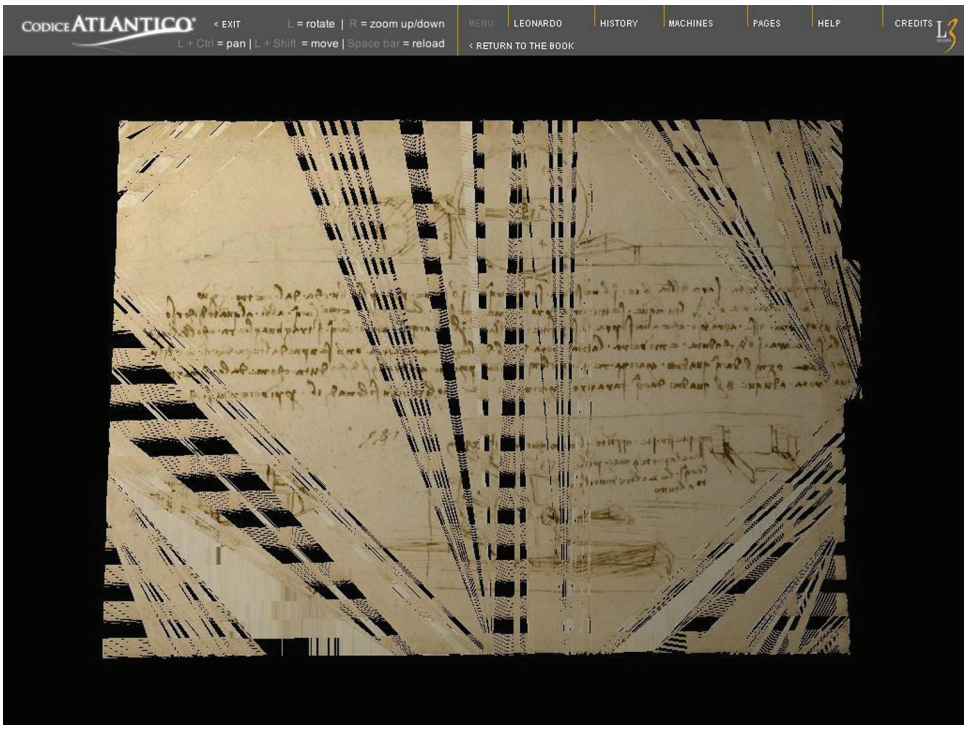


Figure 29. Weighted triple-strand rope-making machine. A weight at the end keeps the three ropes in tension while they are intertwined with each other, to generate a single and more resistant rope.

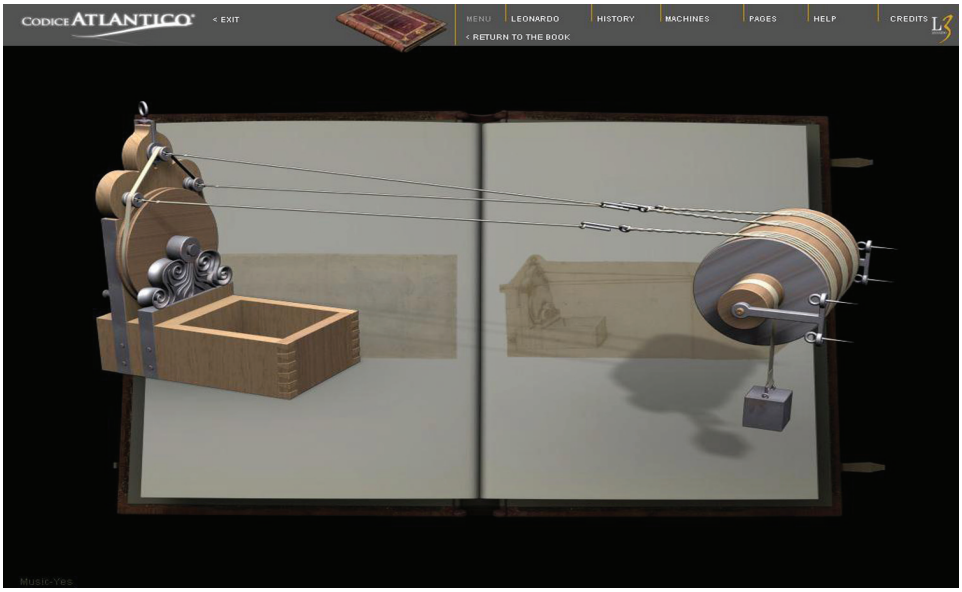


Figure 30. Flying machine in the shape of a flying bird. It has folded wings to understand in detail the parts that make it up and how they are joined together.

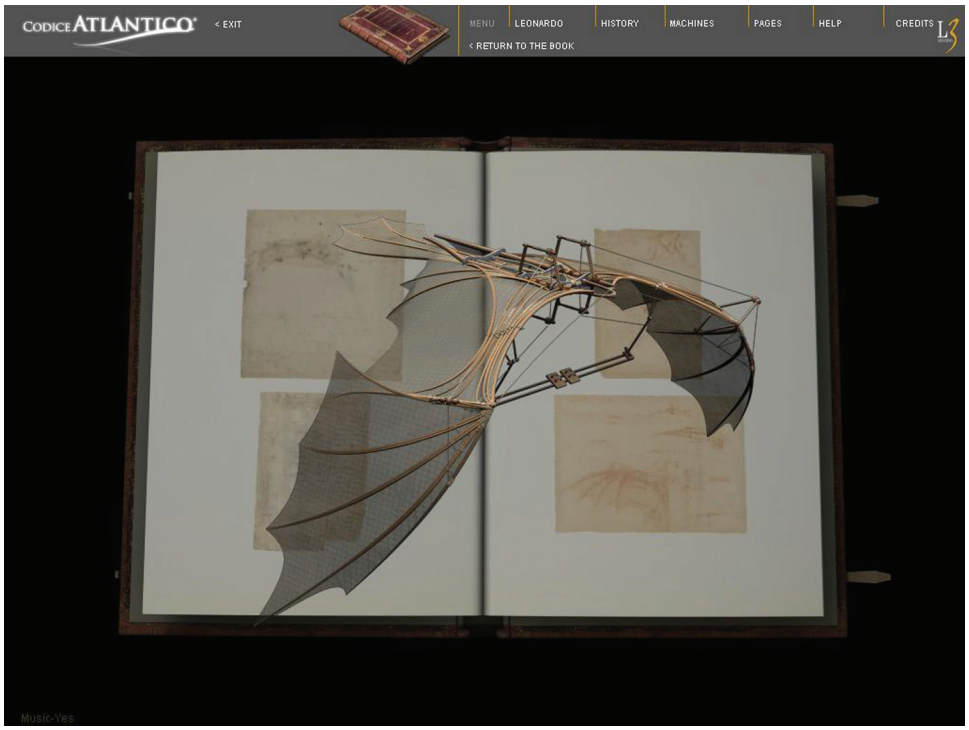


Figure 31. Spring compasses: There are more than 30 compass designs in the compendium. The compasses have a spring to lighten the weight of the hand when working on the paper. In addition, they are compasses with 4 bolts to have a greater opening.

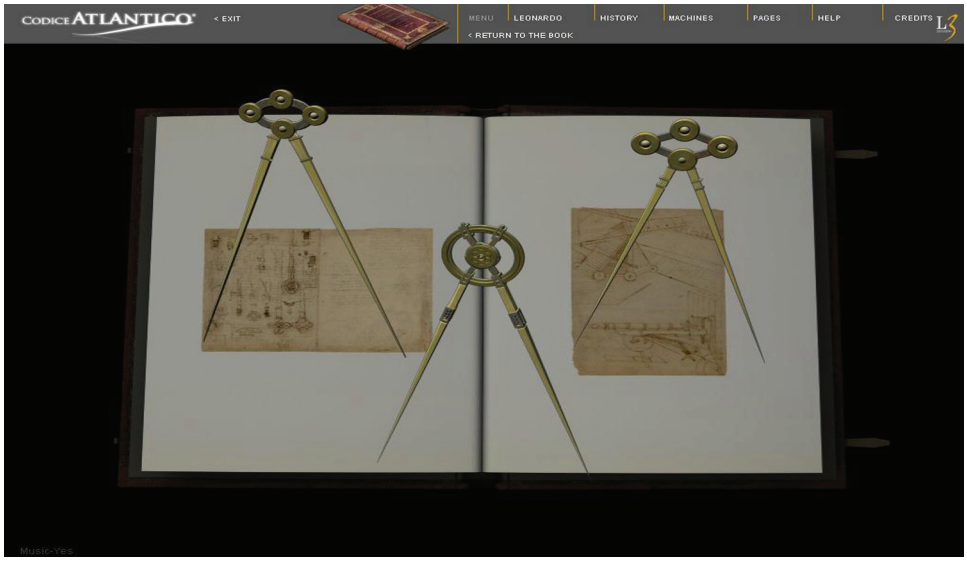


Figure 32. The 3D icosahedron is an exercise related to the notion of the Divine Proportion.

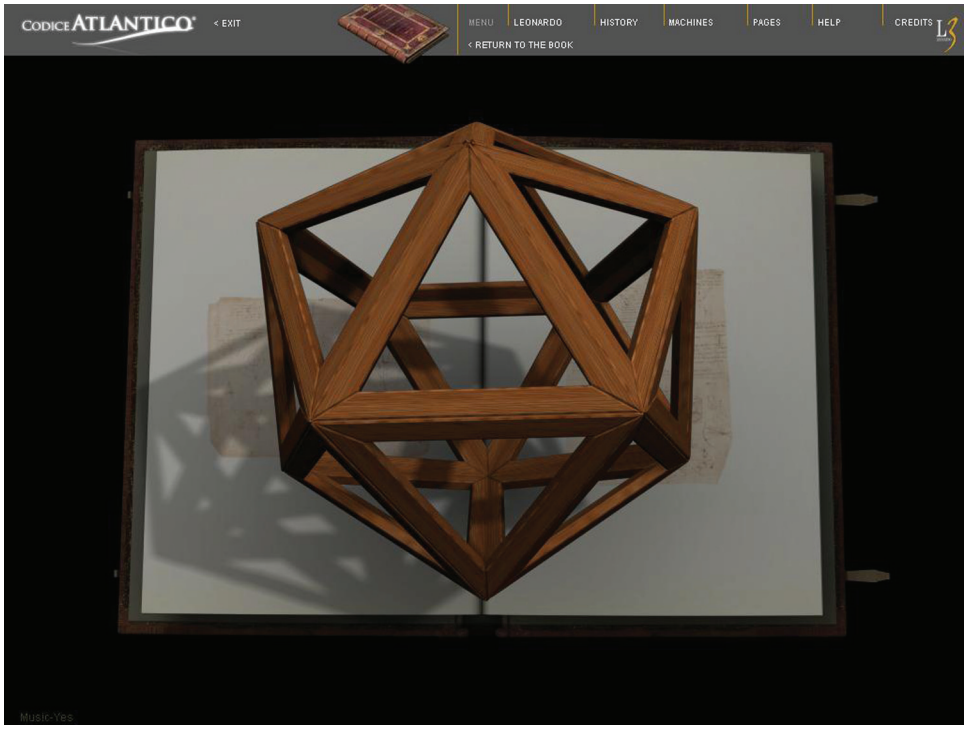


Figure 33. The three intersecting squares. The internal representation of the shadows is perfect.

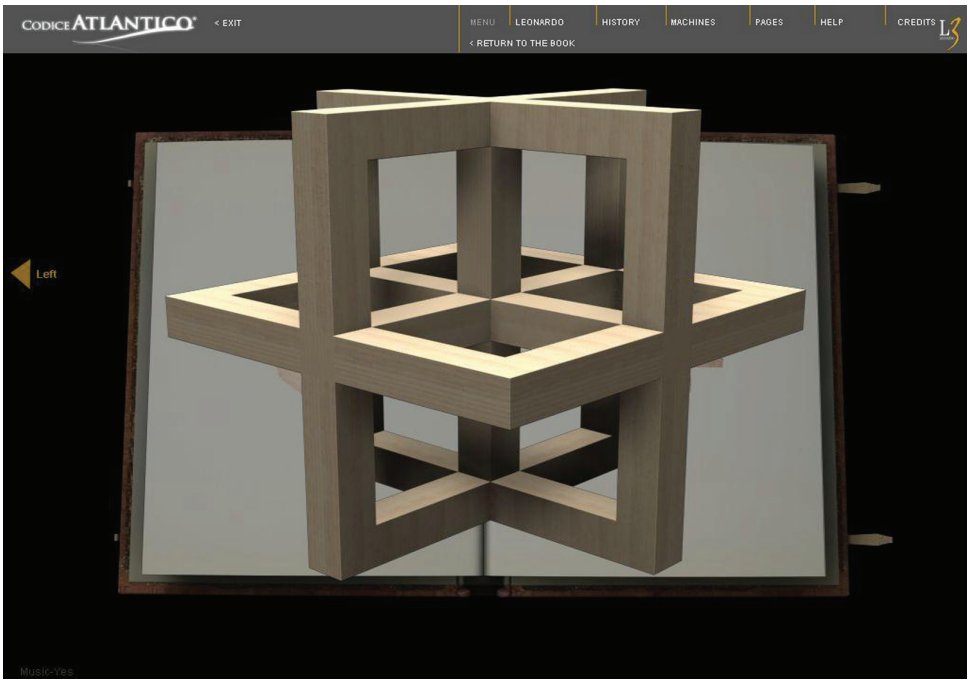
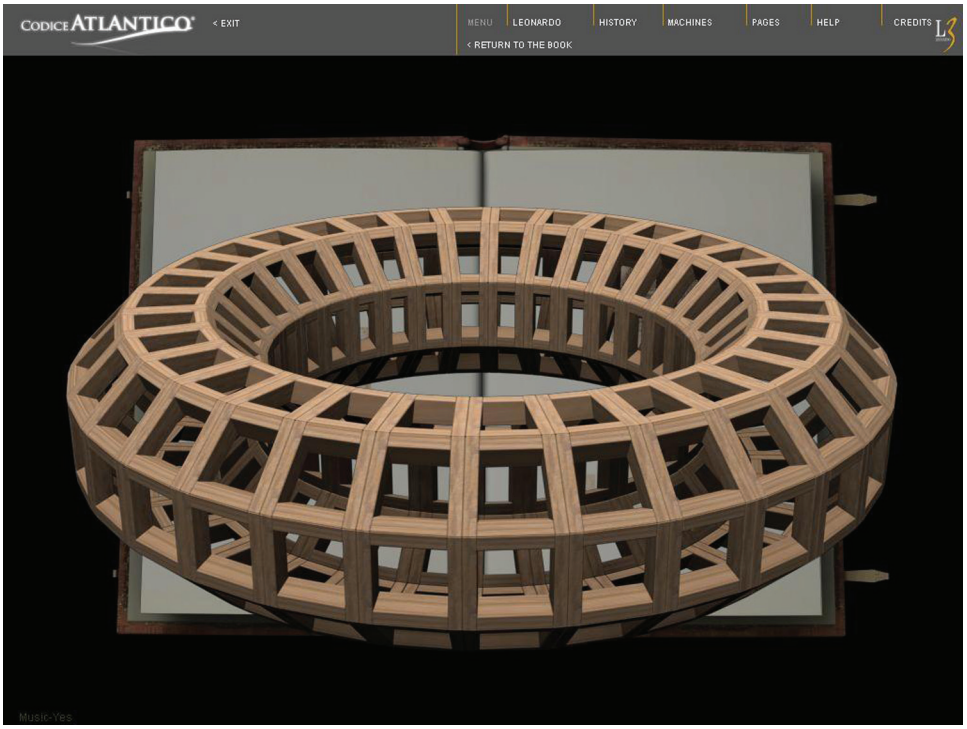


Figure 34. Da Vinci calls this design Mazzocchio, which has 32 sections with an orthogonal base.



In figures 37, 38, 39 and 40 we can see instruments to achieve the greatest possible precision in the face of reality, such as compasses and 3D geometric figures. **The result of these studies led him to perfect structures such as the Divine Proportion, and perfect geometric shapes in 3D. Centuries later, Escher would transform some of those geometric figures or parts of them into impossible figures.**

Besides, the errors detected in the interactive systems, as well as the architecture elaborated for the communication of one of the most impressive contents of the Renaissance work and its timeless and international projection, denotes the great failure of the design models of the hypertexts, multimedia, hypermedia, virtual reality, augmented reality, mixed reality, and so on (Shackel, 1991; Baley, 1996; Veltman, 1997; Bordens & Abbott, 2013). Resorting to a minimalist style as is the case of the analyzed system shows that the authors have not followed any of the concepts of the model developed in Milan, Italy (HDM Hypermedia Design Model), that is, a few meters from the museum. Allegedly it is a model that continues to be used and implemented throughout the planet, as indicated by the indexes in Google Scholar, ResearchGate, Academia, etc., or the comments of the authors and their followers on social networks. All this denotes the little credibility that exists in the scientific information that circulates on the Internet; the quantification of the knowledge of the formal and natural sciences, which is not applied in practical reality; the wild narcissism of co-authors on R&D projects; the conformation from the university classrooms of complex international power networks, which come to be above the democratic rules and norms, which regulate the functioning of free and independent nations.

Lastly, the limitations of the first versions of the interactive system are overcome as the project evolves, from the point of view of interactive communication. That is, as other interactive systems are generated with the works of Leonardo Da Vinci, such as the "Codex on Flight" (DaVinci, 2007). Each one of the figures on these pages is represented three-dimensionally, they allow rotation and in some examples, there is a double animation to better understand the auditory explanation of the operation of the viewed object (figures 35 and 36). Verifying the evolution of a didactic project, as in this case, is positive. In the Latin academic / scientific field, generally, these multimedia projects, virtual reality, augmented reality, mixed reality, etc., remain unfinished or out of date. The latter prevents its fruition before the evolution of software (computer operating system) and hardware (standard incorporation of DVD players, in personal computers in the third millennium, for example). That is, the new generations will not be able to access these contents.

LESSONS LEARNED

Perspective has been fundamental in the history of graphic design, painting, architecture, etc. The interactive systems used as 3D examples in this work have resorted to commercial software from Autodesk, which over time has been acquiring various nominations such as 3D Studio, 3D Studio Max, Maya, and so on. In each of these versions, the improvements incorporated from the software have covered each of the areas of computer graphics and computer animation (modelling, textures, lighting, rendering, etc.). It is a technological advance that has led to situations where the human eye can no longer distinguish between reality and the simulation of reality, where the notion of perspective continues to play a fundamental role. Therefore, the user's perspective and sensory sensations in the metaverse have their limitations, that is, great challenges in the future to overcome them.

Currently, in Blackpool (UK) you can find an avant-garde research and innovation centre (Director Dr. Alan S. Radley —www.perspectiveresearchcentre.com) dedicated to the notion of perspective, with regard to the works of Leonardo Da Vinci, among many other lines of R&D, related to new technologies, science, art, culture, and so on. This centre is the continuation of the work of McLuhan at the University of Toronto (Canada). The founder Professor Kim H. Veltman was Scientific Director of the Perspective Unit —which began research work on perspective formally as part of the McLuhan Program at the University of Toronto (1990). Then later, the unit became the Maastricht McLuhan Institute for Digital Culture, Knowledge

Organization and Learning Technology (MMI, 1998-2004), and finally, from 2004 to 2020, it became the Virtual Maastricht McLuhan Institute (VMMI), in the Netherlands.

CONCLUSION

Throughout history, the synergy between engineering and art has existed, in unique and exemplary people, who have dedicated their efforts to raising the quality of life of their fellow citizens, in the Eastern and Western worlds. The registration of their inventions on paper and subsequent digitization from the ’90s, has allowed the three-dimensional reconstruction and eventual operation. 3D has been able to overcome the limitations of image synthesis at the time they were designed. In many of these objects, the presence of automatism can be verified, to partially or totally eradicate human effort, since the Iron Age. Automatisms are linked to the concept of self-sufficiency and autonomy. In these last two words lies part of the secret of the success of those automatisms that in the 10th or 15th century have found in some personal creations the symbiosis between engineering and art. The other key must be found in realism. That is, when the human being tries to solve the problems in which he finds himself immersed on a daily basis.

The Impressionists, regardless of the pictorial style adopted, represented that temporary context, where the phenomena of nature occupied a predominant place. Today, these natural phenomena are incorporated into computer graphics and computer animations, through algorithms that manage special effects, such as fire, drizzle, water vapour, the decomposition of light passing through glass, etc. That is, fields of studies that belong to physics, and other disciplines of the formal and natural sciences. In some cases, these results have been captured excellently, in the works of artists, for example, the Impressionists. In other situations, more recent ones derived from computer art, for example, require a great effort of understanding on the part of the viewer or user of interactive systems. However, realism must prevail over emulation of reality, especially with the rise of the metaverse, artificial intelligence, and quantum computing.

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Chapter 3
2D Emulation vs. 3D Simulation:
An Assessment of the Escher's Works on Film and Multimedia Systems

ABSTRACT

This chapter investigates the importance of "visual reality," formative and informative, in multimedia systems. In addition, the emulated and simulated representation of the real world is examined through computers and art until the generation of the so-called "empty reality" for the metaverse. A historical study is also carried out on the bifurcation of a divergent modality between contemporary elitist fine arts and experimental ICT artists. At the same time, the main advantages of graphic design in visual communication and interactive systems are revealed through the works of Escher. Finally, there is a heuristic evaluation with users of Escherian works in the field of social media and interactive systems in education, entertainment, and video games.

INTRODUCTION

2D images together with typography have been fundamental in the digitization of graphic arts, in the first off-line multimedia supports (Muller & Wiedemann, 2022; Kahn & Lenk, 1998). The digital images through commercial applications, have allowed the dissemination of vector files or bitmaps on the Internet. This diffusion has generated new professions that range from the graphic editor of images (static or dynamic) to web design or web content, to mention some examples. On the web, the activity of graphic design is not only limited to including photographs or videos in the web pages of portals, but also to generating 2D and/or 3D animations.

Obviously, many of these professionals do not have extensive knowledge of computer programming since educational centres have trained them to use the fashionable commercial applications, or are open software, that is, free or open access. In the latter case, it implies knowledge of Linux. It is an operating system that was developed in the European territory, at the beginning of the '90s and that would be included in a market of personal computers / servers, where Windows and Mac OS (Macintosh Operating System) prevailed (Cipolla-Ficarra, et al., 2018a). The Windows system is for working with IBM

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PC or compatible computers, and the second for Macintosh computers. In short, Microsoft and Apple, respectively.

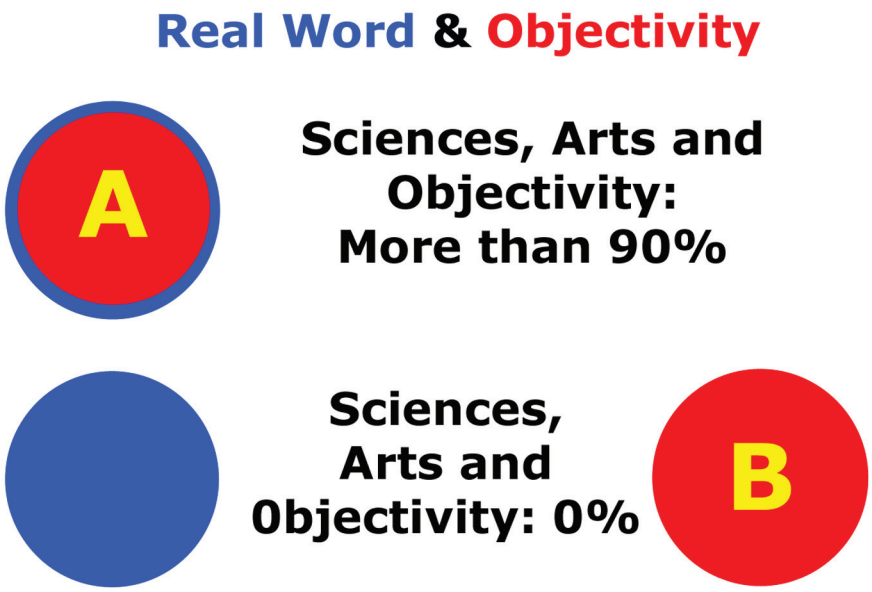
Linux, due to its reliability and robustness, would be incorporated into firewall servers, for example, to guarantee the security of intranet, extranet and Internet networks (Kurth, 2004). Over time, and in the new millennium, its use would expand and its compatibility with mobile phones, tablet PCs, video game consoles, mainframes, etc. would increase. However, in the context of graphic arts, and before the democratization of the Internet in the 1990s, the computers used were Macintoshes in France, England, Germany, and so forth, while Windows PCs in Spain, Portugal, Greece, etc., since the software / hardware costs were lower, and therefore more accessible to graphic designers. The graphic arts experts were in charge not only of digitizing the information on paper, but also of collaborating in the off-line multimedia system production teams (Cipolla-Ficarra, et al., 2018a).

Those first interactive multimedia systems were atlases, encyclopaedias, dictionaries, newspaper yearbooks, magazines, etc, where the text and the static image predominated in the content (Cipolla-Ficarra, et al., 2018b). European fine arts professionals, from the "Windows group" (end of the 20th century and beginning of the 21st century), were concerned with learning the operation of commercial applications to apply the theoretical knowledge acquired. This knowledge ranges from the distribution of elements on a computer screen (navigation icons, menus, dividing lines, photographs, drawings, etc.) to the technical resources of perspective or combination of fonts, to name a few examples (Jadav, 2002; Kahn & Lenk, 1998; Cipolla- Ficarra, 2001; Cipolla-Ficarra, 1996).

Others, on the other hand, although they worked with high-end computers for design, such as the Macintosh, were not at all interested in learning the basic use of graphic arts applications, dedicating themselves to destructive criticism of the sciences and the arts (Cipolla-Ficarra, et a1., 2018a; Cipolla-Ficarra, et a1., 2013). Currently, the opinions of these critics of computer art, new technologies, human communication, etc., range from neuroscience and human subjectivity to robotics and artificial intelligence, including virtual reality and quantum computing (i.e., in Barcelona, Girona, Lleida, Vic, and so on, in Catalonia, Spain). Although they do not have any kind of knowledge in these areas or at least have dedicated themselves to their natural field such as painting, drawing, sculpture, and so forth. The important thing about these graduates in fine arts is that "all the media" of local and national communication talk about them. It is a classic example of the narcissistic phenomenon in the social networks of the 21st century, through the arts.

The goal is to increase online visibility counters and distort reality with the Internet. So **much so, that this psychological and Spartan distortion allows them to promote unrealities such as the viewing in virtual reality of subjective dreams coming from the subconscious of the human being.** In few words, they go beyond the limits of logic and pedagogy in the sciences, basing themselves in a pseudoscientific, frivolous and superficial way on the content of a film, such as Inception (https://en.wikipedia.org/wiki/Inception). However, these deviations have the inertia in certain European universities, in becoming masters or specialization courses, whose cost can be 6 digits, to attend the viewing of videos and photographs (i.e., Catalonian universities). Instead, artists interested in the potential of new technologies are constantly experimenting with what's new in the software and hardware industry (i.e, Danish, Dutch, English, French, German, Italian, Slovenian universities). Nowadays, many of them are generating artistic objects, on 3D printers, for example. Schematically there is a representation in figure 1.

Figure 1. Representation of the distance and approach of artists to reality, through the correct use of new technologies and sciences, for example. Letter A: Relation between real world and objectivity representation = more than 90%. Letter B = 0%. There are only subjectivities.



EVOLUTION OF RECTILINEAR AND CURVILINEAR DESIGN

The artists, motivated by a progressive knowledge of new technologies in a simple way, began to analyze the new applications and began to generate vector images, for example, using Corel Draw to experience the emulation of reality, through instruments that simulate the operation of the pencil, the brush, the airbrush, etc. Tools to which special effects have been attached, such as the drawing of continuous, dotted lines, a combination of dotted and continuous lines, triangular, square, rounded, etc., inclusion of symbols that are repeated successively one after another to generate a continuous line of symbols (Lupton & Abbott-Miller, 2019). In other words, **the combination of the minimum elements of a line (points) can be edited / modified and boost a realism effect, such as shadows or gray gradient to generate an edge and emulate three-dimensionality. A** couple of examples are figures 2, 3 and 4, where they can be seen in their original format and how each of the layers that make up the final image is actually composed. In each of these layers, various forms can be observed. Forms that, based on lines and colours, have different meanings in different cultures (Gage, 2000; Fernandes, 1995; Shubin, Falck, & Johansen, 1996).

The decomposition of the image in figure 4 shows how important it is not only to generate these forms with their respective colours but also to interpret them with their matching meanings. For example, in the vertical and horizontal stripes since ancient times there is a polysemy of meanings (Colapietro, 1993; Sebeok, 2001). Hence, they are used in the design of textiles (figure 6 and 7). The combination of them, together with the colours, has made it possible to differentiate the origin of fabrics, tapestries, blankets, etc. Combining them, in the warp and weft of the looms, allows infinite variations to be generated in each of the annual fashion collections (spring / summer — autumn / winter), as the centuries

Figure 2. Compacted or final vectorial figure made with Corel Draw. Image from the First Nations of the Pacific Northwest Coast (Canada and USA).

Figure 3. Partial breakdown of the grouped figure.

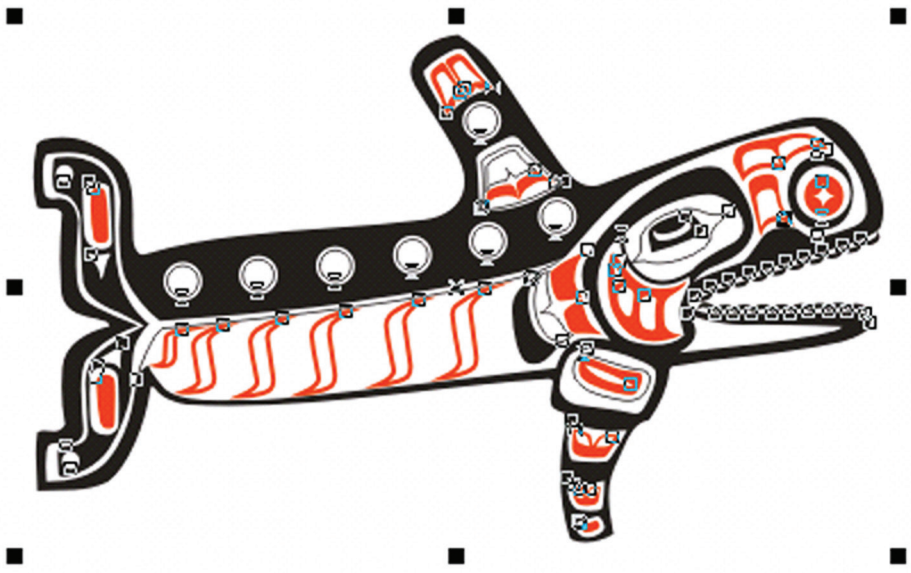


Figure 4. First separation of each of the components of the vectorial image.

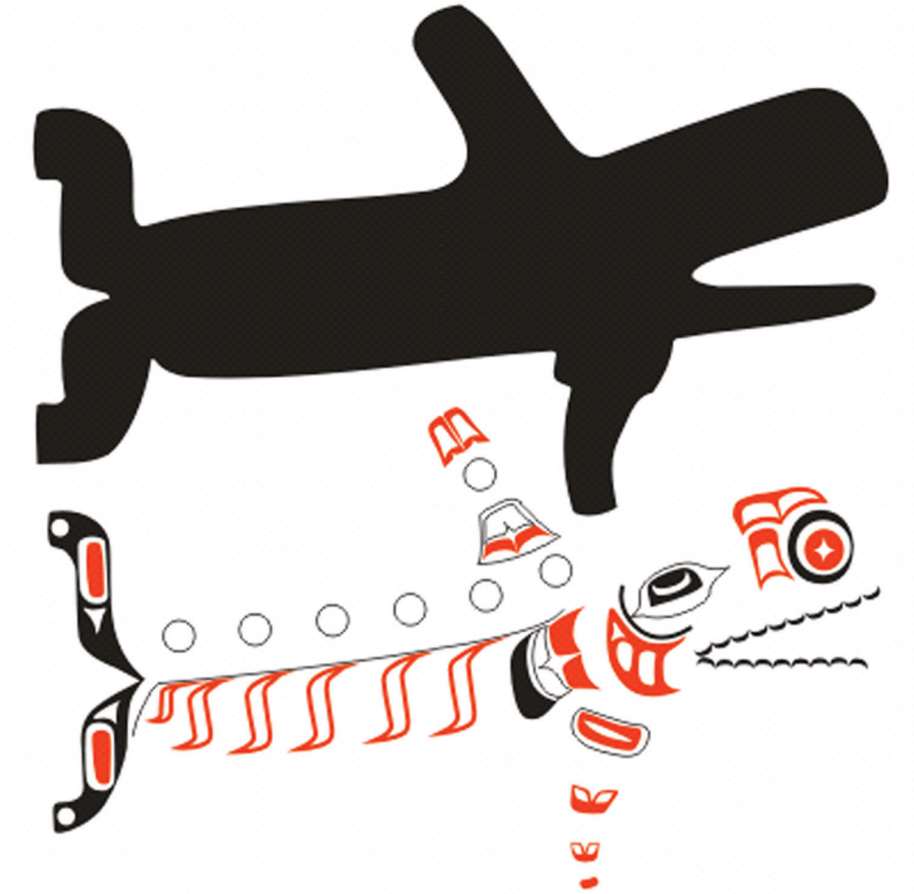


Figure 5. Complex vector image of elements that generate a 3D emulator effect.

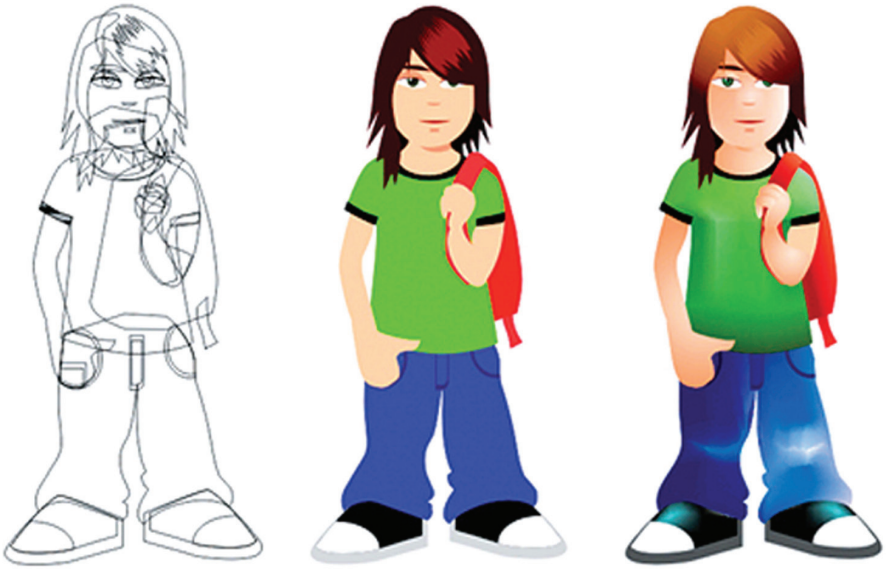


Figure 6. Bitmap image of a real textile fabric that can be sent to a loom for manufacturing or applied to the clothing of avatars and/or 3D characters.

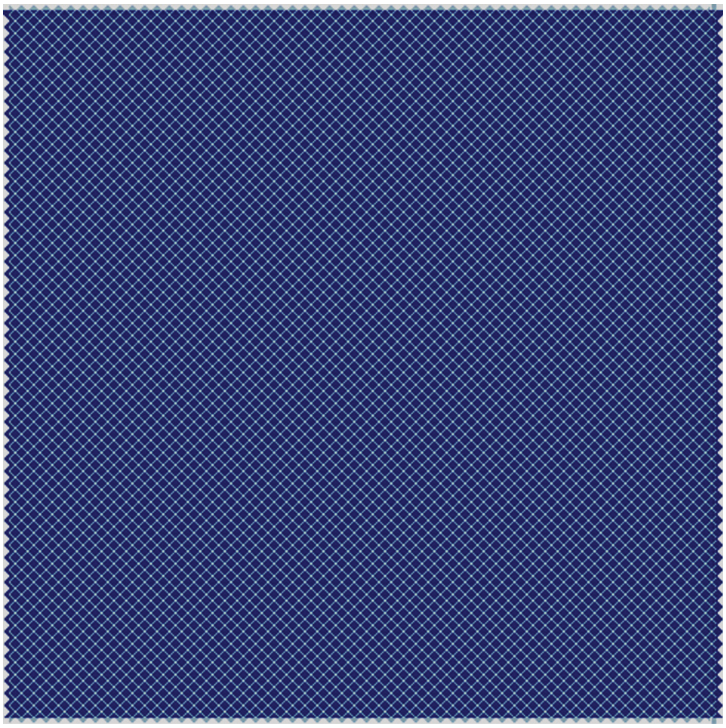
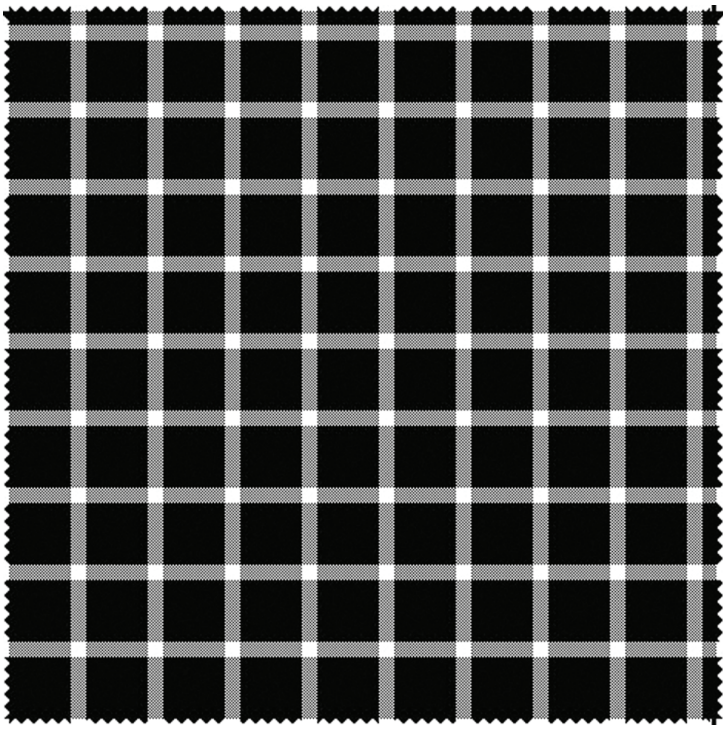


Figure 7. Illusion effect of a cotton textile fabric sample.



go by. Another fashion element is sports shoes, where the three oblique stripes, for example, allow the German multinational Adidas to be differentiated from the rest of the world's brands, even with negative historical references, in some of its latest models (Cipolla-Ficarra, Quiroga & Cipolla-Ficarra, 2021).

This wealth of combination requires a meticulous study of the stylist and/or designer. Stripes usually communicate many things and many of them catch our attention and automatically make us focus in their presence. For example, in figure 7 there is an illusion effect at the points of the squares. A combination of stripes such as black and yellow have a great effect on people. In public transportation, both colours reduce the risk of traffic accidents, according to statistics from insurance companies. Hence, they are the predominant colours in the taxis that circulate in cities like Mumbai, Barcelona, and so forth, or their floating versions in Victoria, BC Canada (figure 8), Sydney, New York, etc.

Figure 8. The yellow and black colour, (a combination of horizontal, vertical and square stripes) in public taxi transport in large cities is widely accepted due to the high level of safety for passengers and drivers. Black and yellow vertical stripes are the best for drawing attention.

Through the centuries there was a metamorphosis of the meaning of the stripes. Historically and sociologically there was a pejorative conception since it indicated social exclusion, in the Middle Ages, because it was intended for the clothing of prisoners or joculators. There was certain distrust towards the fringes because they broke the visual harmony. Centuries later they would acquire a positive value or respectability. It was the mark or badge to adorn sophisticated and elegant suits, giving a special status

to the people who had them. For example, accessories or badges for military ranks, shirts, ties, etc. In the textile industry, the stripes on the ties are a source of inspiration for the design of the shirts. In the British tradition, vertical stripes were imposed on the clothing of workers in the financial sector (jackets, shirts, ties, handkerchiefs, etc.). And the horizontal ones in the French t-shirts, especially in the raw or natural colour of the textile combined with red, blue and black.

The fringes in our days have different interpretations depending on the different societies. Hence, they can be considered as a sign of elegance, fun, challenging, speed, sportsmanship, traditionalist, and so on, in the plastic and visual arts, artists such as Mark Rothko, Bridget Riley, Daniel Buren, etc. They have included stripes in their creations generating new emotions in the public. In other cases, they become the proper identification symbol for a nation, such as the stripes that make up the national emblems (flags, coats of arms, banners, and so forth). In the technological context, the linear diagrams of electronic circuits have been the muse of Harry Beck (1933) to simplify the geographical representation through lines of the subway and train network in London. Another case is the bar codes on products that allow quick reading at points of sale (stores, supermarkets, etc.). In it, the combination of bars and numbers allows knowing the country of origin, the producer and the product code. Scott Blake in the US has made it the central element of his artistic creations (www.barcodeart.com).

The representation of the circles has its origins in the prehistory of the beliefs and observations of human beings, as can be seen in the first peoples and cultures that have left their testimony in cave paintings (Isla de Pinos, Cuba), monuments (Stonehenge, Wiltshire UK), etc. Therefore, concentric circles, for example, already existed in the first civilizations of the different continents, also, the spheres of the sky (Moon, Sun, and so on). That is, circles and spheres that were related to the cycle of life, natural phenomena (eclipses, for example), religious deities, flora, transportation (the wheel), precision mechanisms (gears of automatisms such as clocks), and so on (Demos, 2004; Stephenson & Hampshire, 2007).

The perfect symmetry of the circle lends it is a certain uniqueness for the analog dial function. A dial for manual or automatic instruments in the measurement of time (chronometers), the atmospheric pressure (barometers), speed (speedometers), biomedical (sugar measure in the blood), etc. (Cipolla-Ficarra & Carré, 2018). The digitization of these instruments in industrial design entails a gradual loss of the circular shape towards the square or rectangular, for example. Furthermore, the circle is a form that refers to inclusion in the social sphere, belonging to a set of elements and that generates a group identity. Hence, countries, provinces, regions, cities, associations, organizations, etc., resort to it in their logos and institutional image.

Implicitly in a social structure it denotes and connotes belonging and equality in the group. The classic example is the legend of King Arthur's round table. Currently it can be replaced with button badges that serve as identification of the people who are grouped or associated with each other.

In the sciences, the visual language is very **circular / spherical and influences the arts.** The combinations of molecules and atoms have served as inspiration in graphic, industrial, architectural design, etc. Such is the case, which they are found in interactive interfaces whose contents are related to the future, in a well-structured organization within graphic information, in architecture such as the Atomium in Belgium, among many other examples. Circular and spherical points combined or not with hyphens (lines), have allowed the development of codes and alphabets to facilitate communication between human beings, such as Braille or Morse, or between human beings and computers, such as the perforated paper tapes for information backup, or bidirectional communication between teletypes (Stephenson & Hampshire, 2007; Tse, 2008; Veltman, 2014).

In the graphic arts and on paper are the Ben-Day points (1879). It is a printing process, named by the illustrator and printer Benjamin Henry Day to overcome, through the optical illusion, certain limitations in the combination of the few colours with which one could work at that time (yellow, blue, red, black and white). For example, to create the orange colour, yellow dots were drawn on a red background and from a distance the mind combined both colours to generate orange. A precedent in French neo-impressionist painting is the pointillist style of Georges Seurat and Paul Signoc (19th-20th centuries). An example of the creativity of the points, in the painting of the 19th century, is the figure 9.

Figure 9. The use of the pointillist style (dots) in Georges Seurat's work called the Eiffel Tower (1889). It is currently exhibited at the California Palace of the Legion of Honor (San Francisco, USA).

Dots have also been fundamental in visual communication through LED panels (light emitting diodes). Letters, numbers, icons, etc., static or animated, could be interrupted in those panels. These panels occupied large spaces in the streets, for advertising or propaganda purposes, until the appearance of plasma screens and LCD (liquid crystal display). LED technology opened new horizons in electronic art.

The special effect of spinning spiral in colour, in the opening sequence of the film Vertigo (1958) by Alfred Hitchcock, expanded the use of circles, spheres and points as an optical effect in the audiovisual field, mainly in film and television. The wired spiral in 3D format while it rotates changes colour (purple, light blue, green and yellow). This effect was created by the American animator John Whitney (a pioneer in motion graphics), together with the graphic designer Saul Bass (figure 10). The symbiosis of these two professions would constitute a model to be followed in time.

For example, in 2021, it turned the movie "Vertigo" into an adventure video game, with the same name (www.pendulo-studios.com, 2021) and that works on the following platforms: Windows, PlayStation 5, PlayStation 4, Xbox Series X/S, Xbox One, and Nintendo Switch. In the film there is a constant visual isotopy of the objects that make up the scenes and that serve to reinforce the idea of circularity, such as the spiral staircase, the concentric circles that denote the passage of time in the trunk of the tree, the pupils of the eyes of the characters, in close-ups, etc. These spirals are generally related to states of hypnosis, which lead to disorientation of people (Ernst, 1996). However, with designers and artists they can create effects of beauty, joy and mystery.

Figure 10. At the beginning of the film Vertigo (1958) by Alfred Hitchocock there is an optical effect made through animation that would mark a milestone in the history of motion graphics.

FROM OPTICAL ILLUSION TO EMPTY REALITY

Optical illusion effects depend on how the brain interprets the information it receives from sight. The more abrupt or disruptive the visualized pattern, the more likely it is that the degree of confusion in the brain will grow. A large number of points allows a disruptive pattern to be generated. This type of pattern can defy logic when there is distortion by increasing scale / size and shape. Hence, the large circles can be misleading as in the Vertigo animation (figure 10). Also, concentric circles can create false perspective. Lastly, if these circles are superimposed in a different pattern, the effects achieved can be totally puzzling and illusory.

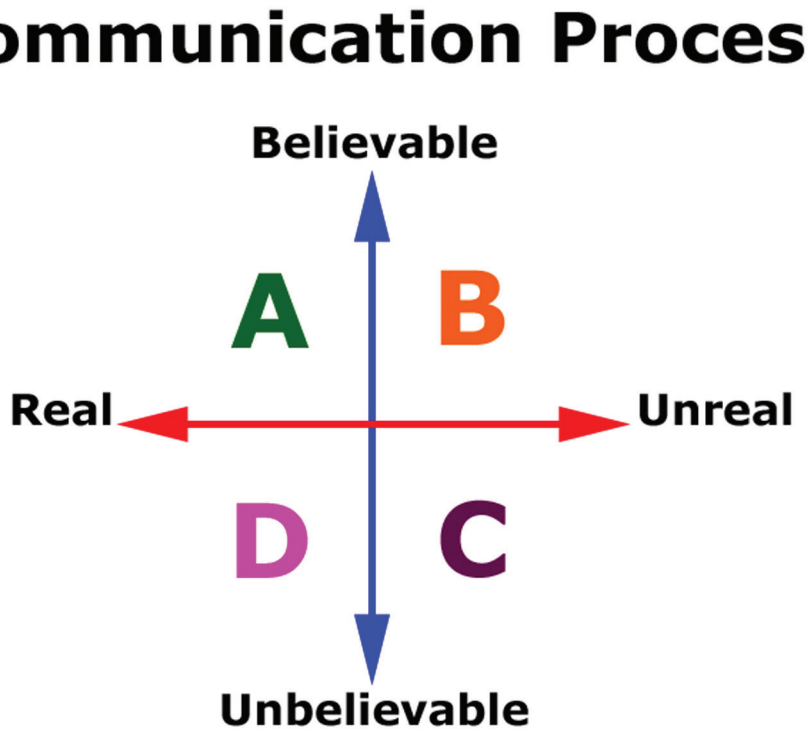
The effects have originated on paper combining points, lines, shapes, colours, perspectives, and so on, making the images real or unreal (Fiell & Fiell, 2017; Stephenson & Hampshire, 2006; Stephenson & Hampshire, 2007; Stephenson & Hampshire, 2008a; Stephenson & Hampshire, 2008b). That ability to deceive, confuse, disorient, etc. requires a brief analysis of the rules that govern common sense in textual, visual, audiovisual, interactive information, etc. (Veltman, 2006; Balassone, 2001; Haralick, 1990). In short, the information, fiction, allusion and exaggeration in the communication process. If the terms real and unreal are contrasted, together with the notions likely and unlikely, within a square, as can be seen in figure 11, it is feasible to establish four areas.

1) In area A the information (real + credible) would be represented, which hypothetically implies 100% objectivity and credibility, although in the audiovisual (video and photography) only the camera lenses can cover a part of reality.
2) In zone B fiction is contained (unreal + believable). Everything that is related to the performance of people as if they were actors in a play, following a narrative script. In social networks is the infinite expansion of appearances, lies, deception, etc., through images and words, in the various applications to increase online visibility, following the script of exaggerated narcissism.
3) Within zone C, the antithesis of what is real and plausible (quadrant A) is located, that is, the allusion (unreal + implausible / unbelievable) and where satire is located, for example. In other words, it is the context of unlikely conversions of reality to the point of schizophrenia.
4) Finally, there is quadrant D (real + unlikely), where something real is communicated but not truthful, due to the high degree of exaggeration contained in the message. Flattery of products, services and ideas that exist in the content of advertisements or propaganda. To the extent where an electoral campaign of a president (propaganda) can be treated as the sale of a mass consumption product (advertising).

Each component of the quadrant axes can be combined with each other, acquiring highly, medium or low, positive or negative values. For example, in the case of a dynamic and exaggerated narcissistic persuader who resorts to new media to spread his resume, where real elements (anagraphic data) are combined with unreal (work experience) and implausible (academic knowledge). Generally, young people or adults who occupy senior management positions in the public / private administration but who do not have training and/or previous work experience in those functions.

Therefore, these four areas connote, from the point of view of the content of new media, a "tragicomic reality" that has little or nothing to do with the context in which the designer, programmer and end user of the interactive systems are immersed. At the same time, they denote that the norms of meaning in

Figure 11. A schematic representation of the information, fiction, allusion and exaggeration in the communication process.



textual, visual, audiovisual, interactive communication, and so forth, are manipulable and that this manipulation is being transferred to new technologies, through design, in the metaverse. A metaverse where the human being will lose the ability to distinguish reality from the information he receives through his senses, in the first quadrant, since it comes from an unreal and contextually empty world, where each of the components will be artificially created. It is the origin of the emulation and simulation of empty reality. In the **empty reality the generation, transformation and elimination of the contents is infinite. Intrinsically, this reality will follow a verticalist-elitist-pyramidal paradigm and where the irresponsibility of its consequences will prevail. In the empty reality, the individual creative capacities of the human being will tend to diminish progressively, with the passing of the generations.**

ESCHER: THE SYNTHESIS OF IMPOSSIBLE REALITIES

Artistic creations can distance the human being from reality. These are the cases in which imaginary forms, figures, textures, etc., are constructed through emulation to deceive the human eye, as have been some of the artist's works in wood (xylography), lithographs, drawings, etc. Dutch Maurits Cornelis Escher (1898-1972). Although Escher took courses in architecture, he was never interested in or studied the formal sciences. However, indirectly and through his artistic creations, he has drawn the attention

of many scientists, mathematicians, physicists, etc., for his unlikely geometric shapes in 2D and 3D, generating several lines of scientific research at a high international level (Ouyang, et al., 2021; Lin, et al., 2017; Sugihara, 2009; Schattschneider, 2010; Schattschneider, 1992). These works denote a constant search for infinity, symmetry, dualistic balance, the need to fi11 with a drawing (be it a geometric, human, animal, vegetable shape, etc.) all the empty space on the plane. Escher's works can be grouped according to Bruno Ernst in three large groups (Ernst, 1995):

1) The structure of the surface (continuous cycles, metamorphosis and tendency to infinity).
2) The structuring of space such as landscapes, for example.
3) The projection of 3D space on the plane, where a classic pictorial representation, the use of perspective and impossible figures is confirmed.

In figures 12, 13, 14, 15, 16, 17 and 18 there are some examples of these three sets. Besides, in figure 12, we have a first 3D representation with a "fish eye" style, that is, of the camera lenses taking pictures to deform space in a curvilinear sense. Escher succeeds in presenting his self- portrait and the objects in his Roman room by resorting to reflection in a glass sphere, which he holds in his hand (Escher, 2014; Veldhuysen & Locher, 2013; Emmer, 1993). A sketch on paper of how he analyzed and structured the composition of the drawing can be seen in figure 13. Figures 13, 14, 15, and 16 have a common denominator in flora and fauna. In this sense, he can also be considered a pioneer, since this ecological aspect is highly topical, with the activation of post-pandemic projects in R&D (European Green Deal, 2050). In figure 14, and unlike the work carried out by Pissarro (figures 5 and 6 —see chapter: "Three-dimensional Images, Computer Animation and Communicability: Pro and Cons Interactive Design into Codex Atlanticus' Interactive System"), Escher manages to combine day (left) and night (right) in the same image, whose birds in the sky fly in the opposite direction, on a Dutch landscape. Figure 16 is one of a series of three woodcuts, called "Metamorphosis" (1937-1968), which includes objects, buildings, flora, fauna, and so forth. This series of woodcuts somehow represents a synthesis of his work. In it, there are no boundaries between inanimate objects and living beings. It is a disorderly transposition of forms, capable of attracting and holding the observer's attention.

These three works are very significant to understand a cyclical and continuous evolution of visual and human communication, starting from the text, the notions of the plane, perspective, symmetry, 3D emulation and simulation, etc. In figure 17, there is the second 3D representation with "fish eye" style. His knowledge in architecture allows him to show the same environment from two points of view, in order to obtain the effect of inside and outside. As in figure 12, perspective deformation (curvilinear) is an innovative technique at the time, especially in the making of reflective spheres. Lastly, figure 18 is a classic example of an impossible or unreal figure, where the non-Euclidean and projective geometries stand out, added to the paradoxical perspectives and the use of shadows in the construction, generated by directional lighting (Schattschneider & Emmer, 2005). All this in order to create an architectural impossibility of a physical type. With his impossible figures he acquired international recognition, on a par with the Impressionist artists of the 19th century or others of the European Renaissance (Monet, 2017; Falcinelli, 2020). More works by Escher can be consulted at the following portal: www.mcescher.com

Lastly and contrary to general opinion, **Escher was not very interested in reality and psychology, but only in his own imagination.** The truth is that almost all of his creations, made individually, serve as a motivational instrument, so that students from an early age can study geometry and mathematics, in

Figure 12. Hand with Reflecting Sphere (1935). It is a self-portrait in lithograph format that creatively resorts to the current photographic technique called "fish eye" (Eastman, 2005). In it there is a sphere that reflects the figure of Escher, giving a certain depth to the Roman environment, in which he is immersed.

times of global crisis. In addition, they can be a source of inspiration for programming or creative coding of some hobbies such as figure or logic puzzles, colouring figures by numbers, and so on.

The use of a manual technique such as the fish eye can mark a before and after in the industry of new technologies, as is the case of cameras. Nowadays, taking a digital photo is possible with almost all mobile phones or smartphones. However, in the 1990s and the beginning of the new millennium, achieving this effect implied for the user the task of acquiring a high-end model or a certain brand of

Figure 13. Sketch of a bird that is repeated in black and white.

cameras, with high costs. In other cases, software had to be used, such as generating commercial applications with special algorithms, to achieve that curvilinear effect, with traditional cameras. An effect that was widely used in portals related to cultural heritage, ecology, gastronomy, hotels, etc., at the end of the ‘90s (Adamson, T. et al., 2020; Cipolla-Ficarra & Cipolla-Ficarra, 2008). The objective was to draw the attention of potential tourists by presenting distorted but 360° panoramic views of the landscape, using fish eye.

Figure 14. Combination of two elements (fish and a boat) in colour.

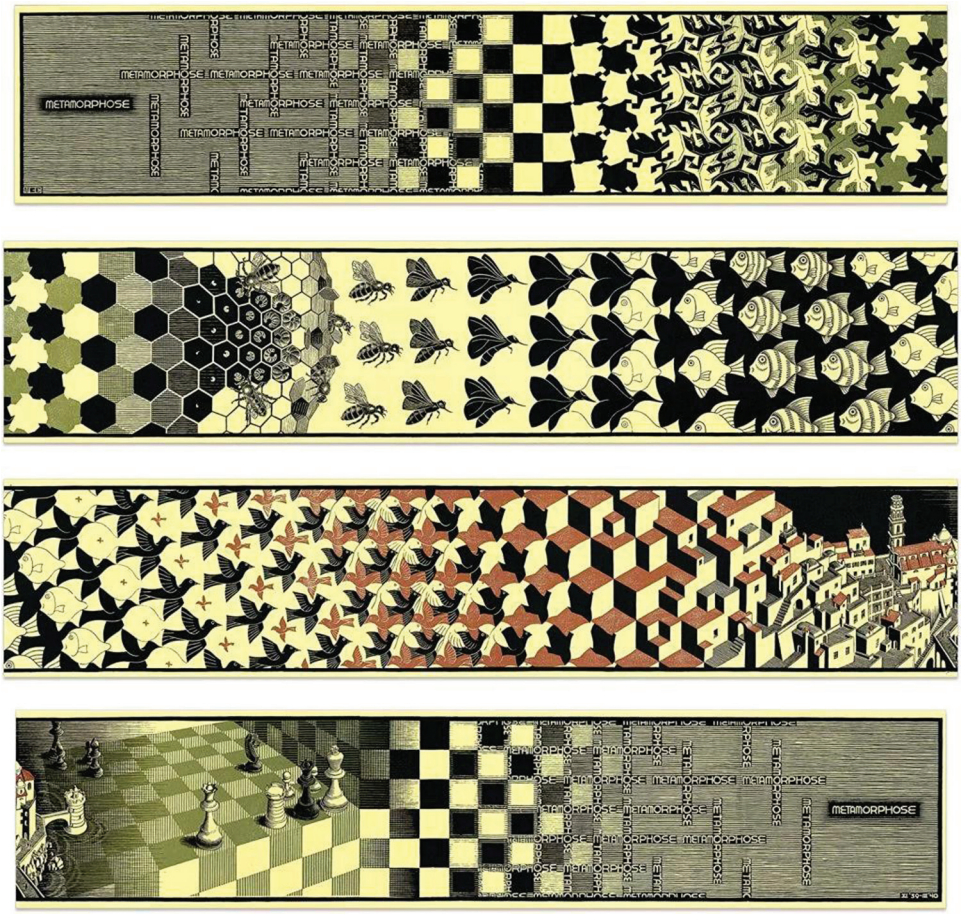
ESCHER: EVALUATION OF MOVING IMAGES

One of the problems to solve for the creation of interactive systems with static and dynamic images is their copyright, especially if photography and video are used (Cipolla-Ficarra, Cipolla-Ficarra & Ficarra, 2010). In some cities and towns in the EU, pre-World War II regulations still persist (Cipolla-Ficarra, 2011a; Cipolla-Ficarra, 2011b). In other words, it is not possible to use the photographs or videos made

Figure 15. Combination of four elements (bees, birds, butterflies and bats) in colour.

of sculptures, paintings, interiors of palaces, castles, etc., without previously paying a right to use such images (Cipolla-Ficarra, Cipolla- Ficarra & Ficarra, 2010). Obviously, this reality complicates the transfer of cultural content, be it analog and/or digital, to the new platforms. In other cases, once these bureaucratic problems have been solved (authorization of free use of images), a series of mechanisms are activated in the academic or governmental or private spheres (suspension of financing, lack of interest in technological evolution by local authorities, generation of parallel synergies for non-compliance with pre-established agreements, etc.) that prevent continuing with interactive system projects, successfully

Figure 16. Metamorphosis II (1940). Here the figure has been divided into 4 sections for better viewing but it is a single rectangular figure (19.2 cm high by 385.5 cm long) with four colours. The transformation is generated from left to right, with the Dutch word "metamorphose". It is a term that opens and closes, the cycle of transformations, in 2D and 3D of the content.



confirmed, in the field of cultural, natural, tourist heritage, etc., and that have been very efficient in generating economic and labour resources in the areas where cultural activities have been established.

Therefore, it is necessary to differentiate when an officially endorsed project becomes a kind of subversive or "unofficial" project, by those local authorities that have promoted it from the beginning. That is, institutions that have benefited financially from their positive results, such as the international visibility or prestige they achieve for free and quickly. In other words, online and/or off-line interactive system projects that are considered locally as mere experiments, collection of suggestions and accumulation of ideas to be used by third parties who are totally unrelated to the initial project. Hence the lack of a strategy in countless areas with rich heritage from the point of view of tourist, historical, natural, gastronomic content, etc. that is not spread correctly on the Internet.

In 1996 an "official" multimedia system was made, with the title of "Escher Interactive: Exploring the Art of the Infinite" (Escher, 1996). It is a very efficient system and encourages enjoyment among users of various ages, since the interactive design tends to be minimalist. The support used was a CD-Rom.

Figure 17. High and Low (1947). Through the "fish eye" technique, a curvilinear space is adopted that converges at the base of the figure. In that place all the upper and lower scene lines arrive.

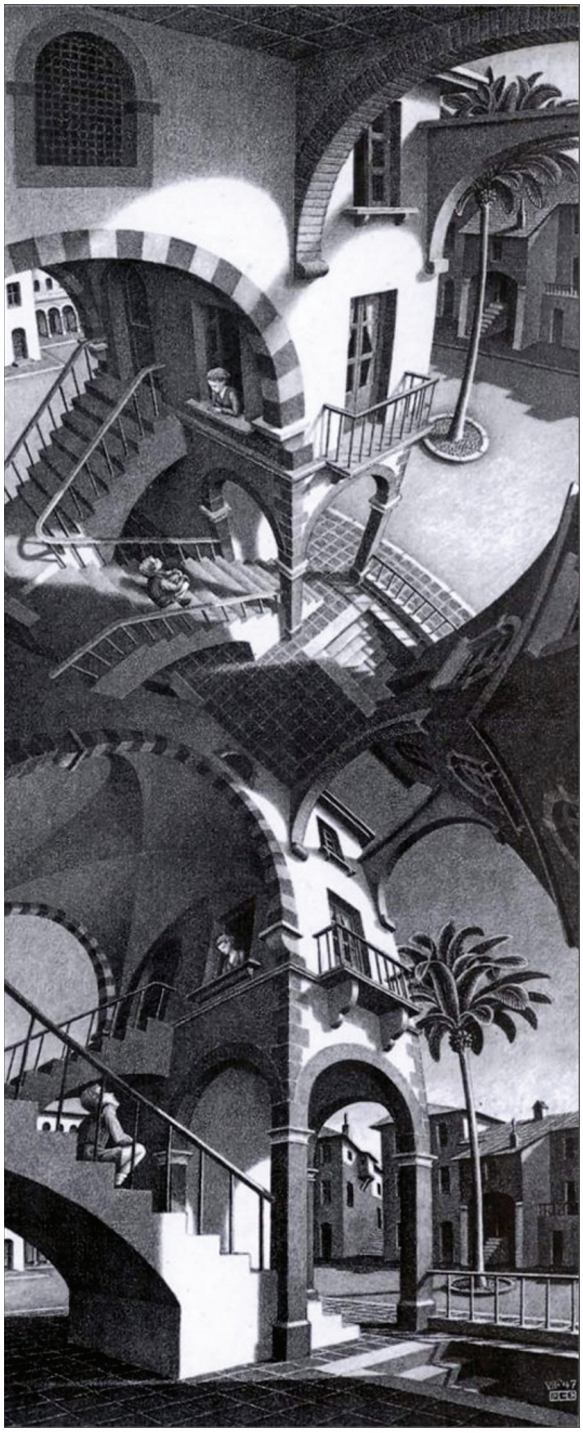
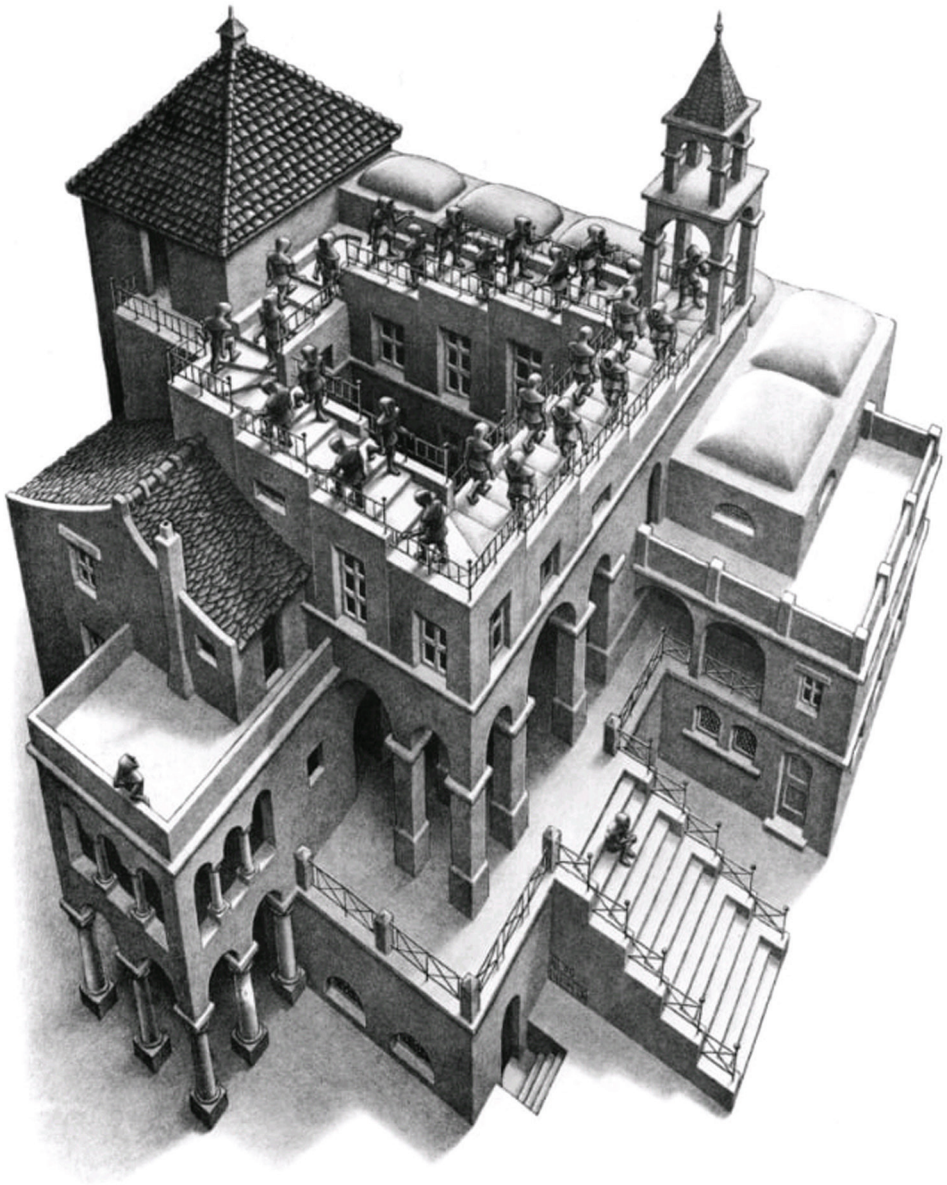
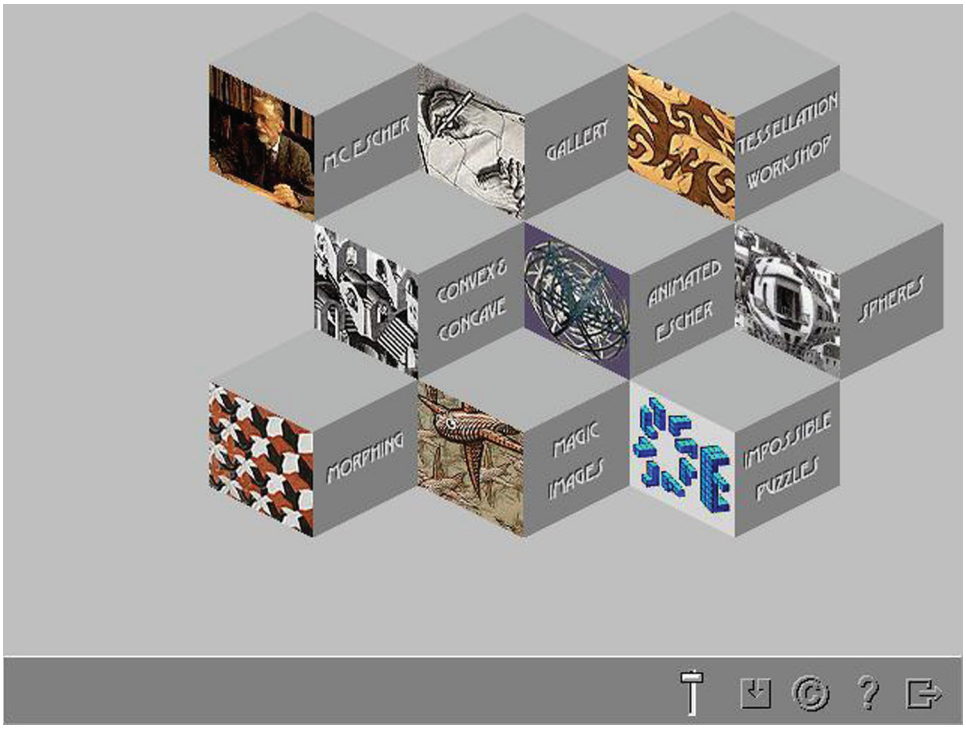


Figure 18. Ascending and Descending (1960). It is a lithograph where the attention is focused on the characters who are going up and down in a circular way, some stairs that never end.



However, not only his works are stored in it, but also the recreational or entertainment part, which stems from his works, and which have been used over time, on television, cinema, video games, and so forth. The figure 19 shows the main menu of the system and from it you can already see how there is a 3D emulation, through the 9 cubes that make up the main menu options: M.C. Escher (biography); Gallery; Tessellation Workshop; Convex & Concave; Animated Escher; Spheres; Morphing; Magic Images, and Impossible Puzzles. Making a qualitative and retrospective heuristic evaluation of the present system,

Figure 19. An "official" Escher's works recompilation (main menu). This interactive system was authorized by his / her heirs, and/or legal representatives of the copyright of Escher's works.



the score obtained is very high, due to the technological means available at that time, as well as due to the communication strategies followed, on the date it was designed and elaborated.

Today, on the Internet it is also possible to locate still and moving images of Escher's works. However, in social network applications such as YouTube, Instagram, TikTock, etc., Escher's works are not catalogued and are presented in a disorganized manner, in countless portals, ranging from mathematics to art, going through culture, music, cinema, exhibitions, books, and so forth. For example, if some examples of videos are analyzed —wrongly titled online animations—, it is possible to find the recording, when someone browses a book of his woodcuts, or the filming of some of his works in exhibition frame format, etc. In other cases, it is confirmed that short animations (less than 3 minutes) in 2D (black and white) have not evolved towards 3D (colour), as some video game producers have done, with some of their content. This disorganization is due in part to the fact that mathematicians insist on including him as an expert in the formal and natural sciences. In reality, we are dealing with an artist who never studied mathematics, nor was he interested in it.

Direct and indirect references to his work can be seen on television, movie and video game screens, such as the infinite stairs (Ascending and Descending), Bird and Fish, Relativity, Castrovalva, among others. On television there are references in animated series mainly for adult audiences such as Futurama, Family Guy, The Simpsons, etc. Here are some examples where the name of the chapter is placed, followed by the season, the chapter number and the year of broadcast for the first time: Futurama, is the chapter called "I, Roomate" (1:3, 1999); the Simpsons, in the introduction or introduction to the chapter "Homer, the Great" (6:12, 1995), and indirect references in "Brush With Greatness" (2:18, 1991) and

Figure 20. The actors of the film Night at the Museum 3, in an area of the art gallery where the paintings by M.C. Escher are to be found.

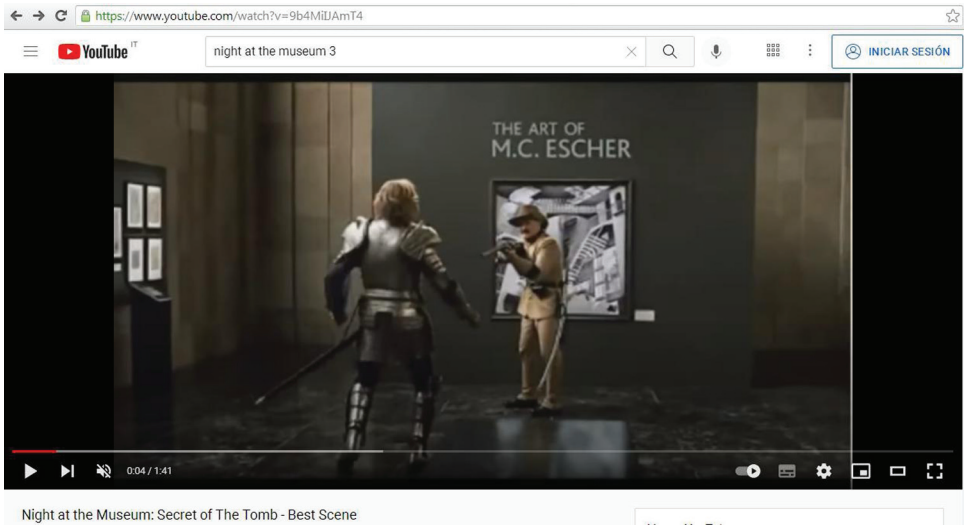
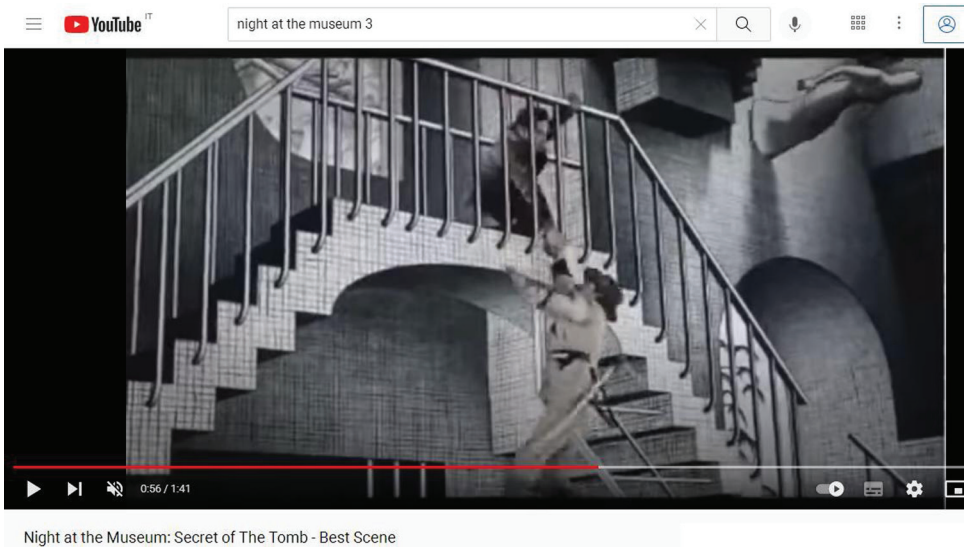


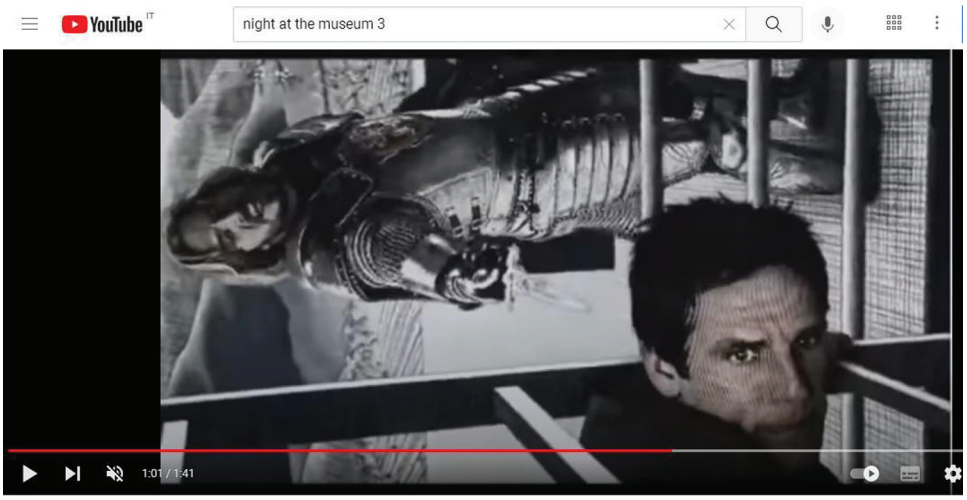
Figure 21. The action continues to unfold in the 3D simulation of the play Relativity.



"Boy Meets Curl" (21:12, 2010); Family Guy in "No Meals on Wheels" (5:14, 2007). 2D animations can also be seen in the 6-minute short film called Mind the steps! (1989), by the author István Orosz (web.axelero.hu/utisz). On television, with real actors, there is the British science fiction series, Doctor Who called "Castrovalva" and divided into four parts (19:01-04, 1982).

In the cinema it is worth mentioning some productions such as: The fantastic-thriller, "Suspiria" (1977); the fantasy-adventure film "Laberyrinth" (1986); the science fiction film "Inception" (2010); "Night at the Museum 3" (2014). In this last film, its main actors Robin Williams, Ben Stiller and Owen

Figure 22. The actors take on the same texture and colour (white, black and grayscale) as the mannequins in Escher's work.



Wilson, virtually they develop part of their action by entering 3D animation, which emulates Escher's Relativity painting. Some frames of that film are figures 20, 21 and 22.

Also in video games we find direct and indirect references to Escherian art. Some video games are Antichamber (2013), where the puzzles are inspired by the works of Escher (www.antichamber-game.com); God of War III (2010) a single user adventure game, based on Greek mythology and there are also puzzles based on Escher (www.mobygames.com/game/god- of-war-iii); Monument Valley, has a refined and special 3D design for children and adolescents. It is basically inspired by three works Waterfall, Relativity, and Belvedere (www.monumentvalleygame.com).

This richness of Escher's content in the new media and in the traditional social media has made it possible to carry out a first experiment on the knowledge of his works in design students, whose average age is 18 years. Previously they passed a test of questions about the works of the Dutch artist. Then, all the members of the experiment interacted previously and independently with the "Escher Interactive" system (Escher, 1996). Subsequently, two groups of four students each —two (w)omen and two (m)en, were randomly established (through a lottery). Each group was assigned the same tasks. The first of these consisted of locating, in the shortest possible time (minutes), three films or television series from the last century and three from the new millennium, distributed internationally, with Escher's works (T1). Second, if there is any obvious link in movies, television series (real or animated in 2D / 3D), and so on, with mathematics, properly speaking (equations), excluding geometry. It is a binary task: Yes = 1, and no = 0 (T2). Third, if there was an external reference to the Escher's, they had to establish the name of the work (total minimum 0 and maximum 10) that was being used in those films and television series (T3). The fourth task was to determine a new total (minimum 0 and maximum 20) whether the scenes recreated in film and TV respect the original shapes, textures and colours (T4). The time available for these tasks was 60 minutes. The results of these experiments are grouped with their corresponding values in figures 23, 24, 25 and 26.

Figure 23. The total number of minutes used to locate films from the 20th and 21st centuries, with reference to Escher, on the Internet.

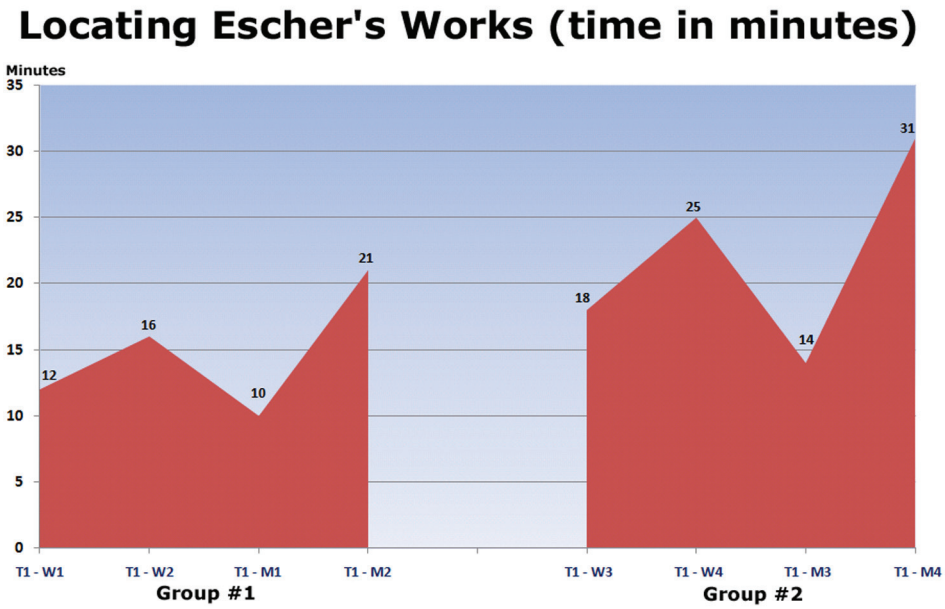


Figure 24. A binary task about the mathematical references or equations located in the audiovisual material analyzed.

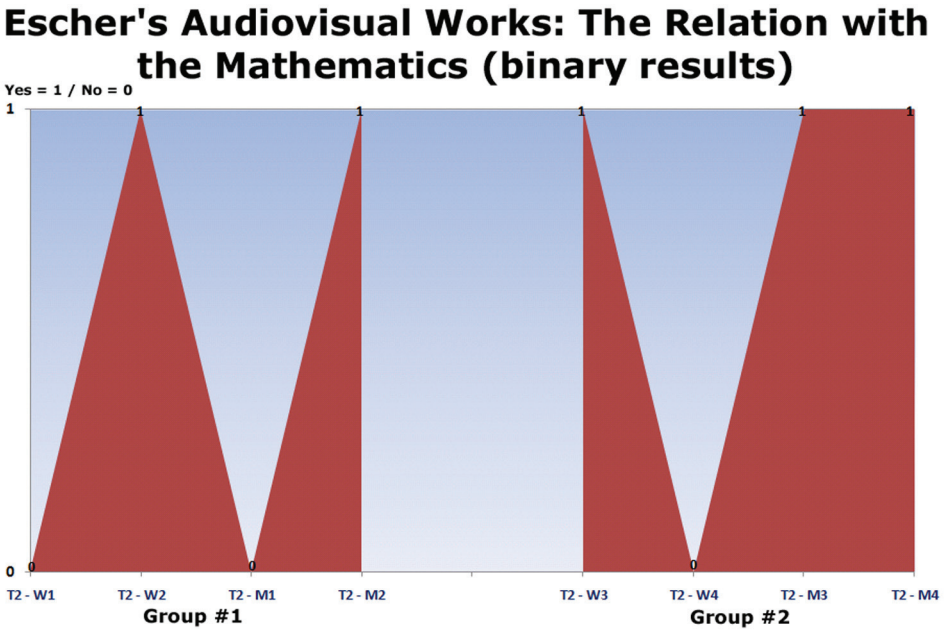


Figure 25. Finding and establishing the names of Escher's works (maximum total is equal to 10).

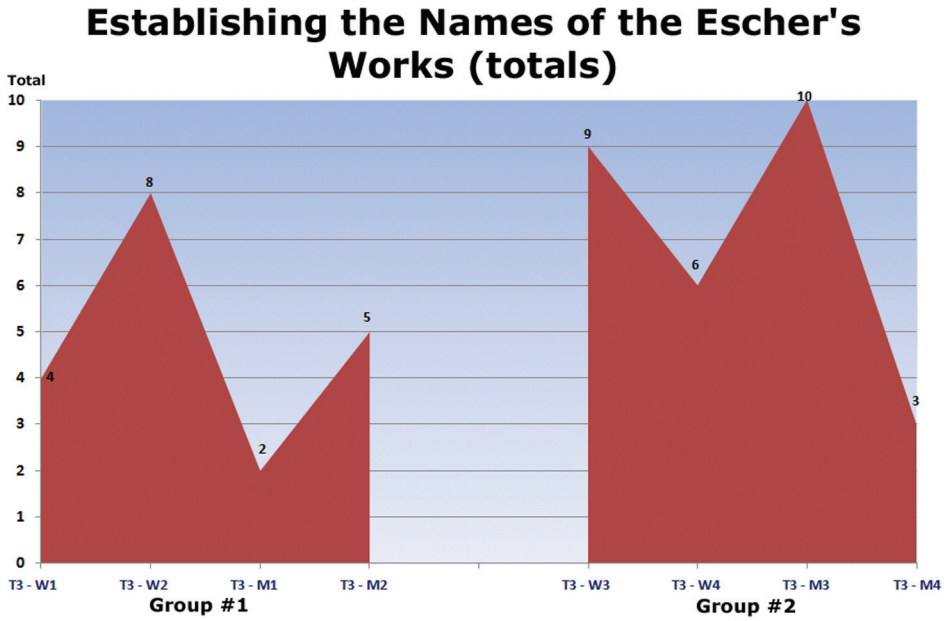
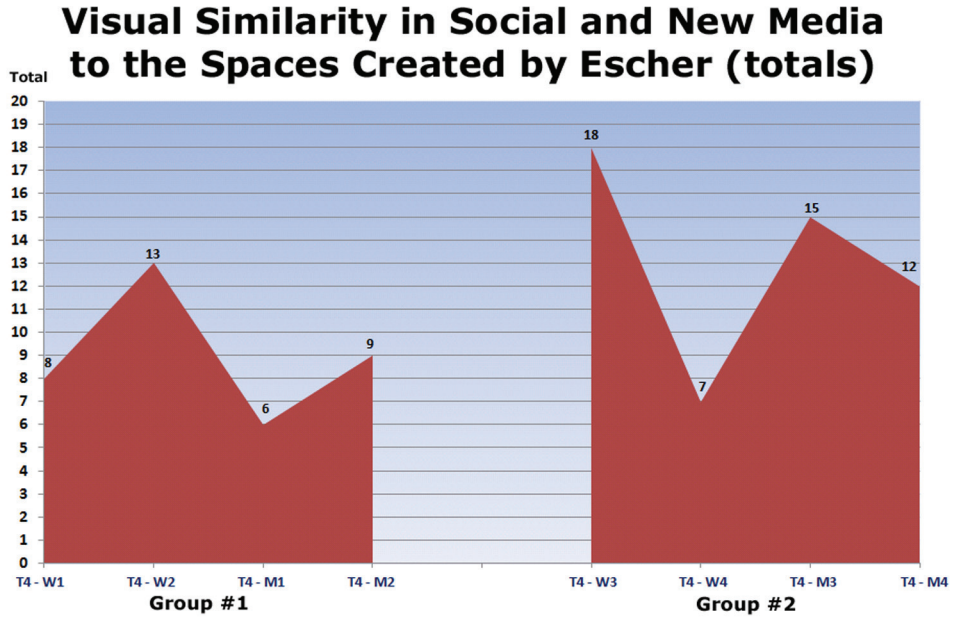


Figure 26. Degree of similarity of film and television settings (social and new media) to the spaces created by Escher.



LESSONS LEARNED

Escher's works are a constant source of inspiration for content in two-dimensional and/or three- dimensional representation of the real world. Like the works of the Impressionist or Renaissance artists, they transcend the local to the level of timeless and universal (Monet, 2017; Falcinelli, 2020). These are works that serve as examples for the creative motivation of students towards the sciences and the arts, for example, very especially, in periods of great global changes, coming from nature or from the actions of the human being. The problem is to find the interest of the new generations towards this type of content, which in many cases are even unaware of its existence, as has been observed in some of the experiments carried out in this work. It is one of the consequences of the culture of fragmented knowledge or the mosaic or tile culture, where, like a great puzzle, the parts that compose it do not find the correct and reliable links with each other.

Besides, there is an antipathy towards reading long texts, since the attention of users to new technological devices has generated a loss of innate or acquired capacities, from early school age. One of them is concentration. However, Escher's images can serve to re-engage the natural predisposition towards the development of the imagination and the 360° panoramic view of the context. These are two essential elements to solve problems in science and in everyday life. All this means that the new generations are unaware of the artistic movements and therefore, the artists, their works, their biographies, etc., because perhaps, in the secondary study programs they have been reduced and/or eliminated. On the Internet, a fragmentation and impoverishment of the cultural and natural heritage still persists. Furthermore, digital culture is governed from the formal and natural sciences by those who, from mathematics, physics, etc., expand towards journalism, culture, tourism, pedagogy, and so on. In this expansion, they appropriate the work of professionals in the social sciences, architects, restorers, etc., who throughout their lives have been overshadowed by mathematicians, physicists, industrial engineers, nuclear engineers, and so forth.

At the same time and after more than half a century, in the digital metamorphosis of emulating and simulating the real world in 3D, the empty world has been generated through computers. An empty world that is related to the metaverse, with a strong technological push but very poor from the point of view of content. Perhaps, it is the beginning of a cognitive and total manipulation of ICT users (Wilkins, 2019a; Wilkins, 2019b). Contrary to this immediate future, with the present work it has been possible to detect how from the design, the students are still interested in discovering the potential of the primary elements (points, lines, circles, spheres, optical effects, special effects with computers, etc.) to use them in the new audiovisual platforms, video games, educational interactive systems, and so forth. Through the use of desktop publishing commercial applications, programming languages, etc., and using the theoretical knowledge of plastic arts, graphic arts, new social media, and so on.

CONCLUSION

In the history of humanity, shapes, colours, textures, etc. have played an important role in representing the context, from the artistic point of view of reality. The context must always be present in the information whether it is objective or subjective. The human being has resorted to various methods and techniques to interpret and synthesize the elements of nature, in the support that he was using for their representation. In this communicative process, graphic design, on paper and digital media, has been essential for offline and online interactive multimedia communication and the democratization of Internet content. The

communication can be totally or partially immersive, at the moment of interacting with the new media. In addition, knowledge of the theoretical principles, experiences in the graphic arts, the use of computers and their various peripherals connected to them, the expansion of digital culture on the Internet, etc., has allowed the generation of new professions for thousands of workers: web design, web content, web master, web communicability, and so forth.

In Europe, the cost of hardware and software determined in the graphic arts the formation of two groups of professionals in the field of the first interactive multimedia systems. At the beginning, both groups were essential in the digitalization of the contents in the analog support in the European south, and later, for the new digital media, whether static (text, painting, photography, etc.) and/or dynamic (video, 2D, 3D animations, etc.). While in some university academic contexts, since the 1990s degrees have been issued to graduates in fine arts, uninterested in the use of desktop publishing commercial applications or the programming of interactive systems. However, they formed elite. In this elite, the role of "actors" within social networks allows them to negatively criticize artistic work with new technologies (robotics, virtual reality, full body interaction, social communication with mobile devices, 3D printing, etc.) of which they lack technical and scientific knowledge, for example. In their actions they go beyond destructive criticism aimed at the contemporary artists and the classics of the Renaissance, Impressionism, among others.

This position of pseudo-superiority allows them to practice and promote plagiarism freely, or transform a film like "Inception" into a university master's degree. Unquestionably, actions of this type have a negative impact on artistic content on the Internet, university education, scientific research, knowledge transfer, tourism, the safeguarding of cultural and natural heritage for future generations, etc. Some examples are the results obtained in the present work, through the experiments carried out with international students, when trying to locate Escher's works online. That is, an artist whose works can motivate the creativity of future generations and eradicate youth apathy towards culture, in the new millennium. Except for the official portals of Escher in the Netherlands, there is still no complete catalogue of the evolution of his works, in the various supports for interactive communication.

Fortunately, in the analysis of the realism of the images in the cinema, where the actors are within Escher's works, he tends to emulate the original woodcuts (film "Night at the Museum 3"). It is interesting to observe how in this work not only are Escher's works correctly contextualized in a museum gallery, but also the real actors intermingle with the characters in the work, acquiring the same texture as the original painting. The "Monument Valley" video game is another excellent example, from the point of view of communicability, computer graphics (rendering), 3D computer animation, interactive design and creativity. In short, Escher's works continue to stand as role models in the realm of innovation, originality, and universality. Like the works of the Impressionists and the Renaissance, implicitly and explicitly, in Escher there are revolutionary scientific notions that transcend borders and the passage of time.

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Chapter 4
Horizons for Information Architecture, Security, and Cloud Intelligent Technology: Programming, Software Quality, Online Communities, Cyber Behaviour, and Business

ABSTRACT

This research reviews the new horizons of the main components of new network technologies. The analysis begins using the technique of the inverted pyramid that ponders the commercial aspects in the evolution of information technology, with the human being as the central axis. Finally, the use of a new technique called "inverted cornucopia" (analysis of the abundance of neologisms and their metamorphosis) is disclosed to examine in scientific information portals and the professionalism of the representatives of the educational context, who are related to ICTs from a transversal perspective of sciences.

INTRODUCTION

Following the notion of the inverted pyramid to analyze the technological and human context in the new millennium, we find that finance and economics occupy a preponderant place in the information society (IT). These two social components have transformed each fundamental pillar of societies that are usually called developed, industrialized, emerging, developing, etc. (Verma & Dawar, 2019; Zysman & Kenney, 2018). In this set of denominations, the cultural and educational level of a society can have an inverse relationship to the level of economic development. In other words, a high level of economic development is not always synonymous with a high cultural and educational level of a society. However, the central column of humanity such as education and health is being managed as companies.

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Companies that must provide benefits, regardless of the ethical tactics pursued to achieve this end. Therefore, education is a business. Public universities entered this business first, then institutes, high schools and training centres, until reaching primary education. The mechanism used is data from the macro economy, related to statistics, and algorithms generated for the Internet, in highly industrialized or developed countries, from online search engines (Tennenholtz & Kurland, 2019; Hartmann, 2016; Cipolla-Ficarra, et al., 2018a).

In this research work we consider finance as the practical aspect aimed at companies and businesses. While the economy is the social science that studies the resources, production, generation of wealth, distribution and consumption of goods and services in order to satisfy human needs. Hence, the need to investigate how online businesses influence communicability and user behaviour (end user who must be considered as a social and gregarious being). An exam carried out under a dualistic vision: Theoretical and practical.

BUSINESS AND ICTs

The new information technologies have given rise to a constant (r)evolution in the labour market, with the creation of new professions, based on the evolution of hardware (Christensen, 1997). This (r)evolution that ranges from software programming to the design of apps for multimedia mobile telephony or three-dimensional printing, to name a few examples (Godbolt, 2020; Ye, 2022; Cipolla-Ficarra, 201 la). The initial dimension of these activities does not require large investments or physical spaces for their development, since they are service- oriented. Nor is it necessary to have sophisticated university degrees. Today, many of these new activities in the field of ICTs have their origin in educational fields, following Californian models of micro-enterprises. For example: SMEs, start-ups, spin-offs, cooperatives, and so on (Khodaei, et al, 2020; Assisi, Raghava & Ramnath, 2019; Cusumano, 2013). Some models of these small companies or labour cooperatives serve to group workers in marginal areas due to illiteracy, unemployment, citizen insecurity, etc., in America, Africa, Asia, Europe and Oceania. Unemployed students, teachers, and collaborators join their knowledge and experiences to generate synergies, with positive results, in the creation of goods and/or services (Kim, et al., 2008; Raman, 2021).

In the 20th century, many small European industries within the four traditionally thriving regions (economic point of view) such as Auvergne-Rhône-Alpes (France), Baden-Württemberg (Germany), Catalonia (Spain) and Lombardy (Italy), have become important multinationals and have seen their dividends grow with globalization. However, they were industries related to the productive sector of goods: Mechanical, textile, chemical, and so forth. **With the information society, micro-enterprises related to computing and all its derivations serve as models for new professionals in the field of ICTs and** a **guaranteed job opportunity for former students of certain educational centres, ranging from vocational training to elite universities in Europe.**

Some of these business projects are subsidized by government, banking, commercial, industrial entities, and so on, thus obtaining social and business recognition in the short or medium term. However, more than 75% are destined to fail, due to the ups and downs of global finances, endemics or pandemics, automation of manual work, etc., which affect all geographical areas, including those four regions of the European economic engine. Currently, Spanish satire attempts to humorously warn young people of the consequences that setting up or collaborating in micro-enterprises can have. We can see some

Figure 1. A startup incubator is a company that helps create and boost technology businesses by building teams of hyper-motivated young people who aspire to be the next Bezos or Zuckerberg. And tell me, what is your role model? Jobs? Bezos? Page? Musk? Well, I don't know... Which one has more money? You just need this attitude!

original examples (figures 1, 2, 3 and 4) belonging to the magazine "El Jueves" (www.eljueves.es) from Barcelona, Spain.

The motivation to follow models must be found in the psychological and business sphere, coming from elitist environments in developed societies, such as private universities, foundations belonging to them, banks, financial and investment funds, industrial or employers' associations, etc. (Cipolla-Ficarra, 2013). A cornucopia of terms and phrases that go beyond the field of education, psychology and finance, entering neuroscience and countless disciplines in the social sciences and computer science. Some examples that reveal the presence of this irrational and illogical cornucopia are the following: Business models within organizations; Creating and managing omni-channel service ecosystems; Customer experience and personalization; Design the customer experience strategy; Design thinking; Emotional design, Emotional UE, HCI and UX; Creativity training; Experiential learning training; Holistic retail design; Innovation and entrepreneurship; Leadership executive education; Lean startup; Multidisciplinary teams managing; Neuromarketing indicators, and an extensive etcetera.

Figure 2. Startups where workers earn a pittance or nothing at all, except for promises, "emotional salary" and a derisory percentage of the company that, if things go well, would be diluted with new investors. Well, Steve Jobs started his empire in a garage, and I'm living under a bridge... There's a connection there!

From this cornucopia, it is easy to extrapolate notions that have been fashionable in the information society in the new millennium: Emotions, personalization, training, motivation, ideas, thoughts, mind, neurology, disabilities, handicaps, innovation, creativity, talent, learning, teaching, multi / inter / intra / trans / poly ... disciplinarity, collaboration, entrepreneurs, leadership, incubators, SMEs, ecosystems, recommendation systems, social networks, virtual worlds, gender, feminism, etc.

This infinite expansion of trade in services, through neologisms, temporary decontextualization of terms and inclusion of irrationality, among many others, is generated mainly from finance and wild mercantilism, resorting to psychology and the "interface of humanistic informatics." Besides, this umpteenth neologism is appealed to lure the public to the implicit authoritarian doctrine, through the illusory approach to the religious congregation, which currently presides over the Roman church. Now, psychology and theology are the main roots of these deviations and their ramifications range from anthropology to telecommunications, through the phenomenon of "kitten education" for the oligarch elite. An example of this education is summarized in figure 5. In the following references, this phenomenon and the con-

Figure 3. That's why many of the CEOs at the helm of these startups are rich daddy's boys who can afford to play entrepreneur and not make a profit for years. To succeed in a startup you have to have perseverance, effort and a little luck. Being born into a rich family, of course. Ha-ha!

sequences verified since the beginning of the new millennium can be deepened (Cipolla-Ficarra, 2013; Cipolla-Ficarra, et al., 2016; Cipolla-Ficarra, et a1., 2018).

The damage caused by this typology of "elitist and oligarchic comets" not only affects the commercial field but also the educational one, starting with the behaviour of students and ex- students. That is, professionals who currently provide their services in the labour market. Some of them have had contact with or been influenced by comets. These are comets formed with a model based on persuasion, deceit, lies, narcissism, incompetence, ignorance, attack and destruction (Cipolla-Ficarra, 2010b). **The model is based on obtaining high economic benefits, in the shortest possible time, with zero responsibility for the actions of the participating agents.** Hence, the decline of countless initiatives or positive projects on the Internet that have been sabotaged to the point of their destruction, because they did not generate benefits for the pinnacle of power, in the real and/or virtual world.

Figure 4. In fact, the first round of investment is openly known with the three F's: "Friends, Family & Fools." Literally sucking the bucks out of friends, family, and FOOLS. Just a moment! but we are not family or friends ... We've only met twice on the subway! Are you calling me dumb? Not at all! If you invest five thousand euros in my startup I will love you more than my brother!

CYBER BEHAVIOUR AND ONLINE COMMUNITIES

In our days, social networks have changed the method, techniques, strategies, etc., teaching inside and outside the classroom, for example (Ling & Ling, 2016). Following some educational models in which the roles of teachers and students can be reversed, supposedly to increase the results in the acquisition of skills, knowledge and abilities, it has been detected that the problem lies with the teachers and not with the students, in social networks.

At the origins of the democratization of the Internet, courtesy protocols or guidelines were established in responses to emails, options were enabled to freely include comments or opinions in the news of digital newspapers, extracurricular activities that students could do in their homes, through the use of the Internet, resorting to various channels for receiving and broadcasting the results of such work, and so on. All this has practically disappeared with the rise of some applications on social networks, where the first static image (photography) and then dynamic (video) has surpassed interest in textual

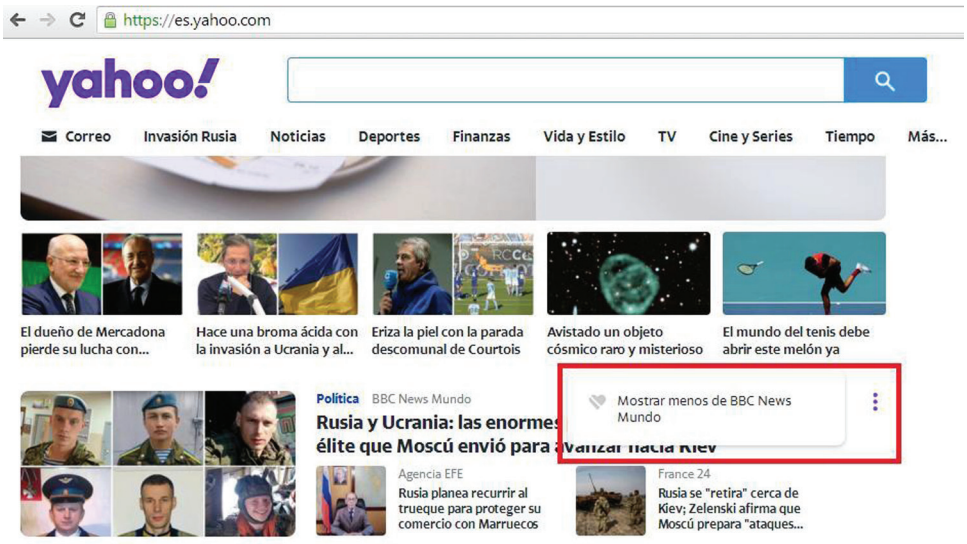
Figure 5. In a decade, in certain geographical contexts of the European Mediterranean coast, it is possible to obtain bachelor's degrees, master's degrees, doctorates, etc., while holding positions of high business responsibility. This bad example not only becomes a role model, but professionally, it transcends national borders.

information (Ware, 1999). An example, in this sense, is the inclusion of the time needed to read news online. Generally, in Yahoo.es, they should not exceed 5 minutes, although it is possible to verify not only the ease or reusability of informative content from other social network applications (YouTube, TikTok, Facebook, Instagram, Pinterest, etc.), newspapers, television, radio, and so forth, but also, the minimum intellectual effort required towards the readers, given the banality or triviality of many of the topics covered. A banality that serves to form online communities, currently also called virtual. In all this triviality there is a constant evaluation or feedback with the user, as can be seen in figure 6 and 7. That is, the user can eliminate a source of information.

In the case of figure 6 it is BBC news *Mundo* (World) and in the case of figure 7, Cosmopolitan. It is a mechanism to discharge the responsibility of Yahoo.es due to the lack of its own human resources to generate news. That is, the constant "copying and pasting", among other disinformation, manipulation, promotion of racism, etc., in the information service of said portal (in Spanish), over the decades (Cipolla-Ficarra, 2018c).

The origins of online communities coincide with the increase in collaborative work on the Internet. For example, in computer-aided design, through the first commercial applications (AutoCAD, CATIA, Rhino3D, Solidworks, etc.) when distributed engineers, all over the planet, could make improvements to prototypes or correct errors detected in the mechanical components, for engines destined for automobiles, trains, ships, and so on (figure 9). These components have been stored in databases, over time. Some databases that have been the central axis for marketing through B2B companies (Business-

Figure 6. Yahoo Spain and the source of information elimination (BBC news).



to-business). At the beginning of the new millennium, some of them succumbed to the crisis of virtual companies. However, many of these databases are currently freely accessible online.

Another area that allowed the first online communities to be formed was distance education (figure 10), either partially (virtual classrooms) or totally (virtual universities, for example, the UOC —Open University of Catalonia, in Barcelona — Spain (Cipolla-Ficarra, 1996). In both cases, the figure of the tutors has guided the students in each of the tasks to be carried out and various types of communications were established between the participants of these interaction processes: Personal, unidirectional, group in a sequential way, group in a star and group in the form of a circle. The combination of these last two is ideal for the development of collaborative activities that depend on a leader or person in charge. In figure 11 there is an example of it.

Finally, there is **the advancement of online video games. The latter determined the exponential expansion and globalization of online communities.** Some video games (from the past and new millennium) are: Battle Royale; Castle Crashers; Destiny 2; Dragon Ball Fighter Z; FIFA; Final Fantasy;

Figure 7. Yahoo Spain and the source of information elimination (Cosmopolitan).

Figure 8. By clicking on the three vertical points of the news, the user supposedly has the possibility to eliminate the sources of information, from which the news is copied to the portal.

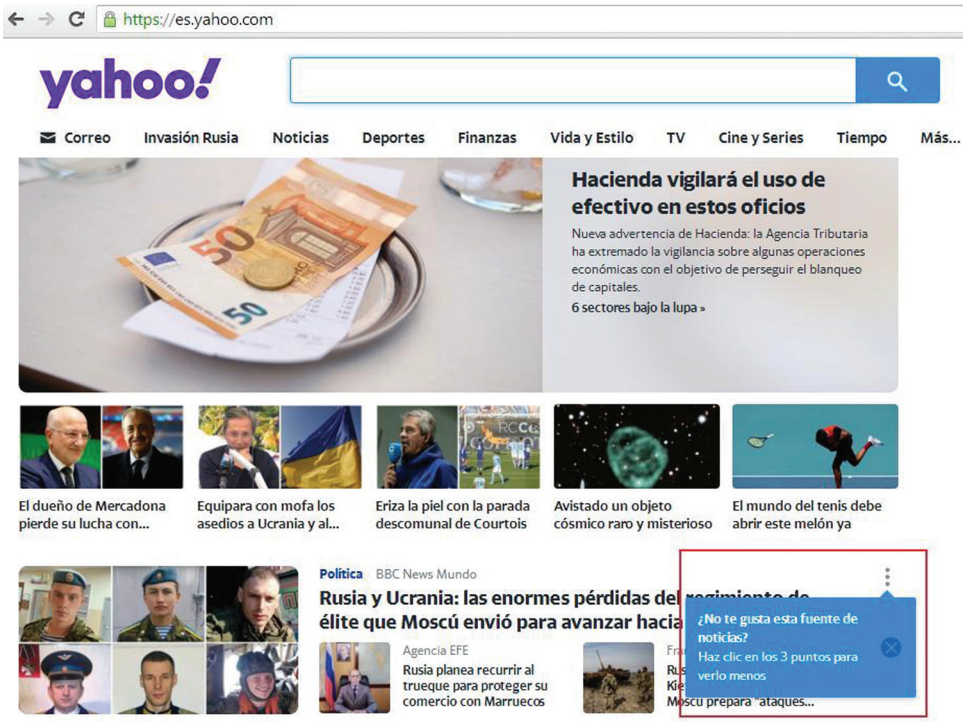


Figure 9. Interface of the Rhino3D software for the realization of 3D objects, where the exchange of information through the online communities of designers on intranet networks and the Internet allows problems to be solved in record time and without the need for physical travel.

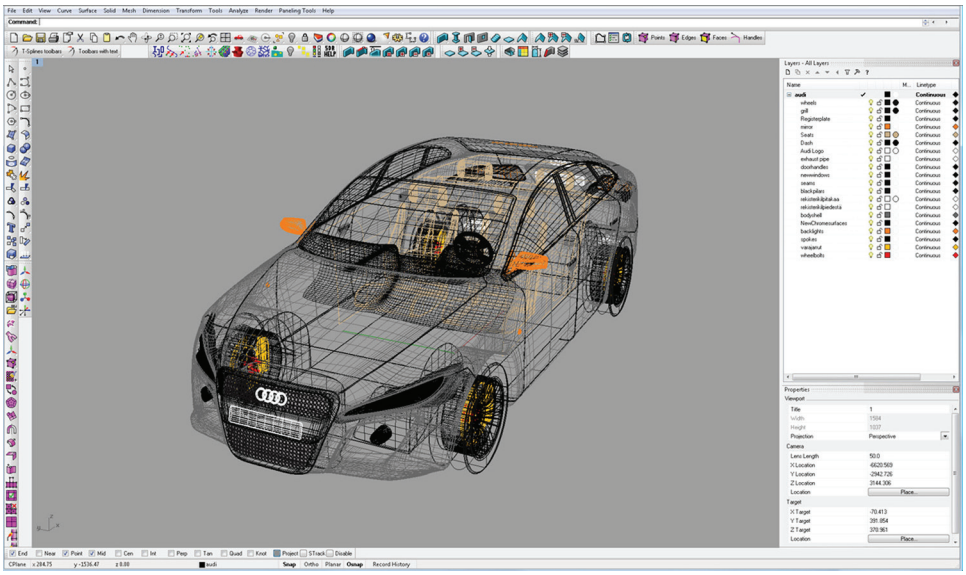


Figure 10. Interface of the first interactive system for communication via modem in one of the first totally virtual universities in the EU: Open University of Catalonia (www.uoc.edu).

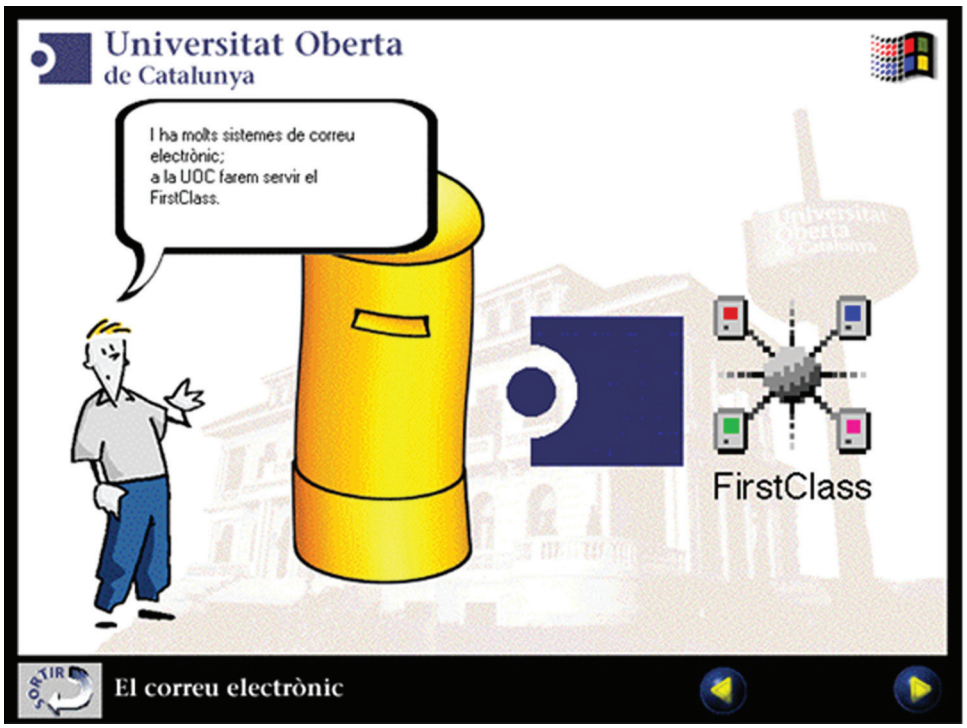


Figure 11. Ideal organization to obtain good communicability in the development of collaborative activities, with a person in charge.

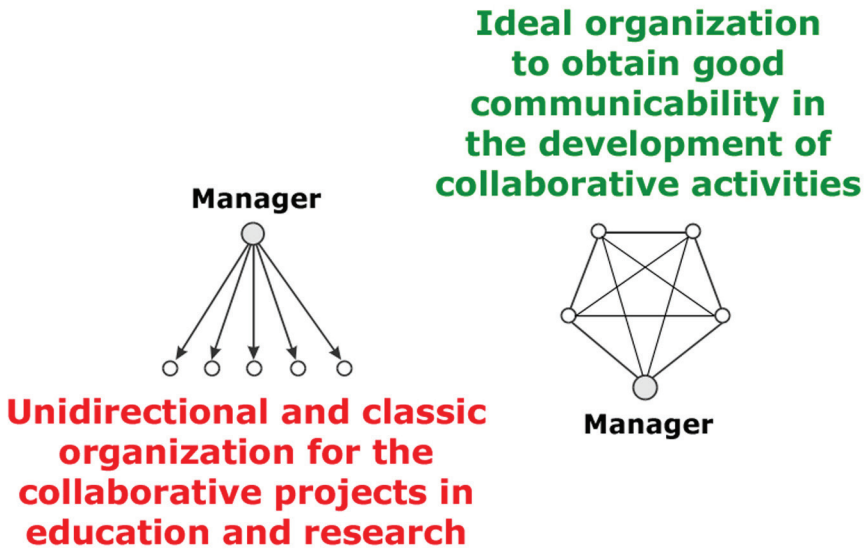


Figure 12. In the video game "Super Smash Bros. Ultimate" there is more than 100 scenarios, with about 70 characters, and it allows up to 8 players (www.nitendo.com).

Hearthstone; It Takes Two; Journey to the Savage Planet; League of Legends; Monopoly Plus; Overcooked! 2; Pokémon Sword and Shield; Sea of Thieves; Super Mario Maker 2; Super Smash Bros. Ultimate; Tabletop Simulator; Warcraft III: Reforged; Warframe; World of Warcraft; and so on. Video games and gamers that started on personal computers and spread to other platforms such as Android, iOS, Nintendo Switch, PS4, PS5, Stadia, Vita, Wii U, Xbox 360, Xbox One, Xbox Series, and so forth.

This evolution over time of video games in the field of hardware and software shaped one of the most thriving industries in interactive audiovisual. The multiplayer option favoured international cooperation in the creation of clubs, associations, organizations, etc. of fans, who constantly requested new versions of them. This has been one of the main motivations for the developers, who include new developments from computer graphics and hardware, in order, in some cases, to obtain a total immersion of the players in these virtual worlds.

Basically these three areas (work, education and videogames) have generated a behavioural synergy that has lasted over time (Zackariasson & Wilson, 2012; Rahimi, et a1., 2019; Cooper, 2021). The first video games on the PCs (Pac Man, Tetris, SimCity, Lemmings, etc.) in the computer rooms served as a pastime or reward, once the teaching levels proposed in the educational day had been achieved. The maximum time did not exceed 20-30 minutes, after 4 hours of lessons. Through these "recesses with video games" high rates of socialization were achieved inside and outside the classroom. A natural process of mutual help could be observed between expert colleagues (generally they had personal computers and/or game consoles at home) and those who were entering the world of video games.

This socialization and daily rewards allowed to generate dynamic and motivated work groups for the resolution of problems related to science: Mathematics, physics, chemistry, computer science, and so forth. Another positive and daily experience was reproduced in the areas of private education for learning applications related to the first operating systems, word processors, spreadsheets, databases, CAD, artistic drawing, computer animations, and so on. Generally, the class was made up of students of various ages and levels of personal computer use, but they all shared the same computer room. Those 20-30 minutes of video games made it possible to eliminate generational barriers between the various students, creating a pleasant atmosphere of collaboration between them. In both examples, the role of teacher disappeared and occupies the same level as the rest of the students before video games.

Figure 13. In Super Mario Maker 2, there is a set of instruments or tools, from which the multiplayers can generate the levels to overcome (www.nitendo.com)

Over time, this strategy has allowed many of these former students, inserted as professionals in the job market, to maintain an interrelation with their former classmates, workmates, etc., through online video games. Therefore, there is a triadic relationship that feeds off itself harmoniously. An outline of it is in figure 14. The reader interested in other excellent results, of these strategies implemented in the context of computing and all its derivations, with didactic purposes and to eliminate generational barriers, encourage participation in the classroom, increase camaraderie, strengthen solidarity to solve problems, facilitate the learning of complex subjects, etc., can be consulted in the following references (Cipolla-Ficarra, 1996; Cipolla- Ficarra, 2010a; Cipolla-Ficarra, 2011b).

There is currently an unnatural tendency to transform education into a simple role play. Education cannot be replaced by "serious games" and the rest of the combinations that can be established

Figure 14. Continuous harmonious cycle of feedback between users, education and videogames, when the members of the real and virtual community know each other beforehand.

from this notion, either from the point of view of wild educational marketing or extreme educational marketing, which goes from childhood to adulthood, in public or private institutions, under the business model, for profit. The problem of roles is not in the students but in those teachers who define themselves as artists or supporters of humanistic computing, didactics and specialized pedagogy, and so on.

Hence the abusive use of social networks to promote themselves as the brand of a commercial product or a candidate for elections. In other words, they resort simultaneously to the techniques of marketing and propaganda (Ramanujam & Tacke, 2016; Stanley, 2016; Kasemsap, 2015). The consequences of these deviations can be seen in the behaviour of their students / former students, inside and outside the classroom: Arrogance, insolence, intolerance, xenophobia, violence, persecution, bullying, cyberterrorism, and so on (Cipolla-Ficarra, 2010b; Cipolla- Ficarra, 2013). That is, individuals who occupy the dark zone of the Internet.

Following an old popular saying with regard to commerce, it is often held that: "The customer is always right." Supporting or being guided by such an expression gives rise to disastrous consequences for individual freedoms and the generation of new professionals; especially, in those institutions where the students are "clients" and therefore, they and the teachers who are in favour of their corrupt games or shenanigans rule.

In many places in the old world, it is possible to verify how they are capable of causing irreparable damage, with a simple anonymous letter addressed to the director, a rigged survey of the teacher's evaluation, the bought opinion of businessmen in the university governing body, etc., among many other stratagems. The final objective is to sink the quality of the educational system, alienating the excellent teachers of mathematics, physics, chemistry, etc. from employment. For the latter, having the best professional and academic credentials is useless.

The science / ICT teachers (i.e., information retrieval, computer science, mathematics, recommender systems, artificial intelligence, robotics, telecommunications, human-computer interaction, children-computer interaction, embodied interaction, usability engineering, user experience, and so on) who are metaphorically devoured by behaviour typical of a kind of anonymous pack of hyenas, which circulate freely on the Internet. This is another of the consequences of the Omega generation that fosters the culture of fragmented knowledge or tile culture (Cipolla-Ficarra, 2022). That is, **an abundance of poor content knowledge, not very well interconnected with each other and that affect the three letters "CKC" of the human being, in their educational process: Competence, Knowledge and Capacity.**

As illegal behaviour on the Internet grew, the fundamental freedoms and principles that were promoted and expanded with the democratization of the Internet diminished. One of them is free access to information. However, from the dark zone of the Internet, the illicit behaviour of small groups of power (cyberterrorism, cyberharassment, and so on), began to vilify and discredit the opportunity to freely express opinions, in the news of digital newspapers, for example. Faced with such events, the newspapers had to implement moderators in the forums. Generally, today, if people are not previously registered, they cannot express their opinions freely.

Therefore, it is feasible to exercise prior censorship. At the same time, these individuals, after destroying free accessibility to free information online, now hide behind the tutelage of the Court of Justice of the European Union (CJEU). Some examples are online search engines and/or social applications (i.e., Google and Meta), including blurring effects on faces, logos, etc., in photographs and online videos; require prior authorization for the dissemination of acts, public documents, and so forth.

The latter is a great contradiction to the freedom and transparency of the acts of these European public officials, with regard to the rest of the community to which they belong. The "community" pays the

salaries of its public officials through taxes. Moreover, since the global financial crisis of 2008 citizens can freely access accountability in the portals of these institutions, under the transparency regulations of the acts, their costs and information about them to the general public. However, once again, certain criminal online communities (i.e., 'G' Factor) are above the rules that govern the structure of community information (Cipolla-Ficarra, Quiroga & Carré, 2014; Cipolla-Ficarra, Quiroga & Alma, 2014; Cipolla-Ficarra, 2021).

PROGRAMMING AND SOFTWARE QUALITY

Qualitative human capital in the software industry can be denoted in those groups of people who have made the most of the advantages of new technologies within the classroom (Cipolla- Ficarra, 2021). People who have absorbed knowledge and experiences, coming from teachers (unrelated to egotistical models) with a high theoretical-practical capacity in the subjects they teach. In addition, these are teachers who have been able to convey the importance and motivation of collaborative work in a transparent, balanced and constant way, always considering video games as a mere hobby, for example. In our days, the use of transmedia and the flipped classroom paradigm (Kalogeras, 2014; Raybourn, 2014; Green, 2020), to mention two examples, will not be able to reach the levels existing at the beginning of this millennium.

Teamwork is one of the fundamental elements in each of the stages of software development. The project manager, the analyst, the programmer, the tester and the software architect must form a compact and collaborative unit to achieve the proposed objectives of the project, within the pre-established times and costs, while maintaining a high level of quality. The incorporation of psychologists, anthropologists, sociologists, etc., in the development process of a computer system does not mean that an optimum level of quality is automatically achieved, as was foreseen at the end of the last century (Basile & Musa, 1991). Rather it is the opposite. These social science professionals, together with marketing purposes, generate not only neologisms without scientific bases, but also the correct relationship between meaning and signifier, within the language used in new technologies. The correct uses of language and design models are instruments that favour communication and generation of qualitative software (Cipolla-Ficarra, 2022).

Another of the problems detected in the inclusion of this group of social science professionals linked to the business environment is that they end up generating internal divisions by setting salary scales among the various agents of the productive and commercial process. So much so that the salaries of sales people in some software companies double or triple the salary of the programmer, for example. Therefore, here is one of the reasons why many computer scientists are dedicated to management tasks.

A classic example is universities where computer science graduates end up doing administrative or managerial tasks because of the salaries. These computer experts cease to be so when they are part of the university management structure. In other words, many of them are not able to pass the exams of the students of the first courses of software engineering, systems, computer science, robotics, and so on.

Consequently, there is always a constant and growing demand for analysts, programmers, etc. This demand continues, added to the type of short-term contracts, and means that software companies have a perennial personnel turnover process. This reality implies, in turn, having to continually train new candidates. Something similar occurs in the educational field and the teaching of exact sciences. That is, there is a lack of teachers of mathematics, physics, chemistry, etc. This lack has been reflected in the distance education crisis due to the pandemic.

Job instability also affects the quality of software. Low wages and job instability, in many supposedly developed cities from an economic point of view, lead the new generations, interested in programming and/or new technologies, to decide to open their own personal businesses, under the format of small businesses, startups, scale ups, and so forth (Ramanujam & Tacke, 2016; Raman, 2021). This decision can also be promoted by the same government or educational authorities for those professionals who have reached the highest academic level (doctorate), who are invited to open business activities to generate role models for future generations.

Obviously, the degree of financial insecurity of these activities will depend on the place where they decide to open these companies, since this risk is not the same in California, Singapore, Japan as in all cities located in the Mediterranean Sea basin, for example (see Appendix #1). Although the costs can be contained at the beginning, through the system of business incubators that are subsidized by town halls, universities, chambers of commerce and industry, etc., the risk that is taken is that the good business ideas that cannot be sustained in the long term, pass automatically and free of charge to companies that are entrenched in the market. This is another of the risks of small businesses that cannot survive in the long term.

All these risks are sometimes assumed unconsciously by those professionals who have seen computing and ICTs as a safe and short-term source of income. There is an interest in carrying out studies in this sector, particularly by young people, even if they do not know exactly the labour or educational reality. Many young people who are enthusiastic or motivated by video games, for example, drop out of university studies in software engineering, computer science, systems, telecommunications, etc., when they cannot pass the first exams in mathematics, calculus and algebra. This is because the content and technological resources, inside and outside the classroom, are not adapted to the real context of these students. In this sense, it is easy to verify the statistical data of the labour market in the Iberian Peninsula. For example, in Portugal, some current data from the Ministry of Labour show that three quarters of young workers have not completed secondary education (figure 15). While other high school students in alpine areas are learning to program video games or robots (Cipolla-Ficarra, et al, 2018b).

Hence, many young people interested in programming begin to study in a self-taught way and make their first systems, without following the quality regulations (ISO - International Organization for Standardization), since they are unaware of their existence, because they did not finish their secondary studies or university. A complete list of the main languages requested in the international labour market, as well as the main issues related to qualitative programming can be consulted in the following reference (Cipolla-Ficarra, 2021).

CLOUD TECHNOLOGY AND SECURITY

The lack of complete or high-level university studies does not prevent these people interested in computer science, IT, automation, etc., from occupying management positions in these areas, in small, medium or large industries / companies, in some of the four European economic engines. For example, in the cloud they can perform network monitoring tasks, such as information traffic, make decisions on opening or closing communication channels, hire outsourcing services, DAAS (data as a service), HAAS (hardware as a service), PAAS (platform as a service), SAAS (software as a service), and so on. The cloud has facilitated the functions of these untrained people since they can refer to the outside the problems derived from the management and/or maintenance of servers, laptops, tablets, smartphones, PCs, etc.,

Figure 15. The title of the Portuguese newspaper "Diário de Notícias" (www.dp.pt — 06.04.2022) reads that Three Quarters of Young Workers do not Pass High School. Doctorates have doubled and graduates have increased by 52%. Data from the Ministry of Labour (Portugal).

through outsourcing, for example. However, externalizing all activities obviously not only increases the internal IT management costs of these industries / companies, but also shifts the responsibility for the malfunctioning of applications, platforms and cloud infrastructure to third parties.

Apparently, the cloud should reduce computing costs and simplify its management, since it allows remote data storage and the possibility of performing sophisticated calculations, to name a couple of examples. All this, depending on the requirements previously requested by the managers of the same. In this sense, the benefits of storing information in various places in the event of natural or artificial

disasters and being able to access information, applications, etc., from a smart phone or tablet PC can be pointed out what is desired. Therefore, there are three key elements or figures:

1) The service provider, related to virtual servers, database backup, etc.
2) The administrator, who is responsible for configuring the services offered by the provider, including added value such as software applications ranging from office automation to production control in an industry, for example.
3) The users who simply use those services pre-configured by the administrator.

However, these last two agents or figures can be merged, in the case of backing up the information of the data itself. That is, the end user is the one who manages or configures the service for himself. In some of these services you can see repetitive tasks that are carried out on a daily basis, such as the safeguarding of digital information. Tasks that are automated, and generally the human being intervenes to monitor and verify if they were carried out correctly or not.

Other tasks recently included in the cloud may be related to ERP (Enterprise Resource Planning), or HCM (Human Capital Management). Undoubtedly, these last two require qualified personnel to manage or direct them. Therefore, those managers who lack this knowledge are reinforced by collaborators, with high academic levels: Graduates, engineers, doctors, etc., in computing, systems, software, telecommunications, and so on. Reason for which, the lack of an IT services management with a poorly qualified staff and not up to date with the latest technological advances, considerably increases the costs in the field of IT services.

Services that must take into account computer security, especially in current times. Times that signal the end of globalization, as it was conceived in the ‘90s. In the new millennium, autocratic government systems have been strengthened, to the detriment of Western democracies, thanks to new technologies, as has been seen in the first two decades of the 2000s, with the economic crises (financial bubbles), health (pandemic), climatic (natural disasters), war (wars), and a long etcetera.

One of the tasks derived from the implementation of cloud technology is monitoring. A monitoring that has moved from computer processes to human processes. That is, the control of human activities, inside and outside the context of work, training, sports, and so forth. With programs such as Anydesk, Chrome Remote Desktop, Mikogo, Team Viewer, etc., remote access to any system and control from anywhere in the world can be verified. Consequently, the privacy of digital information practically no longer exists, since the computing devices are interconnected with each other. Wi-Fi networks have increased this problem to the nth degree. Hence the effort made from the field of formal sciences to guard WhatsApp messages, for example, in a mathematical code, through the use of end-to-end cryptography (text messages, sound messages, videos, etc., automatically encrypted, avoiding the intrusion of cybercriminals and hackers in the communication process). The cryptography opens up a whole universe of studies and research for the safeguarding of information in the quantum era of communicability.

Activating cloud computing services means that the user enters into a potential conflict in the event that their data is violated from the point of view of privacy, either by known people (network administrators) or unknown (hackers, cybercriminals, among others). For example, the administrator of the email server (whether or not it uses cloud computing services) can enter to read each of the messages received by the user, and when leaving, they can mark them as unread. Furthermore, Wi-Fi networks increase the phenomenon of computer hacking, with great losses for industries when industrial sabotage

or attacks through computer viruses occur (viruses that universally increase their appearance and spread during festive periods, for example). Although, it not necessarily piracy occurs from the outside, but also from the inside, due to human factors. Especially, those workers without a university degree (bachelor's degrees or engineering) hold management positions.

Some managerial or management tasks, today, depend 100% on third parties for technical issues. Those managers or directors are a source of constant problems. For example, in the acquisition of unsuitable software and hardware (purchases are made based on the interests of suppliers of computer goods and services), the reception and/or emission of computer viruses, industrial sabotage (the same external technicians, provide identical services between rival companies), dissemination of information to generate labour conflicts (between internal colleagues in the company), etc. A *modus operandi* that has been widely described can be consulted in the following reference (Cipolla-Ficarra, 2015).

Although large sums of money continue to be invested in computer security to prevent cyber attacks on public or private institutions; inventing new micro devices for human beings, through transdermal technology (chips implanted in the skin) in order to facilitate access to health information, use of public transport, etc.; biometric technologies and applications (Veripass, RemoteDesk, Verificient, etc.); among other. Biometric applications have reached their apex with the pandemic. In China, when getting on or off public toilets or on public roads, authorities identify people with a high temperature or fever. These applications are based on big data algorithms, AI, deep learning, IoT, recommender systems, sensors for input data acquisition, etc. For example, in the case of RemoteDesk, through AI, it allows continuous monitoring, guaranteeing the identity of the worker in a remote environment.

However, the inclusion of a computer virus causes the entire computer system to collapse in a few minutes, since almost 100% of human activities in large cities depend on software and automated systems. Once again the human being is faced with the eternal dilemma of the correct use or not of new technologies, through interactive communication, algorithms and the constant evolution of hardware, such as quantum computers and mechatronics.

INFORMATION ARCHITECTURE

In the evolutionary process of the denominations acquired by the activities related to the generation of web pages, intranet, extranet, etc., and their extension on the network, through concepts such as multimedia, AI, IoT, RV, deep data, etc., we find the use of the notion of "information architecture". This notion is necessary to break down for a better analysis of it.

On the one hand, and etymologically, the term architecture cornes from Indo-European languages, such as Greek (ôp/tiexzmv, architéctön) and Latin (architectüra, architectürae), which means "chief builder." Traditionally, it is the area where art and technique are combined to project and build an environment (basically to cover one of the three basic needs of the human being: housing), through the organization of space. Hence, it is indirectly related to the birth of science, since the human being ceased to be a nomad and began to be sedentary, with agriculture. This change led to the need to build houses, towns, cities, etc. In this way the first cultures of the Middle East were born, with all their scientific achievements, such as Mesopotamia and Egypt. The interested reader about history, technology, inventions, etc., can consult the following references (Singer, et al., 1954; Bynum, 2012; Martin, 2014) on the origins and evolution of science.

Figure 16. Fraudulent use of social networking. For example, in the inclusion of courses in universities, without specifying the duration, the level reached, etc., to justify the charge of "irresponsible and ignorant" for the correct management of computer services. The technical tasks are delegated 100% abroad (outsourcing) from century-old industries (Lombardy, Italy) and the internal staff is controlled from abroad.

On the other hand, there is the notion of digital and online information. By contrasting analog and off-line information, we can focus on the transformation process from analog to digital information, through the first multimedia systems, in the 1990s. Where, graphic and visual information have had, have and will have a predominant place in human communication. For this reason, architecture combines aesthetics and functionality, which extrapolated to the web, leads us to the hybrid notion of user experience (UX). A notion that is related to usability engineering and the five basic principles defined

by Nielsen, for the first hypertext systems, especially when users did not have PCs or access to them to learn how they worked. Consequently, they were illiterate in the use of personal computers.

Today, with the UX, the term of positive emotions that the fruition of an interactive system must generate, by users, has been added. In addition to that term, a wide spectrum of other notions are included, ranging from graphic design and information architecture, through interactive design, accessibility, aesthetics, cognitive psychology, human-computer interaction, and so on, to reach marketing, statistics, among many other areas that go beyond the network.

From a historical, technical and computing perspective, information architecture dates back to the IBM company in the US, between the 1950s and 1960s. The first theoretical bases appeared when Frederik P. Brook published his book "Planning a Computer System: Project Stretch" (Brook, 1962). In it he argued the need to consider the computer as an architectural work, to meet the needs of users, depending on the available resources. However, in 1976 that expression was used for the first time in the book "Information Architects", whose author is Richard Saul Wurman (Wurman, 1997).

In short, so far it can be seen how inquiring into a new terminological cornucopia takes us from mid-20th century computing to user experience at the beginning of the 20th century, where several people dedicated to computing, visualization of information, graphic design, urban planning (architects), etc., make use of this notion.

From the point of view of software engineering, interface design, communication and human- computer interaction, reference is made to one of the categories of interactive design: Structure (Cipolla-Ficarra, Carré, & Ficarra, 2018). That is, the way of structuring the dynamic and static content of an online or offline interactive system, to satisfy the user's requirements, in an intuitive, simple and fast way. Wireframes, organizational charts, etc., are instruments that allow the architect to develop a navigation structure that is natural and that can infer a priori the skills of potential users, based on the organization of the main categories that are in a portal: structure, navigation, content, layout, etc. These portals are constantly evaluated by search engines, through link juice. In the case of Google and other search engines, the higher its index, the higher a web page is positioned on the network, occupying the first pages. Controlling those links like popularity ratings, portal structure maintenance, etc. is a typical task for portal developers. Nowadays, this evaluative task is carried out by information architects, web engineers, multimedia engineers, webmasters, web designers, etc.

In the case of online information, many of these professionals usually follow the same principles of the digital newspapers of the 20th century. In few words, there is a content that must be structured and presented online, before a potential of millions of users who can access it. Therefore, there is a corporate image to consider; a selection process of the content to be used and the type of interaction (active or passive); data that is shared by multiple / partial / authorized, ..., users; inclusion of suitable tags on web pages, to optimize the location in search engines, and so forth (Tiganov, et al., 2022; Fried, et al., 2020; Myers & Stylos, 2016). If we carry out a new analysis of the current literature on university education offers, referring to this topic, we find an endless potpourri of terms (nouns and adjectives) such as: Interface, design, metaphor, methodology, reengineering, persuasion, emotion, empathy, usability, reusability, effectiveness, transversality, searchability, findability, recoverability, scalability, etc. However, in this infodemic, with regard to information architecture, presented as a new discipline of study, the fundamental aspect of the communication process of the new millennium is excluded, through new technologies: Communicability. **The quality of interactive communication remains the central axis. Since the 20th century, it has been verified, in each of the successful or unsuccessful stages, within**

the periodic transformation of information technology. Evolutions or revolutions aimed at improving the synergistic quality between human beings and new technological devices, including computers.

Now, in this artistic and scientific process of generating new spaces on the web, making them unique from the point of view of image (graphic, corporate, etc.), it is easy to detect the conceptual differences for an architect's design, particularly, at the moment of intuiting and inferring the emotions / tastes / desires, etc., of generations X, Y, Z and Alpha (Cipolla-Ficarra, 2022). In those erroneous situations of that task, the main cause is to be found in the lack of theoretical knowledge and/or little interest in the daily information of the community of origin, belonging or adoption, through the traditional means of social communication. The study and practices with graphic information in the format of digital newspapers is an optimal solution to solve these problems (Cipolla-Ficarra, F., et al. 2018a).

INVERTED CORNUCOPIA

The written word has always been one of the main sources of human evolution. The printing press made it possible to spread the knowledge accumulated over centuries in the form of books, magazines, newspapers, weeklies, almanacs, etc. Knowledge that was democratized and spread from the top of the population pyramid to the bottom, given the high cost of the first publications in book format, encyclopaedias, etc., in past centuries newspapers and magazines were an interesting source to better understand the work of the information architect (Dalton, et al., 2016; Rosenfeld & Morville, 2002). In situations of global crisis derived from natural and/or artificial phenomena, they allow students to be motivated to work in groups, inside and outside the classroom, for data collection, processing and generation of digital information, to be shared among users, belonging to or no, to the same generation. Currently, there is a tendency to collect information on social networks. However, this tendency can be corrected by directing students to search for information in other sources of information, such as consulting books in libraries, conducting interviews with journalists, authors of publications, presenters of television programs, radio, etc., Internet celebrities or influencers, etc. The purpose is to compare and verify the data obtained, before being published online, for example.

From this analysis work, the same students can discover how in social networks, there are portals related to scientific knowledge, where their authors constantly manipulate online information. This is the case of the information accumulated in Google Scholar (scholar.goog1e.com) and Research Gate (www.researchgate.net) which, through keywords, has allowed the generation of a new heuristic evaluation technique of the veracity of online information called "inverted cornucopia." It is the analysis of the abundance of neologisms (generated with wild mercantilist purposes) and their transformations, in the portals of scientific information.

Portals where there is supposedly the best level of experts on certain topics, the exact representation of reality, labour transparency, objectivity of information, professional ethics, etc. Areas where hypothetically the human and professional quality predominates, of the representatives of the educational context, which are related to ICTs, from a transversal perspective of sciences.

A group of 18 students (9 women and 9 men) belonging to the Z generation, have been guided in the basic notions of the traditional press of the 20th century and in the first educational and informative multimedia interactive systems (encyclopaedias, dictionaries, yearbooks of the press, etc.) under the triad inform, train and entertain. This triad has been extended to other positive and negative actions of mass communication, such as forming an opinion, persuading, manipulating and provoking. Starting

from a universe of analysis of 45 European universities, they have been able to detect the predominance of negative actions over positive ones, carried out personally by those professionals who have the highest level of Spanish university studies. In few words, lies prevail over truth, deception over honesty, camouflaged ignorance over manifest wisdom, subjectivity over objectivity, religious mercantilism over lay gratuitousness, autocracy over democracy, egocentrism over simplicity, the theft of personality over professional originality, etc., in all those men and women that theoretically splendidly guide the current educational and scientific process for future generations. The following table (Annex #1) lists the terms that vary between the Google Scholar and Research Gate portals. Also, they are indicated if these keywords or topics of interest are constantly changed by their authors (i.e., metric "binary of presence": Yes or No), depending on the fashions of the neologisms, since they do not have individual publications that are related to them. Finally, the names of the authors are excluded for privacy reasons, but the university centres are included. This research work will continue in the future. Besides, this first list of university centres can be regarded as a mini guide for those students who wish to pursue higher education or specialization in computer science, human-computer interaction, digital arts, software engineering, pervasive computing, web engineering, learning ecosystems, AI, information retrieval, mixed reality, affective computing, digital cultural heritage, computer graphics, and so on. In short, studying at these universities is discouraged, regardless of what their statistical indexes of educational quality (national and international) indicate, because the ethical and professional value of the academic staff is practically non-existent.

Through the results of the table it has also been possible to verify how the changes introduced in the keywords of the scientific portals are also reflected in the personal portals of these individuals, either in their curriculum vitae, as in the web pages of universities or other information portals that promote them. Lastly, another of the deviations derived from the constant change of keywords is the provocation and persecution of their victims to steal their professional personality. Subsequently, today, the information in some databases and websites (i.e., Google Scholar, Research Gate, Scopus, DBLP, ACM and IEEE), the algorithms for the indexation, etc., are not reliable, exact, and true 100%.

LESSONS LEARNED

The expansion of the Internet towards the most varied aspects of the daily and professional life of human beings has opened a cornucopia of neologisms, for advertising and propaganda purposes. In each of the sections of this work, the presence of some social science professionals, such as psychologists and anthropologists, who have left their scientific role to focus on the tasks of promoting wild mercantilism, inside and outside the educational field, is confirmed. The consequences of such actions are negative, particularly if we consider the new horizons that must be drawn for future generations through the art of combining knowledge and experiences, in a broad and well-structured manner, excluding the current situation derived from the culture of the tile. At this time, guiding these new generations can be a complicated task, due to their fragmented knowledge, perceived and received from the network. However, a joint effort between young students and teachers achieves interesting results, given a critical and constructive analysis of online scientific information, mainly in the field of social networks, such as the technique called "inverted cornucopia." Obviously, that effort will not change the behaviour of these individuals, but at least students have new tools to evaluate future teachers and/or researchers, before enrolling in university careers, specialization courses, master's degrees, doctorates, post doctorates, etc.

CONCLUSION

The democratization of the Internet has served to generate millions of jobs and concentrate wealth in a handful of companies, which today occupy the pinnacle of international economic and technological power. It is true that ICTs have been promoted, but so has the infodemic.

After the pandemic, Web3 looms on the horizon. The purpose is to solve, through the use of technology, the abysses generated between purchasing power and the distribution of wealth among the population. Once again, finance is seen on the horizon of a kind of digital post- neoliberalism, based on cryptocurrencies and crypto finance. All this to decentralize the financial system. However, in the digital world of the Internet, the Achilles' heel is no longer just data privacy, but computer security, which affects almost 100% of the activities, carried out daily in industrialized countries and/or culturally developed. Furthermore, not all social issues can be resolved with new technologies. For example, in education, new pedagogical models are still being tested in which AI, VR, MR, AR, etc. are combined and oriented towards the metaverse.

However, in the face of a pandemic, there is a lack of suitable and adapted content for distance learning that lasts for years, even in universities that have virtual classrooms or campuses. It has also been corroborated that there is a kind of bubble or ivory tower where those officials are placed without solidarity in their role as university teachers. Lifelong officials, who, instead of collaborating with their colleagues from secondary or primary institutes to alleviate the problems of distance education, deny the existence of a world crisis and continue unfazed with the daily routine. This is a behaviour that is repeated cyclically, in the new millennium, within the same group of individuals, in the face of international financial crises, even in the middle of a pandemic, and they would even remain immobile in the face of local revolutions or world wars.

It is very important to analyze and evaluate human behaviour in the era of expanding communicability. This is a task that requires several perspectives of the inverted pyramid. Every aspect of hardware and software use needs to be examined, either individually or collectively. All this is due to the constant revolution of the hardware and consequently of the software. Not only will the generation of synergies between the human being and the new computing, pedagogical, social, health, economic, etc. paradigms depend on this behaviour, but also all scientific progress for the common good of humanity. And in such advances, the Internet and all its derivatives will play a fundamental role.

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ANNEX #1

Table 1. First table of the "Inverted Cornucopia" based on the heuristic analysis of the keywords of the Google Scholar and Research Gate portals.

Google Scholar (keywords)	Constant changes in keywords over time and according to trends	Constant Changes in the Curriculum Vitae of the topics of interest and Research Gate website (keywords)	University Centre (country)	Currently in office
HCI, Embodied interaction, Assistive technology, Interaction design and children	Yes	Yes	Polytechnic University of Milan (Italy)	Yes
Case based reasoning, Personalization, Recommender systems, Tourism, User modelling	Yes	Yes	Free University of Bozen-Bolzano (Italy)	Yes
Conversational interfaces, e-Learning, e-Culture	Yes	Yes	Polytechnic University of Milan (Italy)	No
Ful-body interaction, Embodied interaction, Augmented mixed & virtual reality	Yes	Yes	Pompeu Fabra University (Spain)	Yes
Digital Arts, Art and social communication with mobile devices, Virtual reality and art production	Yes	Yes	Pompeu Fabra University (Spain)	Yes
Affective computing, emotion AI, AI, empathic systems, virtual reality (VR)	Yes	Yes	Pompeu Fabra University (Spain)	No
Humn-Computer Interaction, Interaction design, Sustainable interaction design, Software engineering	Yes	Yes	Instituto Superior Técnico — Lisboa (Portugal)	Yes
Interaction homme-machine, Human-Computer Interaction, Interactive Systems	Yes	Yes	Paul Sabatier University - Toulouse 111 (France)	Yes
Computer graphics, rendering, digital cultural heritage, urban modelling	Yes	Yes	University of Girona (Spain)	Yes
Interactive Systems, Interaction Design, Crisis Informatics, Digital cultural heritage	Yes	Yes	University Charles III (Spain)	Yes
User-centered design, Technology enhance learning, Gamification, Educational games	Yes	Yes	University of La Laguna (Spain)	Yes
Human-Computer Interaction, User eXperience, Web	Yes	Yes	University of Lleida (Spain)	Yes
Web Engineering, Human-Computer Interaction, Human-centered AI	No	No	Poltechnic University of Milan (Italy)	Yes

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Table 1. Continued

Google Scholar (keywords)	Constant changes in keywords over time and according to trends	Constant Changes in the Curriculum Vitae of the topics of interest and Research Gate website (keywords)	University Centre (country)	Currently in office
Human-Computer Interaction, Interactive Smart Spaces, Accessibility, End-User Development, Human-centered Artificial Intelligence	Yes	Yes	CNR— ISTI (Italy)	Yes
Human-Computer Interaction, Software Engineering, Learning Technology, Cultural Heritage, Game based learning	NO	No	Uniersity of Patras (Greece)	Yes
User experience, human-computer interaction, ubiquitous computing, mobile interaction, human- centered artificial intelligence	Yes	Yes	Tampere University (Finland)	Yes
ICT, sustainability	No	No	KTHRoyal Institute of Technology (Sweden)	Yes
Intelligent interfaces, intelligent human interfaces, human- computer interaction, HCI	Yes	Yes	University of Trento Bruno Kessler Foundation (Italy)	Yes
Artificial Intelligence for Healthcare, Knowledge and Language Processing, Information Retrieval	Yes	Yes	Bruno Messier Foundation (Italy)	Yes
Educational technology, Human computer interaction, podcasting, artificial intelligence, dam safety	Yes	Yes	University of Bergamo (Italy)	Yes
Serious Games, Persuasive Technology, Mobile HCI, Health and Safety, Aviation	Yes	Yes	University of Udine (Italy)	Yes
Software engineering, requirements engineering, model-driven agents and multi-agent systems	Yes	Yes	University of Trento (Italy)	Yes
Social informatics, social computing, web services, process management, wellbeing	Ys	Yes	University of Trento (Italy)	Yes
Pervasive computing, software engineering, multi agent systems, self-organization, autonomous systems	Yes	Yes	University of Modena and Reggio Emilia	Yes
Web engineering, health informatics, collective intelligence, human computer interaction	Yes	Yes	Bielefeld University of Applied Sciences (Germany)	Yes
Conceptual modeling, information systems engineering, software engineering, genomic data science	Yes	Yes	Polytechnic University of Valencia (Spain)	Yes
Smart learning ecosystems, competence based learning, technology enhanced learning, design for the experience, human computer interaction	Yes	Yes	University of Rome Tor Vergata (Italy)	Yes

continued on following page

Table 1. Continued

Google Scholar (keywords)	Constant changes in keywords over time and according to trends	Constant Changes in the Curriculum Vitae of the topics of interest and Research Gate website (keywords)	University Centre (country)	Currently in office
Technology enhanced learning, AR, graphic expression, mixed methods, architecture visualization	Yes	Yes	Ramon Llull University (Spain)	Yes
Multisensory experiences, user experience, novel interaction techniques, H uman-Computer Interaction	Yes	No	University College London (U K)	Yes
Technology-enhanced learning, human-computer interaction, computer supported collaborative learning, learning analytics, AI ethics	Yes	Yes	Stockholm University (Sweden)	Yes
User modelling, adaptive systems, HCI intelligent, user interfaces	No	Yes	University of Turin (Italy)	Yes
e-Learning, software engineering, web 2.0, technological ecosystems	Yes	Yes	University of Salamanca (Spain)	Yes
CCI, eBook	Yes	Yes	University of Italian Switzerland (Switzerland)	Yes
Information retrieval, data science, text mining, digital libraries	Yes	Yes	University of Italian Switzerland (Switzerland)	Yes
Human-Computer Interaction for Special Needs	Yes	Yes	University of the Basque Country (Spain)	Yes
Human-Computer Interaction, media & 3D graphics, eLearning	Yes	Yes	Pompeu Fabra University (Spain)	Yes
Information retrieval, web search, web mining, data mining, algorithms and data structures	Yes	Yes	Pompeu Fabra University (Spain)	Yes
Aprendizaje basado en juegos videojuegos colaboración jugabilidad juegos pervasivos *(in **Spanish**)*	Yes	Yes	University of Granada (Spain)	Yes
Dibujo arquitectura, innovación docente, video docente, fiipped classroom, clase invertida (ir *Spanish)*	Yes	Yes	University of the Balearic Islands (Spain)	Yes

Chapter 5
Innovation in Tourism Systems, Intelligent Gamification, and User Interaction

ABSTRACT

In the present work, the bidirectional triad of competence, knowledge, and capacity (CKC) is analyzed in the final users. In the study of the various generations of users, the various objectives pursued when using interactive systems (online and off-line), whether intelligent or not, are detailed, and which range from consulting generic information through training to entertainment or pastime. In addition, a historical and project analysis is carried out towards the immediate future of the present triadic interrelation in order to maintain a successful and qualitative educational process, considering as fundamental variables the end user, emerging technologies, information technology, interactive design, gamification, entertainment, and tourism.

INTRODUCTION

The three words competence, knowledge and capacity (CKC), together with the end user of interactive systems, have been the cardinal points on the compass of educational reforms in many nations of the new millennium. By shortening the duration of study plans for obtaining university degrees, including accreditation mechanisms for teaching staff and promoting the use of new technologies, hypothetically, the new generations of students would have these three letters "CKC" incorporated into their intellectual DNA (Tannian & Coston, 2021; Psycharis, 2018; Bishop & Frincke, 2004). The reality of the results obtained, in the short term, tells us that this has not been the case. For example, the doctoral degrees awarded in Spain in the 21st century are equivalent to the final projects to obtain a bachelor's degree or an engineering degree, in Italian public universities, before 2000.

The use of the Internet has served to reduce the intellectual function of the teacher, by becoming a guide, in the face of the infodemic (Eysenbach, 2002). That is, the roles were reversed in the classroom. The role of the teacher has passed to the student, and vice versa. This model has turned the teacher into

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a kind of constant coach for solving students' problems, as if they were a team of handball, baseball, soccer, hockey, rugby, volleyball, etc. Additionally, team sports play has been the arena where many of these role reversal techniques have originated. However, there is scientific content that still requires classic teaching models, which can be reinforced by new technologies and other pedagogical paradigms. Teaching can be reinforced by intelligent, serious and interactive games, as was the case in the design of the first multimedia systems. **Teaching is not synonymous with playing or increasing statistical data, whether official or** not.

With the analysis of the first interactive off-line multimedia systems, it is possible to detect the basic components of the design that have boosted the competence of users in the use of computers and multimedia applications. Also, you can understand those contents that have masterfully enhanced education with new technologies, from the early age of users, with personal computers and multimedia peripherals: Graphics card accelerators, microphones, speakers, camcorders, printers, scanners, etc. As well as the motivations for which it was necessary to include the playful aspects or entertainment, in learning through interactive systems such as computer aided education (CAE), computer-assisted language learning (CALL), to mention two examples. Entire generations of children and adolescents have grown up with video games and multimedia mobile telephony (Cipolla-Ficarra, 2020). Invariably, it is natural for them to spend much of their free time with smartphones, consoles and apps. The **crisis of virtual companies at the beginning of the new millennium was overcome thanks to the incipient industry of multimedia video games in off-line and online support.** Currently, the video game industry has surpassed the music and film industries. Additionally, video games like Fornite (www.epicgames.com) and Minecraft (www.minecraft.net) approximate the notion of the metaverse that is circulating in academia and business.

The 3D world of immersive games will become "natural" environments or scenarios through which users will be able to buy or sell goods and services (Kulshreshth, Pfeil & LaViola, 2017; Kulshreshth & LaViola 2015; Cipolla-Ficarra, Alma & Cipolla-Ficarra, 2018; Cipolla-Ficarra, 2020). From video games you can perform endless activities as if it were in the real world. Hence, the creation of video game services with millions of users, as exists with digital terrestrial television (DTV or DTT, is expected (Cipolla-Ficara, Alma & Cipolla-Ficarra, 2017). Another way to enjoy free time is through tourism, visiting the cultural and natural heritage, throughout our planet (Cipolla-Ficarra, et a1., 2014). The first developments of multimedia systems were also aimed at tourism, since in certain nations it is a fundamental source of GDP income, such as the countries of the European Mediterranean basin. Throughout this process of metamorphosis, the user must be the central axis in communicability and interactive design, taking into account the positive aspects that have endured over time and the negative ones to avoid and not transfer them to the new paradigms, platforms, applications, etc., which will be developed in the coming years.

END USERS: COMPETENCES ACQUIRED AND LOSSES WITH THE TECHNOLOGICAL REVOLUTION

In the origins of the commercialization of the first hypertext and multimedia systems related to tourism, for example, the success of the applications depended not only on the proper functioning of the software, but also on the profile of the potential users, at the time of design. In interactive design, a strategy followed by developers back then was inference (Nekipelov & Wang, 2017). Inference is a component of

communicability. The other notion used was usability since many users had no experience in the use of computers (Barnum & Dragga, 2002; Cipolla-Ficarra, 2007a; Cipolla-Ficarra, Nicol & Cipolla-Ficarra, 2010). Through the concept of usability, it was possible to establish categories of users of off-line systems based on variables. Some of these variables were how long they would supposedly interact with the content, previous knowledge in browsing a multimedia system, the type of users, age, goals to be met (consultation, education, entertainment, among others), etc. From these data, classified categories of users could be generated using a numerical, alphabetic or alphanumeric code.

For example, in a first category of users, there would be those who do not have any experience in using computers, but need to consult content on multimedia supports, for study reasons, as were university students from the '90s to the beginning of the new millennium. For example, in the Lombard universities, in the first decade of the new millennium, many university students did not have computers at home; therefore, there was a high rate of computer illiteracy. Although it is true that they had a great interest in learning its use and therefore, the time available was unlimited. In a second category, there would be the researchers, also with unlimited time in the use of the system, since it is part of their work to consult digital information. These users are experts in the use of systems since they have previous knowledge in computing. A third category can include occasional users, who must consult the interactive system to obtain tourist information, for example, such as bus lines and routes, the location of hotels, the opening hours of museums, etc. (Cipolla-Ficarra, Nicol & Cipolla-Ficarra, 2010).

Generally, the time available was less than an hour. Undoubtedly, other categories could continue to be established. With regard to the type of content, at that time it was open or closed. Open, meant that the system was in the public domain and could be purchased physically in specialized stores (e-commerce was in the development phase). On the other hand, closed when it was limited to a certain number of users, such as subscribers to specialized publications (magazines, catalogues, yearbooks, etc.) in which a digital version was included, through CD, DVD, etc., or, they belonged to a work or teaching group where specialized systems were made, such as user guides, exercise manuals, presentations of theoretical topics, and so on.

The categorization of the potential users of the first interactive systems is related to two quality attributes called competence and fruition control. **Competence is the ability of the system to adapt to the abilities of potential users for interaction.** Potential users can be grouped according to date of birth, studies or cultural level, reasons and time of fruition. Currently, through the date of birth, users are divided into generations. Therefore, their competencies are defined by their interest and behaviours in the face of technological progress. Chronologically the generations are classified as follows: Generation Silent (1925-1944); Generation X (1965- 1980); Generation Y or Millennials (1981-2000); Generation Z or Gen Z (2001-2012); Generation Alpha (2013-present). Transversally, to all of them, is the Generation Omega (1945 - present). In the following reference there is an extensive description of each of them (Cipolla- Ficarra, 2022). These generations start and end dates may vary slightly in the computer field, particularly in the areas of HCI, UX and usability engineering, but not in the sociological field, since their data comes from official statistics. The Omega generation is sui generis since they represent the negative components of each of them.

At the origin of interactive multimedia in the 1990s, the enjoyment of systems was carried out fundamentally with personal computers and through the keyboard. Child users needed more interaction time than an adult user in front of the computer keyboard. One of the reasons remains the ergonomic factor (Salvendy, 2006). The keyboards have a standard and universal dimension, which fits better in the hands of an adult than in those of a child. Moreover, depending on the richness of the content of the

system, such as a scientific museum, it requires more time to look at the photographs, diagrams, videos, etc., read the texts, listen to the audio, and so forth. Traditionally, in the first multimedia systems for PC entertainment, adult users (silent and X generations) preferred content with a single plot, while young people (generation Y or Millennials) needed more than one plot. The argument refers to a story or story whose content is divided into three basic parts such as the introduction, development and outcome. In other words, adventure video games were preferred for that generation, compared to other video games with which generation X and silent interacted, such as Pac-Man, Tetris and SimCity, for example.

These distinctions that are born in the field of user preferences regarding interactive systems, also influence the communicative language (Cipolla-Ficarra, Quiroga & Ficarra, 2018). Nowadays, the term "narrative" is used as a synonym for an argument or communicative strategy. Another term is "empathy" as a synonym for inference. **Empathy has been included in colloquial language, in the 21st century, as a way of valuing or perceiving other people.** That is to say, supposedly on an egalitarian level, although implicitly there is the component of the superior being (ability to be empathetic / manipulative in communication) towards an inferior being. "Inferring" the competence of potential users is not the same as being empathic with them. Inference is frequently used by a designer and/or programmer, when novel or original systems are developed, and for reasons of confidentiality they do not allow users to resort to their validation phase. Furthermore, in the history of the evolution of the first interfaces of multimedia systems, not all prototypes were tested with real users in usability laboratories, for example.

The competence includes the mode of communication and the form of interaction that the user has with the interactive system (Cipolla-Ficarra, 1999b; Cipolla-Ficarra, 2008b). It is the way and the means used to receive content. From this perspective, a multimedia application is a "multimode" system, since the system designer can "encode" the same content. This last notion refers to the strategy followed by the designer when choosing a medium or a path to present a certain content, on the screen of an interactive device (Smartphone, tablet PC, PC, etc.), using various media (dynamic or static) and paths to access the same information. For example, in a collection of maps and photographs of a city that you want to visit, you can resort to a manual or automatic guided link (a guided link is a set of nodes and each one of them fulfils the function of the initial node in the sequentiality).

This richness or variety, well used, in the communication strategy at the interface design stage makes communicability successful, since it facilitates the use of the system, especially for inexperienced users (Cipolla-Ficarra, 1999a; Cipolla-Ficarra, 2008c). Therefore, there is a direct relationship between competition and the quality attribute called accessibility (Cipolla-Ficarra, 2005; Cipolla-Ficarra, 2008c). A system can have correct access to the database or hyperbase (name assigned to the databases of hypertext systems), but at the time of design the ideal profile of the potential user of the system has not been considered, either from a local or a global point of view. This profile can affect the relationship that is also established with the predictive attribute of the system's operation. For example, a user belonging to the Z generation can predict the operation of a video game in virtual reality, before the Silent or X generation, even if it is based on a world-wide literary work.

A way to alphabetically break down the basic components of the competition related to users is as follows:

- Access to information and navigation mode,
- Classification and coding of users,
- Content fragmentation, and
- Media used.

ACCESS TO INFORMATION

In off-line interactive systems, there were three main ways of accessing information in the database. The first consisted of entering what was being searched for in a dialog box (question and answer). A current and online example is access to the content of Wikipedia. As can be seen in figure 1, there is the home page of the Spanish version, with all the articles it has in other languages. This quantitative data is totally secondary to the veracity of the information contained. Another method is to click on an icon or a list of words. That is, planned exploratory or fully exploratory. This last modality was widely developed for artistic purposes by musicians, mainly, where the interface did not present any menu bar, icons, dialog box, etc. The objective was to motivate users to discover the visual and animated content of a playful/musical interactive system (CD-i), such as Xploral (figure 2 Peter Gabriel's Secret World, 1993).

At the same time, the planned modality to access the database with icons has been transferred to users of smartphones, smartwatches or other interactive technological devices (Agar, 2013; Abdullah, 2006). Unfortunately, users are unaware of many of the options of these devices, starting with the meaning of the icons, or the functionality behind each of them, or what information they can access with them (Sockwell, 2017; Cipolla-Ficarra, 1996). Now, among these modalities was the option of examining a collection of objects that had previously been selected by a "query" (those queries, for example, in the European field of business management, erroneously called "management engineering", based on large servers such as the IBM AS/400, has generated an elite in information technology and systems, which surpasses the power of the owners or officials of companies, industries, government institutions, etc.). Apart from this circumstantial deviation, accessibility to information is a quality attribute that has revolutionized the Internet and human-machine interaction (Wobbroch & Kientz, 2016; Vaccaro & Waldo, 2019). To such an extent that the human being can already interact directly with the brain, as is the case

Figure 1. Interface with a dialog box, on the Wikipedia home page, in its Spanish version, with the millions of stored documents, in the different languages.

Figure 2. Set of interfaces of the work Xplora 1, where the interface is totally exploratory, resorting to the metaphor of the passage of time on the same image (day, sunrise or sunset and night) and gender equality (in the silhouettes of the three male and female characters).

with the BCI: Brain-computer interaction or brain-computer interface (Tan & Nijholt, 2010; Bernhard, 2013; Stegaman, et al., 2020).

Evidently, although both notions share the same acronym, and although many scholars for mercantilist purposes use it incorrectly as synonyms, there is a big difference between interface and interaction. Subsequently, the notion of accessibility to information would become a kind of universal right of citizens in the global village, especially free content and the elimination of copyright. However, the use and abuse of this freedom of access to information, such as the lack of veracity of data and information, have not only raised barriers to free content online, but also the costs to access certain databases. Such is the case of indexing in some databases, where scientific information related to new information and communication technologies is stored.

NAVIGATION MODE

In the navigation mode and according to the intrinsic characteristics of the evolution of interactive multimedia systems, there are two modes of interacting or browsing with the dynamic and static media of these systems: Active and passive. Active when the user has absolute control in the execution of a task

such as interrupting, pausing, moving forward, going back, etc., a video or a song. In a three-dimensional immersive system, the ability to move objects, change the lighting, move closer or further away from sound sources, etc. In the passive mode, the user has the same role as in the origins of television or radio. That is, a viewer or listener, who receives a unidirectional message, at the moment he / she is in front of the screen, for example, in the automatic and sequential viewing of a photo album, a product catalogue, and so on.

The topology of navigation is an ideal resource for the architecture and organization of information based on the various pre-established objectives in the interaction, such as entertainment, consultation, training, etc. Over time, the design models (Cipolla-Ficarra, Alma, Carré, 2018) for this type of system, where dynamic and static media are combined, have not generated a style guide for the topology of navigation, based on potential users. In addition to being utopian models in our days, given the advance of the metaverse, they only serve to detect those closed groups, which are dedicated to manipulating the increase in citations in Google Scholar, from the dark zone of the Internet (Cipolla-Ficarra, 2021). From the communicability and during the realization of different off-line and online interactive systems, over decades (Cipolla-Ficarra, 2008a; Cipolla-Ficarra, 2008b; Cipolla-Ficarra, 2020), it has been verified how guided links can facilitate navigation for inexperienced users, although they keep the navigation architecture hidden. One way to avoid this last problem is to resort to various topologies depending on the potential user. For example, for expert users, guided links can be used in the form of trees or schemes, while for occasional or inexperienced users; a linear sequential topology can be used.

THE FRAGMENTATION OF THE CONTENT

In the ‘90s, text occupied a predominant place in interactive content since it took up little space on storage units. In addition, in the process of endoculturation and transculturation of the Silent and X generations, reading was a common practice, inside and outside the home (Cipolla- Ficarra, 2022). By increasing the storage capacity in information media, visual and sound dynamic media, they were occupying more space in audiovisual communication, until relegating textual information to the background, gradually acquiring the qualification of tedious or boring content. For the users, it was the origin of the mosaic or tile culture, with very fragmented knowledge and very weakly linked to each other.

Furthermore, since the usability engineering or the interactive system design models of the ’90s, no rules were established for the fragmentation of the content in the face of the various user typologies (Nielsen, 1992; Nielsen & del Galdo, 1996). However, from the perspective of communication quality, guided links were a good solution to these problems. Through the guided links, various content styles could be established depending on the total number of screens that make it up. More than 25 screens were long-style guided links and their use was discouraged for casual or inexperienced users. For example, in a system related to cultural and / or natural heritage, if there were more than 25 works by the same author in a museum room, the ideal would be to divide them according to the date they were made, the place they were made, the theme, the technique used, and so on (Cipolla-Ficarra, 2008b).

MEDIUM USED

One of the main advantages of multimedia systems is that one or more media can be used at the same time to transmit the same content. This advantage has been fundamental in the educational process of generation Y, through the use of the personal computer. Furthermore, in the case of resorting to different media combined with each other (static + dynamic: animated computer graphics, carousel of photographs with speech, maps with three-dimensional historical reconstructions, among others), priorities can be established before the potential types of users. This is priority will be based on the user experience, in the communication process in the face of the interactive technological medium, which is being used. Using a state-of-the-art technological device does not mean that the user knows all its functions. For example, more than 50% of the functions of digital cameras on smartphones are unknown to adult users, belonging to the Silent and X generations (Cipolla-Ficarra, Alma, & Carré, 2018). Therefore, it is necessary that at the design stage of the systems this reality is taken into account, which belongs to the context of new technologies and their users.

A WAY OF EXAMINING THE COMPONENTS OF THE COMPETENCE OF USERS OF INTERACTIVE SYSTEMS: CLASSIFICATION AND CODING

It is a task that depends on the designers of interactive systems. They are the ones who infer the potential users of the system (Oulasvirta, A., et al., 2020). Consequently, they group potential users, based on the date of birth, the predominant medium used, the content fragmentation modality, the selected navigation topology, the information architecture and access to it, the communication strategy used, technological device used, among other variables. Table 1 is a reduced example of how potential users can be classified when designing an interactive system. These users have personal computers with DVD / CD read-

Main components of competence in multimedia systems	User #1	User #2	User #3	User #4	User #5
Architecture and access to information	Manual	Manual / Exploratory	Exploratory	Exploratory	Exploratory
User Code	U3S	U3X	U3Y	U3Z	U2A
Technological device used	PC with DVD/CD drive	PC with DVD/CD drive	PC with DVD/CD drive	PC with DVD/CD drive	PC with DVD/CD drive
Communicability strategy	Predominance of textual, visual and auditory information	Predominance of audiovisual and hypertextual information	Predominance of audiovisual and multimedia information	Predominance of audiovisual and hypermedia information	Predominance of narration Transmedia
Fragmentation of content	None	Reduced	Extensive	Largely large	Largely Small
Dynamic / static médium used	Text * static image audio	Text + audio * static / dynamic image	Text * dynamic image audio	Dynamic image + audio text	Dynamic image + audio
Topology of navigatio	Sequential	Sequential / Schema	Schema	Scheme	Scheme

ers, that is, they have access to off- line multimedia systems. This information support is still valid and widely used for medical- confidential information such as the results of X-rays, ultrasounds, computed tomography, etc., of patients. User coding is alphanumeric. Numbers refer to age (children = 1, adolescents = 2, adults = 3, seniors = 4). Each user is assigned the first letter of the generation to which they belong (Silent, X, Y, Z, Alpha) except for the Omega generation, since it has been excluded in this table.

The components of table 1 can be expanded and adapted depending on the type of user, the technological device used and the interactive system: Hypertext / multimedia / hypermedia, RV, RA, MR, and so forth. It is also necessary to differentiate hypermedia information with regard to transmedia storytelling (the latter mainly uses smartphones and the Internet for the convergence of video games, social networks, data analysis, and so forth). Therefore, this classification is not exclusive of others that may be carried out in future research, especially if user skills, cultural factors, and the ergonomics of interaction devices are considered, to name a few examples. All these new components or factors that influence interactive design can lead to various ways of grouping users, with a more detailed form of interactive design for augmented reality, mixed reality, metaverse, etc. (Bellinghurst & Kato, 2002; Ren, 2016; Sereno, 2022).

Off-line interactive systems have served to experience competition over the entirety of an application aimed directly at disseminating cultural heritage, and indirectly at tourism, such as the first commercial version of the Musée d'Orsay multimedia application (EMME Interactive, 1996). Subsequently, this system has had a free commercial distribution, since it was attached to the Iberian social media publications, on paper (late 20th century and early 21st century), such as newspapers, magazines, catalogues, and so on. Therefore, its content has been adapted for all types of potential users, starting with the use of other languages. This entire process is included under the notion of information reusability. The reusability of information is a fundamental aspect when making the decision to create interactive systems, since it allows the same content to be presented through different static and/or dynamic media. For example, in a gallery of paintings in a museum, by positioning yourself on each of them, you can activate a 3D animation of that artistic work. Later, some frames of the animations can be used as figures of a puzzle, in the entertainment section of the interactive system.

The Musée d'Orsay is one of the first examples of information reusability in multimedia systems related to cultural heritage (Cipolla-Ficarra, et a1., 2014). However, in this transformation process, flaws have been detected in design categories, such as presentation and content. Figures 3 and 4 show the original interface of the system in its Spanish version. In this off-line system, from the home page the user is faced with two options to follow: A guided link or access to the museum's collections. In the revised version, intended for the general public and with a free distribution, it can be seen in figures 5 and 6 of the home page interface that there is already a change in the accessibility of the information. There are three options:

1) Masterpieces. In the original system they are called "collections."
2) Building. In the original system it is a guided link, whose screens show the parts of a building, while in the modified system it consists of the activation of a video and a voiceover.
3) The works. It is an index to access the authors of artistic creations. This index in the original system is in the "summary" (figure 3).

Examining these four interfaces, from the point of view of the presentation in figure 5, the use of the term "masterpieces" and "works" in the same interface can generate ambiguity in the user, harming the prediction about the information content stored in the database or hyperbase. Simultaneously, from a

linguistic perspective, it can be seen that in figure 3, the Spanish title *"colecciones"* has been changed in English to collections (figure 4). These failures denote that no type of qualitative evaluation of the systems has been carried out, either in the original version or in the modified one.

In the structure of the original system, the total number of collections is 14. Each of the collections in this system has more than five artistic works. That is, 80 in total. Instead, in the new system, only 10 works have been labelled as collections, which belong to the collections of the original system. In this way the user is accessing ten artistic works and not collections as it is in the original system. Therefore, the second system has a much lower structure than the original version. Surprisingly, nowhere in the system is the user warned that it is a reduced version. In addition, there is a lack of transparency in the information, which is widely and freely disseminated through social media, to which the modified version of the multimedia system was attached.

The mistakes detected with the mix of languages reach the maximum level when this occurs in the outline-type help section for users, as can be seen in figure 7. This type of outline help is positive for expert users. The schematic mode allows viewing on a single screen all the explanations of the components on the page for navigation, access to the desired information, resolution of possible problems, etc. Also, it is a modality that speeds up reading, especially when online portals are including the minutes required by the user to read a news item or other type of textual information. The use of a bubble with a pointer (called a tail, directed towards the speaker / object) is a valid instrument from the point of view of visual communication, especially with users of the Silent generation, since many have learned to read through them. However, when tails appear in it that do not have any reference to an object, as is the case of the central bubble in figure 7, it generates disorientation in the user.

Figure 3. The user has two options to follow: A guided link or access to the museum's collections (original version).

Figure 4. The Spanish title "colecciones" has been changed in English to collections. A lot of mistakes detected with the mix of languages (original version).

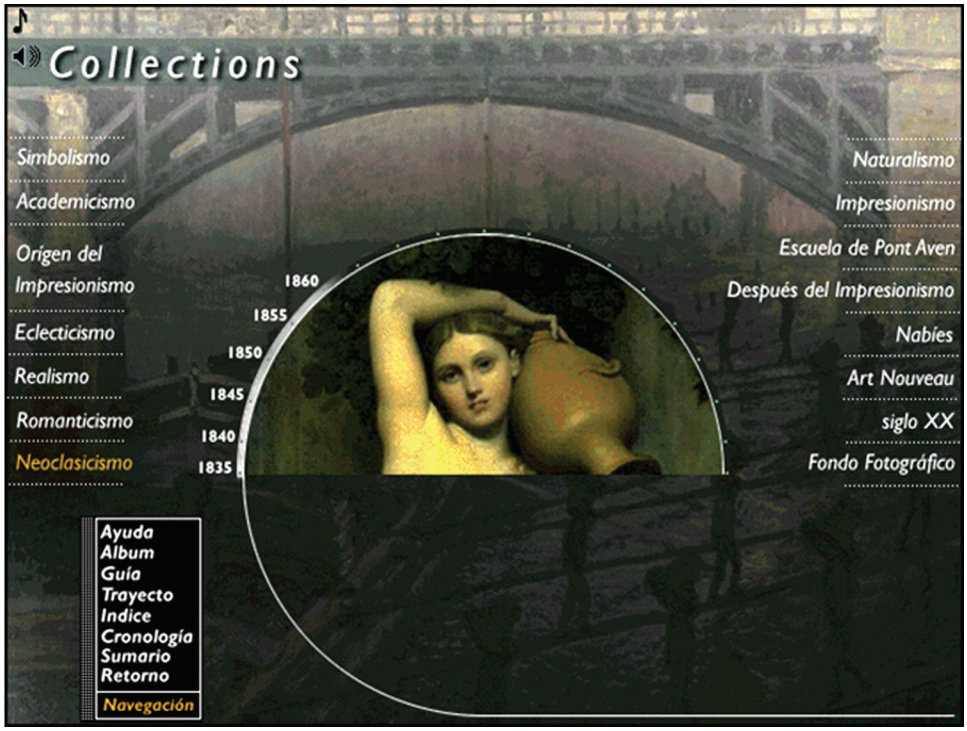


Figure 5. The Musée d'Orsay —home page interface (revised version).

Figure 6. The accessibility of the information (revised version).

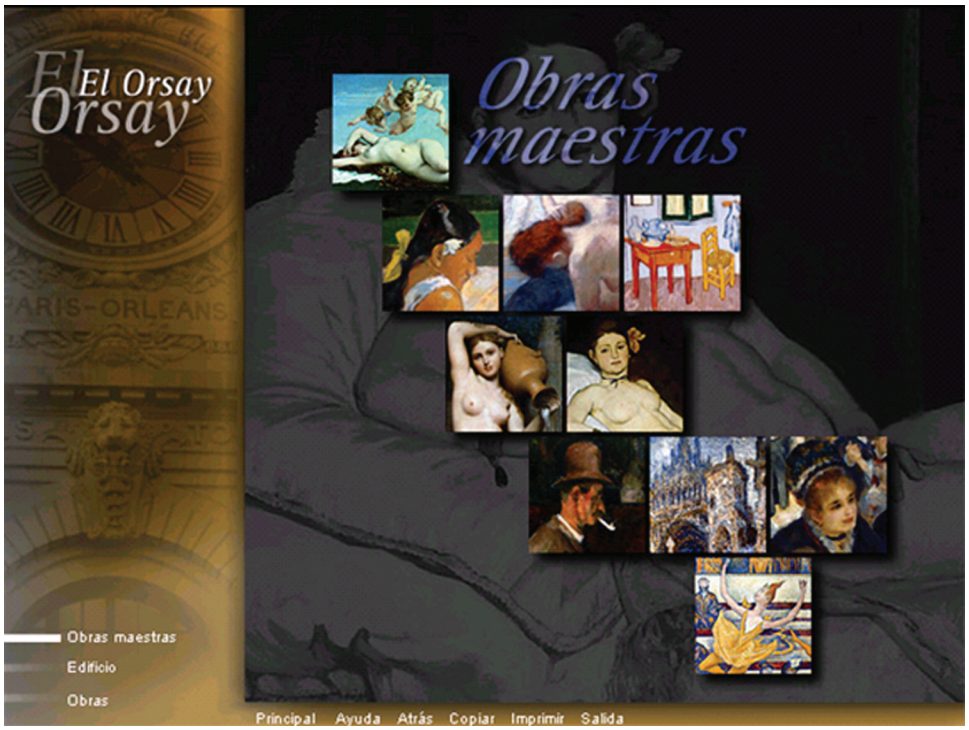


Figure 7. The help text is in Italian, and the language of the multimedia system is Spanish (original version).

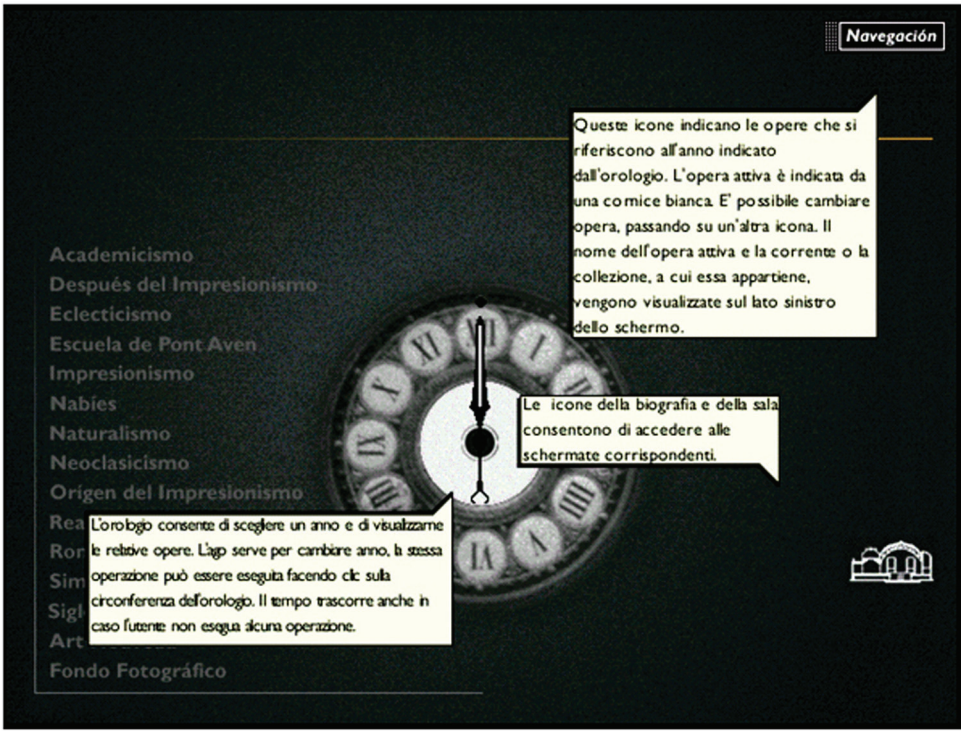


Figure 8. The silhouette of a virtual guide (original version) that invites the user to visit the various collections of paintings in the museum has promoted the use of interactive systems among the new generations and has been a source of inspiration for the development of new ways of telepresence and interacting in the VR, AR and MR (Kasahara, et al., 2017).

Lastly, these flaws detected in this first commercial system that was later adapted for free distribution in analog communication media indicate that the designers and/or those responsible for digital information reusability projects did not have a methodology for the heuristic evaluation of a multimedia system, before its local, national and international commercialization. However, this multimedia system Musée d'Orsay has been a pioneer in visually including the figure of the guide, as can be seen in figure 8. That silhouette of a woman that invites users to visit the different collections in the museum not only boosts the importance of the use of guided links for inexperienced users, but also opened several lines of research in the design of interactive interfaces, such as the tangible embedded and embodied interaction, for example. In addition, the visualization of a structural resource in the information architecture of interactive systems, such as guided links, allowed its spread in use for the first online educational systems, especially in the field of virtual campuses of the ' 90. Consequently, it is an element that has demonstrated over the years the great success of its use in the design of educational interactive systems and in the promotion of new communication media.

Currently, this notion of guidance to invite users to experience new experiences can be regarded as a new line of research in the avatars of the metaverse (Dionisio, Burns & Gilbert, 2013). If the metaverse becomes the successor to the Internet, whoever builds it and how they build it have to take responsibility that will be critical for the future of humanity and future generations. Therefore, it is necessary to have

common standards, starting with regulations. Regulations that must be guided by the principles and values of dignity and equality among people, freedom of expression, privacy of information, transparency of the actions of officials, among many others. However, as well as the scarce diffusion of the use of design models for the first interactive systems in the 20th century (Cipolla-Ficarra, Alma & Carré, 2018) and the non-existent update in the new millennium, hardly anyone pays attention to these values and legal principles in digital information. Therefore, except for the technological aspect, the rest of the metaverse is a utopia, starting with the privacy of personal information online. Only in off-line multimedia systems can you still enjoy this universal right. The new generations of users (Z and alpha) are mere producers and consumers of videos and photos, mainly through smartphones. Users of generations Y and X no longer have access to the first digital multimedia content in their homes, due to the evolution of software (operating systems) and hardware (computers). All this reality that affects universal knowledge serves to favour the increase of absolutist power in the Omega generation (Cipolla-Ficarra, 2022). A generation that, from the first computers to the latest developments in information and communication technologies, is transversal to the rest of the generations of potential users of interactive systems.

INNOVATION IN TOURISM SYSTEMS

Museums are a key element for the development of tourism (Cipolla-Ficarra, et al., 2014). The first multimedia systems of the museums that contained all the works of the same, exponentially, increased the presence of tourists in their rooms. This reality contradicted previous and popular conjectures, that virtual visits reduced the displacement of people towards these cultural institutions. Some of the first strategies of interactive design for multimedia systems consisted of grouping the structure of the system in a single screen, under the format of a map or diagram. A structure map is a graphic that indicates how the components of a multimedia system are organized, the type of query that can be performed (static or dynamic), the query area (total or partial), and the content (geographical, historical, architectural, and so on). Some "classic" examples can be seen in figures 9 and 10.

The worldwide production and distribution of these first systems was related to the software and hardware industry to demonstrate the potential of multimedia in personal computers, through the different peripherals: speakers, microphones, video cameras, etc. Commercial firms such as Microsoft began developing educational multimedia guides for museums. One of them is the Art Gallery system (1993), related to the London National Gallery. Just like in the Musée d'Orsay system, there was also a list of errors from the perspective of interactive design, in each of its categories: Layout, content, structure, navigation, panchronic, and so on (Cipolla-Ficarra, 1999b). Many of these errors were transferred to on-line systems, since they were added to the production of tourism-oriented systems, professionals lacking experience and/or training such as mathematicians, physicists, nuclear, industrial, managerial engineers, and so forth. Professionals who have promoted collaborative and interdisciplinary work to hide the lack of knowledge / experience but establishing themselves as leaders, presidents, directors, etc., of national and / or international projects. A common denominator of these deviations, from the point of view of sociology, is the intersection not only of the formal and natural sciences, but also of religion and politics (ultra-nationalist movements, for example). Projects that, once the financial funds were finalized and the working groups dissolved, remained unfinished, and therefore, their main / secondary objectives were not achieved, harming the development of the tourism industry (Cipolla-Ficarra, Quiroga & Ficarra, 2013).

Figure 9. Static view of the exhibition areas of the Genoa Aquarium (Italy), divided into the two levels of the building. That is, there is information on the content of the rooms but access to the information from the scheme is not allowed.

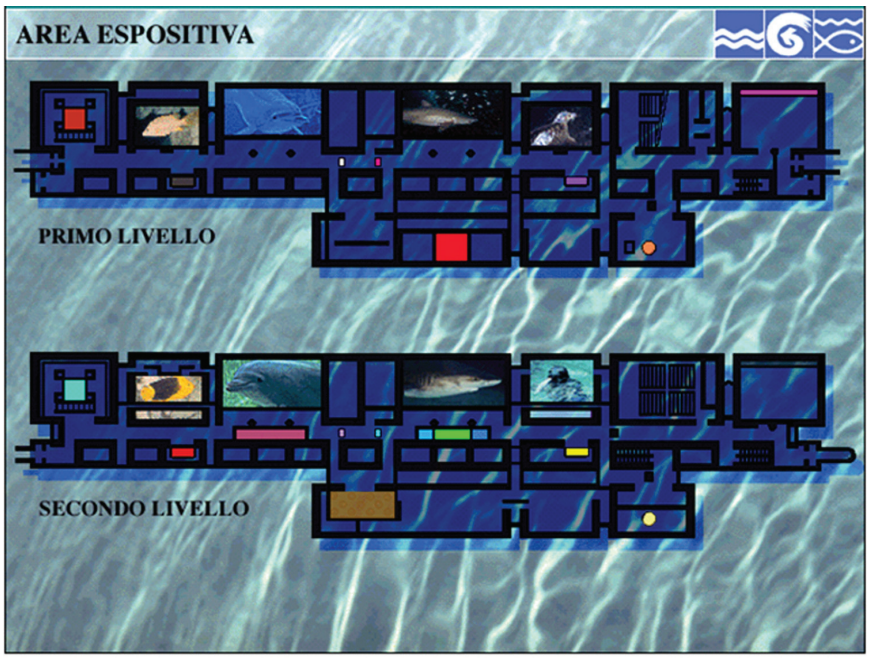
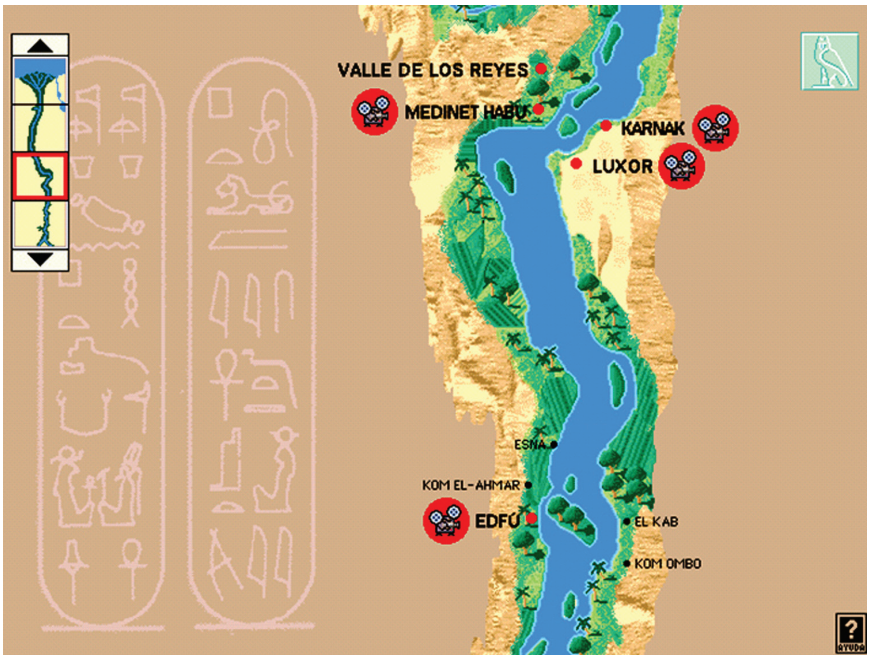


Figure 10. Dynamic query in the Egypt Tour system. The nodes and the means to which they can be accessed are displayed on the map. When these zones are activated, some visual resources are used, such as a box, arrow, the change of colour in the background of the selected zone, and so forth. In the left margin is the area selected on the map.



The tourism industry has been boosted by the democratization of the Internet (Lee, et a1., 2021). Users from home could autonomously access the places they could visit, get information on flight schedules and costs, book hotels, local excursions, buy travel insurance, etc., without having to go through agencies travel, for example. This freedom of action was transferred to some of the first off-line interactive systems, which suggested to the user which places to visit (museums, parks, monuments, restaurants, etc.), planning eventual excursions, depending on the time they had available: Hours, days, weeks, months, and so on. Then, they turned to customization. That is, if it was the first time they were in those cities, if they had previously visited some of the proposed sites, and so forth. In relation to the responses received, they served to reformulate a new proposal to the visitor, in Amsterdam (RCS, 2001).

In some way, intelligent elements were beginning to be included in interactive / hypermedia systems, to adjust these proposals based on a set of variables related to potential tourists or visitors: time available, preferences for tourist circuits, preferred hotel categories, types of appetizing restaurants, and so on. The inclusion of intelligent algorithms and the handling of certain types of personal data, which may be trivial today, were not so at the beginning of the new millennium. Many European Mediterranean cities that have lost their local industries related to steel, mechanics, textiles, petrochemicals, graphic arts, etc., have found in tourism the solution to the loss of income in the national GDP, before the transfer of these industries to other countries of the Asian or African continent, to mention two examples. In Spain, income from tourism was equivalent to almost 15% of GDP, before the Covid-19 pandemic. This is the main importance of statistics in tourism industry. The data of the sector from the National Institute of Statistics of Spain (INE: www.ine.es) is constantly under observation, such as the total number of tourists who arrive in the territory, the consumption per day and average per capita of these tourists during their stay, the main routes of entry into the country (plane, train, bus, car, ship, etc.), the main cities and/or destinations, and so forth (Cipolla-Ficarra, 2011; Cipolla-Ficarra, Nicol & Cipolla-Ficarra, 2010).

These data make the official portals of tourist agencies or offices, municipalities, provinces, regions, country, etc. be regarded as a multimedia showcase, which must be periodically updated from the point of view of new platforms and interactive design, to constantly attract the attention of potential visitors. For example, one way to quickly detect interest in international tourists is the total number of languages used in the portals of these official tourism agencies. If they exceed the average of 5 or 7 languages, excluding the local language, that is a good sign (Cipolla-Ficarra, 2011).

At the beginning of the new millennium, many European portals were bilingual or trilingual, since their economies were based on heavy industries. With the global financial crisis of 2008, local, national, regional, state authorities, etc., had to review the traditional industrial paradigms, to generate new synergies towards the tourism industry, based fundamentally on cultural and natural heritage. Some details of successful projects of the new millennium, implemented in Italy, where tourism from cities and rural areas converges; cultural and natural heritage; education and entertainment; cinema and literature; local gastronomy and e-commerce; new methodologies for interactive design and heuristic evaluation of multimedia systems, etc., can be consulted in the following references (Cipolla-Ficarra, et al., 2014; Cipolla-Ficarra, 2011; Cipolla-Ficarra, Nicol & Cipolla-Ficarra, 2010; Cipolla-Ficarra, 2008a; Cipolla-Ficarra, 2007b; Cipolla-Ficarra, 1999).

Until the first years of the new millennium, the statistical data related to tourism, the user's freedom to access tourist information, the safeguarding of ecology and cultural heritage against mass tourism, among many other variables, did not depend on the so called "recommender system." These systems filter online content to generate recommendations for users. The expansion of the same begins to be infinite since it began in e-commerce and now it is directed towards the media. Therefore, there is a

high rate of manipulation by those who generate the algorithms of these systems. In the case of tourism, until now there was no algorithm or technology to suggest, manipulate and control each of the actions carried out by the user, at the time of accessing this type of information as international e-portals do in the commerce or social network applications, such as YouTube or Spotify.

All this will now be carried out under the hypothetical need to diversify tourism and balance environmental sustainability, using information technology, artificial intelligence, e-commerce, emotions and religion (digital humanities or humanities computing). For example, suggesting an alternative route to a potential tourist so that they do not congest the city's traffic, or, alternatively, move them away from the common places where the cultural/natural heritage is concentrated, most visited by foreigners. In fact, the main purpose is economic, since the area of those stores is promoted which are in the peripheral places of the tourist centres. The other latent purpose is the so-called "over-tourism." That is to say, to eradicate through informatics and new technologies tourism in the great cities of art, because it deteriorates the quality of daily life of the local inhabitants. However, there are other significant contradictions in the face of this myopic view of reality:

- The **first** is the impact it has on the GDP of European countries, for example, and that little by little; this industry without chimneys is being implemented or qualified for its development in the rest of the continents.
- **Second,** it is always important to consider the training in the social sciences of those who have under their control the development or management of projects, systems, and everything related to "recommender systems" since, given the lack of time of millions of Users facing interactive systems, they are vulnerable and manipulated by these algorithms, generally carried out by powerful groups that apparently are on the surface of the Internet (educational or small business) but actually belong to the dark zone of the Internet.
- **Third,** the generation of models or paradigms from human behaviours that represent small groups but that later tend to be imposed vertically to standardize the emotions and actions of millions of people (Han, B.C. & Steuer, 2022a; Han, B.C. & Steuer, 2022b; Cipolla-Ficarra, 2021).
- **Fourth:** The loss of interest in the provisional categorization of potential users through previous experiments in laboratories. Tests where communicability, objectivity and truthfulness are the premises to follow, in the development of systems that have a strong impact on society, from the consumption of goods and services.
- **Fifth,** since the first design models for hypertext systems, the mathematical / physical equation — religion / politics, has led to promoting in the final users of the 21st century, the culture of fragmented knowledge or also called mosaic or tile culture. This denotes a frequent loss of human capacities such as free will in decision making and acting according to logic, derived from the processes of endoculturization and transculturation, to cite two examples.
- **Sixth,** it is not positive to mix urban and territorial planning with the policy of people's mobility, through the use of recommender systems. These systems with perverse and manipulated algorithms, applied to multimedia technological devices widely spread among the population (i.e., smartphones), lead to the control of the free movement of human beings in the territory (Han, B.C. & Steuer, 2022a; Han, B.C. & Steuer, 2022b).
- **Seventh,** the user must pay more attention to the use of applications derived from recommender systems, developed and implemented in areas with latent territorial conflicts and that falsely promise balance in the distribution of wealth and local economic development, through the sus-

tainability of the environment and tourists. An area of latent territorial conflicts in central Europe is the western area that belongs to or borders the former Austro-Hungarian empire (historically, the source of the two world wars in the old continent). Linguistically, socially, economically, educationally, etc., although some territories in that region have special autonomous statutes, for example, South and North Tyrol, intolerance and divergences are generated daily among their fellow citizens. Therefore, the recommender systems generated there (applications in app format) are not international models to follow because there is no cultural homogeneity among their users.

- **Eighth,** when tourism systems use Inverse Reinforcement Learning (IRL) algorithms, they no longer refer to natural processes. These data from these algorithms infer the behaviours of people, based on the sequences of actions performed by groups of users in the past, for example, the places or museums that most people have frequently visited in the past. However, with natural or man-made catastrophes (floods, tornadoes, earthquakes, pandemics, wars, and so forth) all that data can become obsolete overnight. Consequently, these systems must be updated and maintained periodically, which increases their management costs derived from constant updates. These updates not only must be downloaded by users on their smartphones but must be paid for by the managers of the tourist offices, whether public, private or hybrid, for instance.

Figure 11. A geographical area of central Europe: Austria, Italy (South Tyrol — Bolzano) and Swiss Confederation, where experiments with users tend to limit the free movement of people, through algorithms in recommender systems, new technologies and the false use of the notion of environmental sustainability.

The automation of tourism systems is a trend that will grow over time (Grabler, 2008; Smirnov, 2018). However, it is necessary that the official tourism agencies know in detail the type of algorithms that their applications will have, requesting guarantees in writing, so that their use does not lead to actions to control the free movement of people. Currently, there is a tendency in computer language to include terms related a priori to ecological or natural tourism, following a commercial or marketing purpose: ecosystems, environmental sustainability, recommender tours, etc., and without considering the destructive effect on nature.

Millions of litters of water and kilowatts of electricity consumed per hour, to cool the structures where the hundreds of thousands of servers are installed, of companies and/or online virtual services, starting with applications based on audiovisual social networks. This lexicon was non- existent in software engineering, interactive design, usability engineering, etc., for the development of the first systems aimed at promoting tourism and cultural / natural heritage, in the 20th century. Therefore, a user of generation Y or millenial "freaks out" (some of the main meanings of the Spanish verb *"flipar"* it means to hallucinate, excite, surprise, go crazy and irrational) when they partially understand or find out how the algorithms of recommendation systems work. That is, the power of manipulation at the time of making e-commerce purchases through platforms such as Amazon, eBay, etc., based on reading the ratings of users who have previously purchased the same goods or services. The freedom of the tourist to explore the cultural and natural heritage of humanity should not be automated numerically or commercially, such as the purchase of a product in a museum souvenir shop.

SMART EDUCATION

In our days, in a review of the keywords in countless university papers related to education from professionals in the formal and natural sciences, we can find the following miscellany, arranged alphabetically:

- Asynchronous / synchronous / integrative e-learning,
- Collaborative work,
- Computational thinking,
- Constructivist / constructionist learning,
- Cooperative / collaborative learning,
- Creativity,
- Diversity,
- Down syndrome,
- Early childhood education,
- e-Book,
- Education for the disabled,
- Education for the elderly,
- Educational games,
- e-Learning,
- e-Meeting,
- Emotion,
- Empathy,
- Gamification,

- HCI,
- Inclusion,
- Learning management system,
- Learning ubiquitous,
- Methods,
- Moodle,
- Neuro-education,
- Open educational resources,
- Pedagogy,
- Pervasive / ubiquitous gaming,
- Programming,
- Robotics,
- STEAM,
- Strategies,
- Systematic review of ... (the ellipses make reference to any topic, the important thing is to gain visibility in Google Scholar indexes),
- Tangible technologies,
- Technology enhance learning,
- t-Learning,
- Transmedia,
- Usability engineering,
- User-centered design,
- UX,
- Virtual agents,
- Virtual campus,
- X-learning,
- Zoom video communications (Zoom), and a very long etcetera.

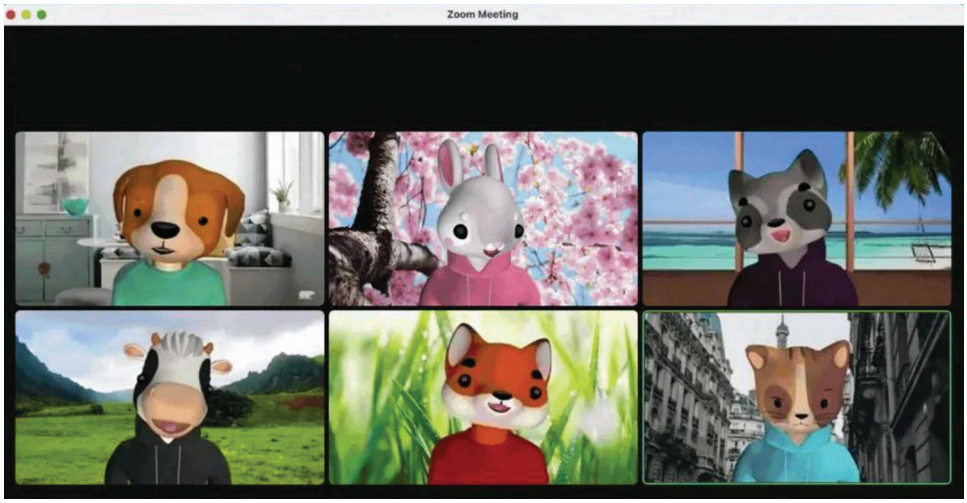
All these words in the face of a global emergency situation such as a pandemic focus on the use of Zoom for distance education, virtual meetings, scientific conferences, defence of final degree projects or doctoral theses, and a long etcetera (figure 12). That is, open software developed like so many other applications for communication and education, in California (USA) or other English-speaking cities or countries. **Zoom is an application that has made it possible to efficiently solve communication between millions of people, in their roles as students, teachers, tutors, managers, businessmen, industrialists, etc., in situations of a global health emergency.**

In this context, distance education, in southern Europe and in many parts of the world, has had dismal results as can be read, seen and heard in countless traditional media or new media. In few words, in that miscellany of words, there are those who commercially hypnotize master's and doctoral students, or walk around for free (trips, stays, etc. paid for with taxpayers' money, through taxes), for the length and breadth of the planet, with the scam of "educational or pedagogical novelties", as is the case of the professors of the historical universities in Spain, for example, Salamanca (Spain), the first university in the Iberian Peninsula, founded in 1218, therefore one of the oldest in Europe (Cipolla-Ficarra, et a1., 2020).

While the teachers of primary schools, secondary schools, vocational training centres, etc., in Salamanca not only do they not have enough to satisfy the demand and transformation of real classes into

virtual classes, but they also do not have the content and technological instruments to solve educational problems, at all levels of public, private and hybrid education. Professors whose teaching load consists of a couple of days (half a day) a week, since theoretically the rest of the time they would be researching, programming and developing artificial intelligence systems, robots, virtual agents, open software, interactive and innovative content, etc., helping other teachers teach in situations of national emergency, and an extensive etcetera (Cipolla- Ficarra, et al., 2020).

Figure 12. The new version of Zoom for personal computers with Windows or Mac operating systems and for iPhone allows you to replace the real face with the avatar of a three-dimensional animal that captures the facial mimicry and the real movements of the person.



The reality is that in the face of pandemic or other natural / artificial catastrophes, they dedicate themselves to planning national and international trips in their agendas, ignoring the context and didactic issues, such as the generation of educational software or content for the various levels of education, in their cities, provinces, regions and country of residence. This is an uncomfortable reality that has been widely manifested in emergency situations. Hypothetically "public" universities, where "their owners" / "present themselves", not only promoting for the umpteenth time, "exaggerated narcissism" through the new media / social networking, as "guarantors of educational continuity" and "challenging the coronavirus", but rather trivializing the vital risk of university staff, students, their families, etc., in the face of a pandemic (Cipolla- Ficarra, et al., 2020; Hirigoyen, 2019).

This denotes total ignorance and labour irresponsibility of those egomaniacs. To this end, they resort to the same war propaganda methods of Goebbels or I1'ičëv of the 20th century, through university press offices, local and national mass media, new media, etc. An effective methodology that serves the infodemic for the current promotion of narco-education from the University of Cauca (Colombia) to the rest of Latin America, Spain, France, Switzerland, Greece, Portugal, Germany, Austria, Finland, Sweden, Italy, and a long etcetera. Readers interested in these educational deviations can consult the following link www.pirateando.net, to continue "freaking out" in the face of the described reality and the consequences of the narco- education infodemic.

Figure 13. Fake scientists in pedagogy who do not solve local education problems in a pandemic but resort to the media, for propaganda purposes, following the style of Goebbels or Il'ičëv (Salamanca RTV "Al día.es" — 10/14/2020, www.salamancartvaldia.es).

Another of the notions that is in the list of terms of the initial "potpourri" is the "Flipeed Classroom" (Chen, 2016; Chao, et a1., 2015; Giannakos, Krogstie & Chrisochoides, 2014; Kim, M., et a1., 2014). Homonymously and curiously, the English term flipped almost has the same sound and connotation as the verb *Jipear* in Spanish, when the situation of doctorate or master's courses in some universities is analyzed, and the reality exceeds the fiction or science fiction. The flipped classroom is a new teaching modality that is gaining ground in the new blended teaching / learning processes, also called hybrid or mixed (there is a direct relationship with blended learning). There is an investment in the traditional pedagogical approach, supported by new technologies (Giannakos, Krogstie & Chrisochoides, 2014; Kim, et al., 2014).

Hypothetically, it serves to improve learning, taking the group paradigm (real classroom) to a more individual and personalized one (virtual classroom). The purpose is that the positive aspects of face-to-face classes converge with virtual classes and tutorials. The classroom serves to cognitively develop complex processes to enhance meaningful learning (Chen, 2016). The fundamental mission of the teacher is to provide digital material (audiovisual and textual) to be consulted outside the classroom (podcasting, videos, blogs, lesson summaries, etc.). Without a doubt, this is one of the main reasons why Wikipedia,

YouTube, Instagram, Facebook or Meta, Moodle, and so on, have rapidly increased the number of users (students and teachers, in the role of multimedia editors), across the planet.

In the case of podcasting, blogs and webinars, to cite three examples, a priori, they can have a great social impact but they entail a series of problems that are not easily solved, since they derive from the communication processes of the 20th century, such as the press, radio and television. With the difference that back then the message once issued could not be altered by the sender. With the democratization of the Internet and its inclusion in the educational field from an early age, all this has changed. One of the current problems is that these are tasks that are not only outside the physical space of educational institutions, but are also based on online digital media, whose value of content truthfulness, in countless cases, is highly debatable. The latter is due to the ease of modifying and even eliminating them, by the editors themselves, without leaving a record of these actions, in the virtual community (Cipolla-Ficarra, 2021).

The game of changing roles that is currently presented as a pedagogical novelty through the flipped classroom was the common denominator in the doctoral programs of the faculties of computer science, systems, software, etc., in southern Europe, in the '90s, for example. That is, the student who becomes a teacher for his / her classmates and the teacher occupies the role of a continuous student. In those doctoral, master's, specialization, continuing education courses, etc., whose costs are between five or more digits, even today it is easy to find yourself in the academic year of those courses, with the participation of 2 - 12 hours (average), of didactics by the owner of the course. In other words, his / her name in the program only serves to attract students, or rather "clients", especially those from overseas.

The didactic task of these teachers in those first minutes of the course consisted of assigning research topics, through a couple of papers (conferences, magazine articles, etc., from associations or organizations such as ACM, IEEE, and so on), to the students to develop research and prepare a lesson for the rest of the group. In the following classes, the students were the teachers (active teachers) and the head teacher or her assistants were spectators (passive teachers). As for the latter, the activity they carried out in the classroom was to take notes on their personal computers or photograph the slides of the Powerpoint presentations, from the last benches in the classroom, of the students' explanations.

Notes, comments, clarifications, photographs, etc. that passive teachers automatically transformed into publications for their congresses, workshops, magazine articles, book chapters, and so forth. Therefore, it is a pedagogical model, with or without the use of new technologies, which serves to offload the responsibility of learning and the development of content directly on the students. Theoretical knowledge is acquired at home through transmedia, for example. At the same time, the passage of personal and individual capacities for acquiring knowledge and solving problems towards the group, which must always be interconnected to the network, is observed, with the consequences derived from the data and information that circulate online: Inaccuracy, vagueness, ambiguity, falsehood, and so on. There is a total loss concerning the consultations of the analogical supports, that is to say, the books in the libraries.

One of the justifications for using this paradigm is that students can adapt their learning pace efficiently and without generating differences within the classroom. The student is not alone to solve a problem but rather, as an active member of a group, expects or promotes feedback within it. However, with this type of model, the consequences of group dynamics are not investigated, when they are internally distorted and tend to be aggressive towards the rest of the individuals, for example. In summary, students must arrive in the classroom knowing the topics in advance and they themselves are responsible for their own learning in an autonomous and collaborative way. The role of teachers is basically to guide and solve problems that arise in the activities that students have to develop.

GAMIFICATION

"Learning by playing", that is, the game as a learning tool is one of the concepts that is constantly repeated in the new millennium, from the inclusion of the first computers in classrooms, through the experiments carried out by Piaget and his colleagues, in the late '60s (Piaget, 1993; Schwebel & Raph, 1974). However, the relationship between meaning and signifier of "learning by playing" back then, to what currently exists in the field of gamification and the flipped classroom, in some geographical areas of our planet (Chao, et al., 2015; Chen, 2016; Gangadharbatla & Davis, 2015).

The change of roles between students and teachers does not mean that we are facing a mere "role play." An exchange of roles that has easily allowed the inclusion of teachers in the university and secondary level without knowledge in the subjects they teach, but also lack of experience in didactics, even if they have the title of professors. Qualitative mechanisms for the evaluation, certification and accreditation of teaching staff (public institutions such as universities or autonomous agencies, attached to the ministries of education) are not synonymous with a guarantee when the power structure is always governed by the same members of the group (Bishop & Frincke, 2004; Tannian & Coston, 2021).

A formation of groups, where no one analyzes the formation of their structures and ramifications in society, but which is the new paradigm to follow, with the imposition of the flipped classroom model. The members of these groups follow more the models of a pack of hyenas than the epistemological and philosophical principles of science, placing pedagogy and game theory first.

However, gamification as a motivating tool for students, through video games, game elements used in the real or virtual classroom, transmedia, etc., is not the absolute panacea for certain subjects that require greater intellectual effort (i.e, logic, calculus, philosophy, and so on), in the field of flipped classroom (Cipolla-Ficarra & Cipolla-Ficarra, 2009; Cipolla-Ficarra, 2020). It is essential to study the dynamics of the groups to detect internal deviations in them. In gamification, the rigor of constantly measuring student actions, establishing behavioural guidelines, simulations, interfaces, group competitions, etc., also tends to lead to another mixture of words and acronyms (Gangadharbatla & Davis, 2015). Some of them in alphabetical order are: Advergames, AI (artificial intelligence), AR (augmented reality), ARG (alternative reality games), avatar, behavioural economics, ecology, e-commerce, e-learning, fail to learn, funology, GUI (graphical user interface), HCI (human-computer interaction / human-computer interface), HRI (human-robot interaction), IoT (internet of things), multimedia, MR (mixed reality), safe circle, serious games, social learning, social media, UCD (user-centered design), UE (usability engineering), UX (User eXperience), VR (virtual reality), wellness, among many others. All of them are directly and indirectly related to gamification. Evidently, some were already present in the first diverse set of education.

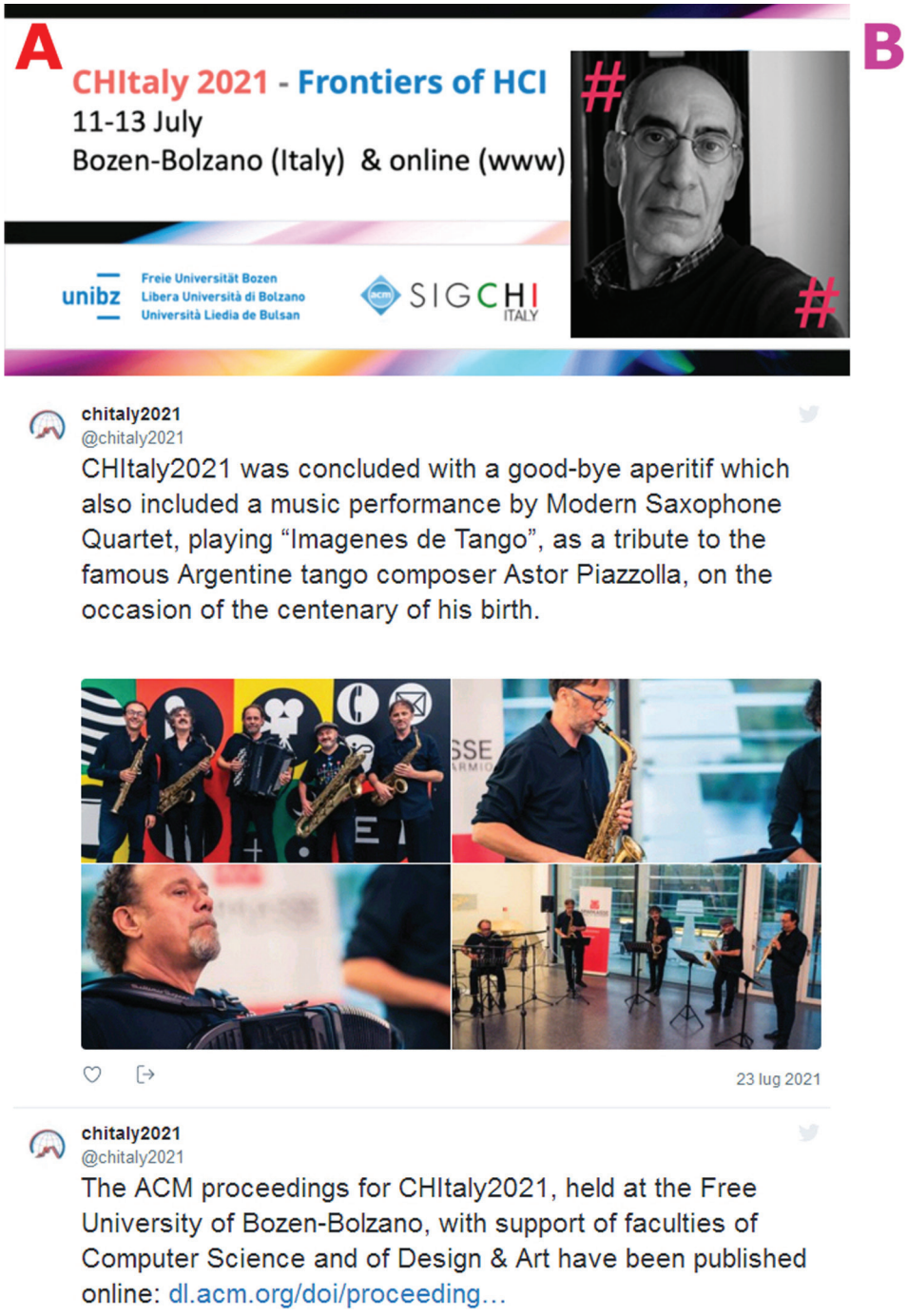
Given these two sets in which educational models and new technologies converge, the following rhetorical question arises naturally: **How can you innovate in gamification, given such an academic reality?** In the first place, it is putting order in the existing chaos by including experimental paradigms, which only follow the precepts of wild mercantilism, in the field of education of the new millennium. To this end, it is easier to exclude everything that is erroneously stated in educational settings and is listed below, with real examples:

1. **Gamification as a synonym for video games** to promote the culture of fragmented knowledge or mosaic culture.
2. **Educational paradigms based solely on the metaverse,** when the technology is still in the experimentation phase, nor has "serious" pedagogical content been created and evaluated for the different educational levels.
3. **Propagandistic and mercantilist miscellany** of those groups that contain a mixture of words related to ICTs, transmedia and online courses, such as the definition of online courses based on transmedia. An authentic very bad example: "Transmedia learning, online, open, interactive, accessible, usable, adaptive, gamified, which includes activities, tasks, tutorials, monitoring and electronic evaluation, designed for different formats, devices and platforms (tablets PC, smartphones, smartTV, PC, virtual reality glasses, electronic books, etc.), adapted to the different regulations (SCORM, xAPI, LTI and AICC, SIMPLIT, etc.), which implements neurolearning, exponential technologies (Extended Reality, Artificial Intelligence, Blockchain, IoT, etc.) and different models and teaching methodologies (constructivism, connectivism, flipped classroom, ubiquitous learning, etc.), based on serious games."
4. **Theoretical statements without experimental verifications** in classrooms located in rural or inhospitable areas (tropical jungles, centuries-old forests, etc.) or in the degraded suburbs of cities in Mexico, Haiti, Brazil, Colombia, Paraguay, Bolivia, Chile, and so on, or other marginal areas of the large European and Asian cities, etc., whose inhabitants, teachers, students, and so forth, do not have access to computers (cost) or electricity to make them work. For example, in some academic circles in Spain and Portugal (Córdoba, Santander, Valencia, Valladolid, Aveiro, and so forth) it is argued that the new learning theories based on social constructivism, connectivism, ubiquitous adaptive learning, flipped classroom and online learning models are latent in the new digital society, the use of these systems has a favourable impact both in the reduction of the dropout rate and in the high acquisition of knowledge and skills by students in a design approach for all. If, in marginal areas, schools and homes do not have the bare minimum for their daily functioning, such as drinking water or electricity, teaching through the computer continues to be more of a utopia than a reality. Therefore, it is useless to insist on theoretical hypotheses that come more from the environment of the formal and natural sciences than from the social sciences, as is the following statement: The new accessible, usable and adaptive learning objects that the teacher can produce easily with the authoring tools in the cloud, based on the use of gamification systems applied to education and in serious games, are being used more and more and it has been shown that with them, the student's participation in the learning process is more intense and effective. Before developing utopian theories about the gamification of users in these geographical areas, efforts should be focused on solving two of the fundamental elements of human survival in the 21st century: A balanced diet and decent housing.
5. **Formation of educational groups** (teachers and students) who work assiduously with online content fundamentally **based on images,** whether static or dynamic. To examine over time the behaviour of the leaders of these groups in work environments, taking into account private (religious) training centres and the use of the flipped classroom model, for example. Exaggerated group work ends up forming professionals in the formal, natural and social sciences, which are unable to personally or individually resolve technical questions or problems that require a 360-degree vision.
6. **Cult of narcissism.** Investigate whether there is a mechanism in university or educational venues that encourages egomania and inbreeding in some small groups of teachers, through the local press,

social networks, obtaining prizes rigged beforehand, etc. (Hirigoyen, 2019). This exaggerated egocentrism and inbreeding encourages the formation of pressure groups, where the educational quality of students and respect for the rules of the epistemology of science are the last of the priorities. Some Latin American examples verified for decades are the following (Cipolla-Ficarra, 2008c; Cipolla-Ficarra & Ficarra, 2013; Cipolla-Ficarra, 2021; Cipolla-Ficarra, 2022).

7. **The immunity and irresponsibility of the controller.** It is important that the teacher in his role as controller / evaluator of the training process be controlled from outside the academic institutions to which he belongs, and excluding possible groups of friends or colleagues, whether the latter are latent or manifest. The goal is for them to take responsibility for all their actions. In educational environments where everything the student does inside and outside the classroom is measured (gamification, flipped classroom, e-learning, blended learning, digital humanities, recommender systems, etc.) over time, this not only generates stress in students, but also health problems that affect attention and concentration. The latter can be verified when reading texts, by generation Z and Alpha.
8. Educational proposals at home, whose **pedagogical model does not promote consultation of books, magazines,** etc., in libraries; and/or uses 3D images in more than 50% of the content (avatars, virtual reality, etc.), and/or forces the student and their families to create content through social networks, using more than 50% of the time, to video and photo platforms.
9. **The curriculums of the teaching staff magnified in times of natural or artificial catastrophes.** Bachelor's degrees, engineering, etc. in the 1990s, are 75% higher than the "CKC" of the degrees obtained after 2000. In addition, university study plans were based on an average of 5-6 years to obtain an engineering degree, bachelor's degree, architecture, etc., including the final year project. Therefore, be suspicious of those teachers who, for bureaucratic reasons of homologation of degrees between states, manage to transform a degree into an engineering degree, or who can be included in the category of "kitten professionals." An extensive description of them can be found in the following references (Cipolla-Ficarra & Ficarra, 2013; Cipolla-Ficarra, 2008c). It would be wise to avoid interacting with teachers who in the midst of a pandemic have obtained doctorates in education, pedagogy, anthropology, and so forth, particularly when individual publications do not appear in the doctoral theses or outside the magic circle of their colleagues, friends, pressure groups, etc. Other classic examples are computer science graduates in Italy (called *dottoressa* — woman, or *dottore* — man, whose abbreviation in Italian is *dott.ssa* for women and *dott.* for men), who use the initials Dr or PhD, as if they had obtained a doctor's degree. There is also the Latin picaresque of placing an exclusive dedication to teaching, with the English expression "full-time" (professors). In Europe some activities that promote all these deviations are under the following associations, publications, events, acronyms, and so on: AIPO, Interacción, HCI Collab, CHISPA, ISA / ILA / IXDA, CHItaly, IXD&A, AVI, Bruno Kessler Foundation, MDIP (Sensors), RITA, and so on.
10. **One of the consequences of the pandemic has been the union of Gardunia / Garduña groups in southern Europe.** An example is in figure 14. In it, it can be seen how Ibero-American narco-education has reached Austria, whose gateway is South Tyrol. In part A of the figure 14, a classic example of disguised racism of the local organizer of the event is observed, when resorting to tango, with the pretext of celebrating the centenary of the birth of Astor Piazzolla. Explicitly, the Gardunia organizer and colleagues of the virtual event who usually invite their fellow citizens to emigrate from the country, if they do not agree with the local and international Gardunia operations, in the

Figure 14. Generally, in the mountainous areas of the Alps, Pyrenees, etc., when jazz, gospel, instrumental music, etc., are used in social and international events, they denote the strong presence of the camouflaged xenophobic component. Something similar happens with inclusive language or gender equality. For example, in section B, the two pink #'s mean that he has two daughters, therefore, a defender of gender equality and authoritarian ultra-nationalism. It is a classical example of the generation Omega.



educational, scientific, labour context, etc. In zone B, a new communicative strategy of autocratic subjects is seen, politically formed under verticalist paradigms of the supposedly autonomous regions in north of Italy *(Lega Nord per l'Indipendenza della Padania* LN, in the '90s) and who today present themselves as progressive and defenders of gender equality, resorting to the colour pink, in the use of the symbol #. This tells us that there are parental ties (daughters).

These few points highlight the need to insert controls in the controllers of the educational process in our days, whose failures can be hidden through the use of new technologies, the abuse of social networks and endless other stratagems. Only in global emergency situations are all the failures in the distance education process detected. Even in those centres that for decades have been working not only with virtual classrooms, but also fully virtual universities (i.e., Open University of Catalonia, in Spain) and that manage to maintain and sustain a caste of owners of public academic spaces. In other words, it is necessary to bear in mind the old Latin saying: *"Qui custodiet ipsos custodes"* —"Who watches the watchers?" Although it is a phrase or question that comes from satire, the latter must be considered as an element that favours the democratic process of societies, where education is one of its fundamental pillars.

LESSONS LEARNED

The analysis of the three letters "CKC" reveals how in the face of certain educational methodologies and paradigms linked to new technologies, there is a progressive and constant loss of that triadic relationship, specifically for future generations of users of interactive systems. Interactive systems that are losing the north in the development of educational content because they are based on the special effects of three-dimensional images widely spread with online video games. Moreover, there is a geometric progression in suggesting to the user the paths to follow when freely browsing the Internet. This manipulative orientation comes from professionals in the formal and natural sciences. They not only in a compulsive and obsessive way, collect and analyze everything that the user does with interactive devices or when he / she is enjoying his / her free time, such as places to visit on vacation.

Consequently, they are developing partial models of reality, whose algorithms will serve to implement future artificial intelligence systems that will affect not only the automated processes of industries but also education. What is more, they often resort to the notions of the pioneers of computing and education to sell recycled or rehashed solutions. For example, doing doctoral theses in the educational departments of Spanish universities, where a rehash (teaching and learning computational thinking and programming in childhood education in an inclusive way) is presented as innovative to "give away doctoral theses" in times of pandemic. A rehash that is light years away from the excellent work developed by Seymour Papert and his team, aimed at education and the teaching of programming to children in primary school. In the rehash, programming robots is supposedly taught, from the age of three. In a few words, in this utopian rehash, the umpteenth phenomenon of the meteoric system is verified to obtain university degrees as a gift, when simultaneously, the author carries out endless other activities. With the addition that from the perspective of science, in that potpourri of words and experiments, it not only has an academic value equal to zero, but also contains each of the points listed above. These first points are a kind of universal guidelines to avoid the failure of future generations, in education and in the innovation of gamification, through the letters "CKC."

CONCLUSION

As has been verified over time, guided links have been a valid instrument to bring users closer to the use of computers and as a communicative resource of successful design when guiding the user to visit the different nodes and links that make up the structural architecture of an interactive system. They have been the key in numerous interactive applications for inexperienced users who were in front of a computer for the first time, for informational, educational, tourist, commercial purposes, etc. Now, the total immersion of the user in 3D environments, following video game models, is the new horizon outlined by the main players or manufacturers of software and hardware, and which will begin to expand in the educational field. Therefore, it is necessary to consider, use and update those quality attributes of the first interactive systems (hypertext, multimedia, and hypermedia) that must be included in the metaverse, for example.

Miscellaneous models, methodologies, technologies, etc., presented as the panacea in distance education should be avoided, especially in international emergency situations. For example, one of the consequences of the covid-19 pandemic has been the abandonment of studies by millions of young people around the world. It has been found that part of this potpourri of topics comes from professionals in the formal and natural sciences who have dedicated themselves to infinitely expanding topics related to HCI, UX and EU. Therefore, now the solution in the classroom is not to create 3D virtual worlds, using state-of-the-art technology and transmedia, with a high level of realism and playability, but rather to find solutions to the real context of students and teachers, with technological resources available. Otherwise, we can no longer speak of digital divides, but rather of digital abysses. It has also been noted that the level of the three "C" in the Z and alpha generations continues to decrease with regard to the Y generation. It is enough to compare the final research works to obtain university degrees, between the end of the 20th century and those of the new millennium. Some factors of this fall are located in the Omega generation, the poor quality of educational audiovisual content, the abusive use of social networks, the distancing of users from the context of belonging, the implementation of the flipped classroom at all educational levels and the rise of tile culture.

Many of the successful communication strategies and educational content of the first interactive systems with the use of the computer can be adapted to smartphones, tablet PCs, or other low- cost and/or widely distributed technological devices. Tactics that have boosted industries related to audiovisual, tourism, video games, to name a few. Consequently, it is necessary to revalue, balance and motivate the individual effort of the students, in the daily learning process, without constantly putting pressure on the students, in that continuous process of endless evaluation derived from collaboration and group participation. A cyclical evaluation of role exchange (teachers and students) and carried out with ICTs, based on the new pedagogical paradigms. In addition, they are based on the latest technological trends and imposed as models to follow, by programmers / manufacturers of software and hardware, whether commercial or of free access. Finally, control mechanisms must be included for the controllers or evaluators of this process.

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Chapter 6
Challenges and Limits of the Scientific Education and New Media

ABSTRACT

In this research, the author present the main current limits and future challenges in science education, specifically through new information technologies (IT) and new social media. In addition, the social factors that positively and negatively influence science education, from childhood to adulthood, are disclosed. Simultaneously, through a historical analysis, a parallelism is established between the past and the present, with a projection towards the future of technological innovation and engineering, resorting to the Renaissance as a generator of new synergies in the face of global crises. It also examines some of the main linguistic aspects in the new media as instruments of quality in scientific education, considering the alphabet as the basis of Western civilization.

INTRODUCTION

The teaching of coding is already a reality in many elementary schools in the USA, Europe, Asia, etc. (Bau, et al., 2017; Guo, 2013; Antonakos, 2011; Bork, 1971). In them, the students begin to study the basic notions of computer science and progressively, programming and artificial intelligence, resorting to algorithms of games, which draw their attention. Some of the exercises they are doing are presentations and the generation of their personal pages. In other words, the children are not taught how to use the network, but rather how to build it, with coding. Thus, the notion of communicability has overtaken usability in primary schools. In the early 2000s, such exercises were required of students at technical institutes specializing in computer science, in the Italian Alps, for example. Now, we observe how the teaching of programming and multimedia content creation, are possible in the alpha generation or Gen Alpha (born since 2010).

Meanwhile, in Iberian Peninsula, the Omega generation (1945-present) is oriented towards obtaining EU financial funds (Next Generation, disbursed until 2026), in order to alleviate the consequences of

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the pandemic. The priority of the Omega generation is numerical issues, leaving education and science on the back burner (Cipolla-Ficarra, 2022). In few words, they are very interested in counters and accumulators as a synonym for quality of information, especially, with phrases such as: "Stars of social networks that have millions of followers." The group is represented by members of the formal, natural, factual, etc. sciences, who over time have dedicated themselves to reducing the qualitative level of teaching, due to poor or no academic training or previous experience, in the generation of original and digital educational content. These are contents related to new technologies and distance education for all ages, for example. The interested reader can find an extensive description of this Omega generation in the following reference (Cipolla-Ficarra, 2022).

With the pandemic, there has been a unification of requests from the almost 90 Spanish universities for the digitization of university campuses, teacher training, modernization of the educational system, digitization of the public administration, reinforcement of the health system, digital initiatives related to culture, innovation of the industrial fabric, and so on. This list shows the existence of a common denominator of tasks to be carried out, similar to other European Mediterranean countries and other areas of the world. However, these are themes and requests that have been repeated since the 1990s (Cipolla-Ficarra, 1999; Cipolla-Ficarra, 2010). If they have not been carried out in a quarter of a century and those responsible for them are officials for life, then some rhetorical questions arise spontaneously, such as:

- Where has educational and scientific excellence gone, if it is still necessary to digitize campuses and train teachers?
- How can we talk about exporting the models of Industry 4.0 / 5.0 / #.0? (The symbol # refers to the increase of the version / numbering over time)
- If 5G has not yet been implemented due to a lack of professionals, how can remote interactions for the internet of emotions (metaverse) be experienced in 6G?
- What guarantees are there this time around that these funds will really serve to modernize the two fundamental pillars of today's societies: Education and healthcare?

Besides, one of the consequences derived from the pandemic is the new programs and large R&D (research and development) projects in science education, which the states, individually or in groups, are implementing, with an eye on the immediate future but leaving aside their continuity, once the financial resources are finalized. In other words, the umpteenth set of unfinished projects. **The 2020 horizon in ICT (information and communication technology) education and sciences has not generated great positive changes to raise the quality of life of humanity, despite the large public and private financial resources that** have been **invested in R&D projects, for technological and educational innovation, digital culture, welfare of the disabled, e-government, etc.** Now, the new main objective is to quickly reactivate the productive engines of companies and industries, which have survived the global health crisis. These programs tend to draw new horizons in terms of renewable energies, technological innovation, social inclusion, labour structuring, and a long etcetera, but always with the same agents. That is to say, it is the old leopardism as seen in the novel by Lampedusa (Gilmour, 2007), whose members supposedly change everything but in the end nothing changes.

In almost all these new European R&D proposals, interrelate the most developed countries with the emerging ones, there is a growing interest in the automation of production, promotion of ICTs, promotion of digital administration, transfer of knowledge between industry and academic field, etc. (Jalote & Natarajan, 2019; Chakraborty & Varma, 2019; Bjorn, 2016). The common denominator in almost

all of these projects is education and more specifically, science- based education. Such is the case that the changes in the educational systems seek to divide the job market between technicians from higher institutes, specialized in certain areas that the industry needs, and those with a short-term university degree. Today, in many public universities in southern Europe, after the implementation of the Bologna plan (signed in 1999), bachelor's degrees / doctorate in education, pedagogy, psychology, philosophy, anthropology, literature, history, business management, mathematics, physics, and so forth, can be obtained in three years, etc.; and technical engineering in management, textile, chemical, industrial, automation, video games, and so on.

In the other pillar of developed societies, read health, there are already several short-term degrees in the field of rehabilitation, nursing, dentistry, and so forth. In other words, the length of stay in the educational centres is intended to be reduced as much as possible because, theoretically, the new technologies used in the educational process facilitate the acquisition of skills, competencies and knowledge of the students (Cipolla-Ficarra, Nicol, & Ficarra, 2010a). However, het Bologna plan that had as its objective the establishment by 2010 of a European Higher Education Area (EHEA). The purpose was to facilitate labour mobility across the borders of the EU (European Union), but it has not been fulfilled with doctorates, for example, since the degrees are not automatically recognized between the various member countries of the EU.

In fact, the implementation of the plan has served to generate a pool of low-cost workers for companies, industries, government institutions, etc., seriously damaging the R&D sector in Europe (Cipolla-Ficarra, Nicol & Ficarra, 2010b). Simultaneously, the statistical data of the census with reference to graduates with higher education have been increased, excluding the variable "quality of life" of those graduates and their family environment. Consequently, it is the definitive confirmation of the savage commodification of European university education. It is here that the first rhetorical question arises spontaneously: How has all this been achieved in such a short time? Through the transfer of technology between industry and school/university, students from specialized technical institutes would find a quick insertion in the industries and university students in the managerial organization chart for foreign trade, marketing, logistics, productive coordination, etc. (Cipolla-Ficarra, Nicol, Cipolla-Ficarra, 2010c). However, one of the spaces where both types of training (specialized higher education / university) converge is computer science, and in many places it is a source of conflict. The genesis of these conflicts is varied:

1) The age at which the worker entered the company, industry, school, university, etc.
2) The type of contract that he/she has (definite time, indefinite, full-time, part-time, and so on).
3) If he/she has an education at a vocational training centre / specialized technical institute, or at a high school / high school related to the humanities, or a short-term university engineering or bachelor's degree. Generally, non-university students have access at an early age, in industrial contexts, and with accumulated seniority they become directors of future colleagues from the university field. Some directors who have generalized or obsolete technical knowledge tprogramming languages for management systems in Cobol — COmmon Business-Oriented Language — and that only work on large IBM Power Systems servers, to cite an example), office applications (Excel, Access, etc.), some applications for network security, whose servers run on the Linux operating system, and so on. In brief, there are bachelors, experts, technicians, etc., who are not trained for continuous training. Subsequently, it is generally a "sui generis staffi' that resists changes, even though they are immersed in the field of ICTs on a daily basis.

On the contrary, engineers or computer science graduates from universities, at the time of access to these departments, usually have a good technical preparation, but without continuous updating courses, that knowledge is lost in a short time, and they are forced to perform technical tasks such as network maintenance (servers, computers, printers, scanners, etc.), with extension to electrical tasks (wiring), maintenance of telephone devices, automation control (opening and closing of doors, alarm systems, and so forth). In a few words, tasks and/or knowledge that due to their intrinsic nature have not been considered in their study plans because they belong to other engineering or graduate degrees: Telecommunications, electronics, electrician, etc. The solution for managers in these situations is to hire external services or outsourcing. This reality, which can be expanded on in the following references (Cipolla-Ficarra & Ficarra, 2010; Cipolla-Ficarra, 2015) considerably increases the ICT costs of companies, industries, government and educational institutions, and so on. These problems are repeated daily in hundreds of thousands of structures that provide goods and services in the old continent.

However, it is not a problem of training but rather of human resource management. Staff with higher qualifications cannot be demoted and/or humiliated in the private or public sector, by younger staff without the same years of training, regardless of whether or not they have university degrees. Just as university education teaches the continuous process of study, the same should be true for specialized technical personnel, whose only masterful solution is the infinite hiring of outsourcing service companies. One of the consequences of these entities, poorly managed from the IT (information technology) field and Enterprise Resource Planning (ERP), is that they are not constantly updated to technological changes due to the costs caused by the lack of competence, knowledge and capacity of their leaders. Another consequence is the lack of motivation in the local population for future generations to continue studying at national universities, or finding out that once these studies are completed, young people emigrate abroad (West & Bogumil, 2001). This is the main reason why private / religious universities guarantee a 100% job opportunity (mostly abroad) and the constant propaganda due to the lack of technical professionals, experts, engineers, etc., in new technologies, from business foundations, banking associations, industrial organizations, government institutions, the media, etc. (Cipolla- Ficarra & Ficarra, 2013). Achieving the balance between the local work environment, training in new technologies, new media, and scientific education is one of the greatest current challenges in the global village (Hyman, 1977; Vita, 1998; Balassone, 2001; Fox, 2001; Chomsky, 2002; Brewer & Dittman, 2018).

THEORY VERSUS PRACTICE IN THE EVOLUTION OF SCIENCE TEACHING

In the first European universities, founded in the XII - XV centuries (Bologna, Oxford, Paris, Cambridge, Prague, Vienna, etc.) the teaching of science was very scarce. The first disciplines were grammar, rhetoric, logic, arithmetic, geometry, astronomy, and music. Once these areas of knowledge were overcome, courses in philosophy and theology could be accessed. Only in the universities of the current Italian regions of Emilia-Romagna and Campania could law and medicine be studied (Rei, 1978; Copland, 2015). With the humanism of the Renaissance (15th - 16th century) studies of history and literature would be permitted. Reliably and cyclically, once an international crisis has been overcome (natural, war, financial, health, and so on), there is a return to the frequent use of the notion of rebirth and the association of new technologies with humanism (Guerard, 1949; Basalla, 1989; Raab, 2022).

The latter refers to what is currently known as humanities computing or digital humanities (Gold, 2012). This new discipline is a source of infinite unions and intersections of concepts, although, as in

social networks, the correct relationship between meaning and signifier has been lost, as well as the synchronic and diachronic consideration of the terms used. For example, analyzing in detail the first studies that were taught in the first European universities, we find that the teaching of arithmetic consisted in numbering, geometry in studying the first books of Euclid, astronomy in the calculation of the dates of certain annual festivities, and so forth. That is, the practical aspect was secondary. Over the centuries, "thinking" would gain space in university cloisters. However, the search for the eternal balance between theory and practice, in the various disciplines, remained pending.

Also, in the fifteenth century and before the economic boom of Venice, engineers / inventors begin to have their first rights. In the Venetian Republic, the first laws are established to recognize engineers / inventors of machinery and instruments. It is a kind of copyright in "mechanical arts" and as a means of economic support for inventors. In this historical framework, everything related to the metal from the extraction in the mines to the construction of weapons converged in the elevation of the social status of the craftsmen and inventor engineers (Rei, 1978; Copland, 2015). Undoubtedly the most important of the time was

Leonardo Da Vinci, although he did not have a university education. In his work the Atlantic Code —*Codex Atlanticus* (1478-1519) you can see some of his inventions and solutions related to military architecture, weapons, flight, music, botany, mathematics, etc. (see chapter "Three- dimensional Images, Computer Animation and Communicability: Pro and Cons Interactive Design into 'Codex Atlanticus' Interactive System"). In figures 1, 2, 3 and 4 there are some examples of this. Leonardo's genius, creativity and innovation were unique, transcending borders and time, and introducing the fusion between arts and engineering.

Figure 1. Leonardo's bicycle.

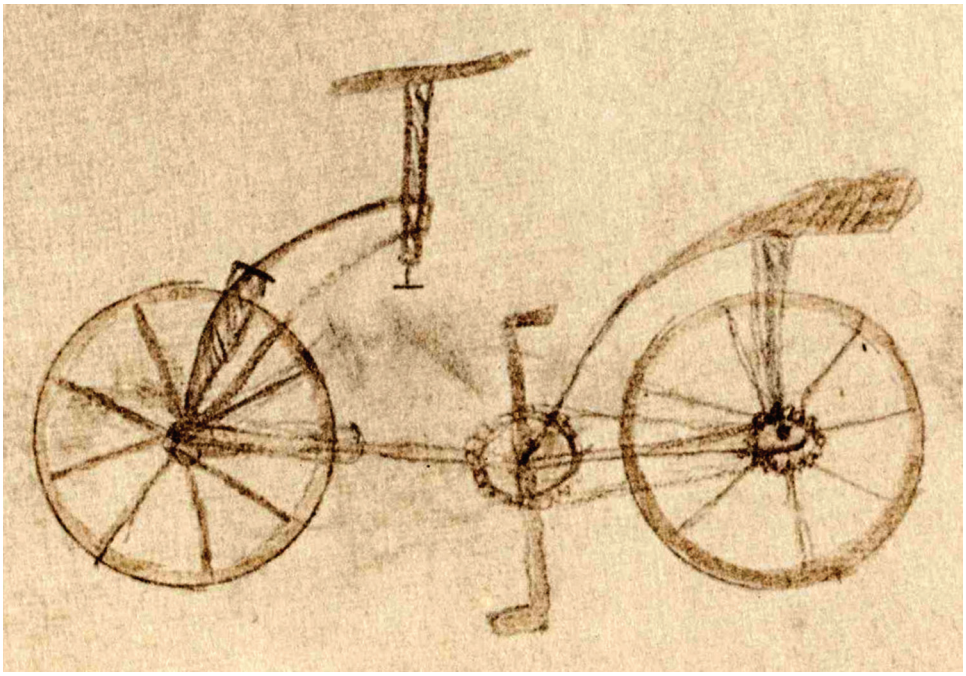


Figure 2. Swing bridge.

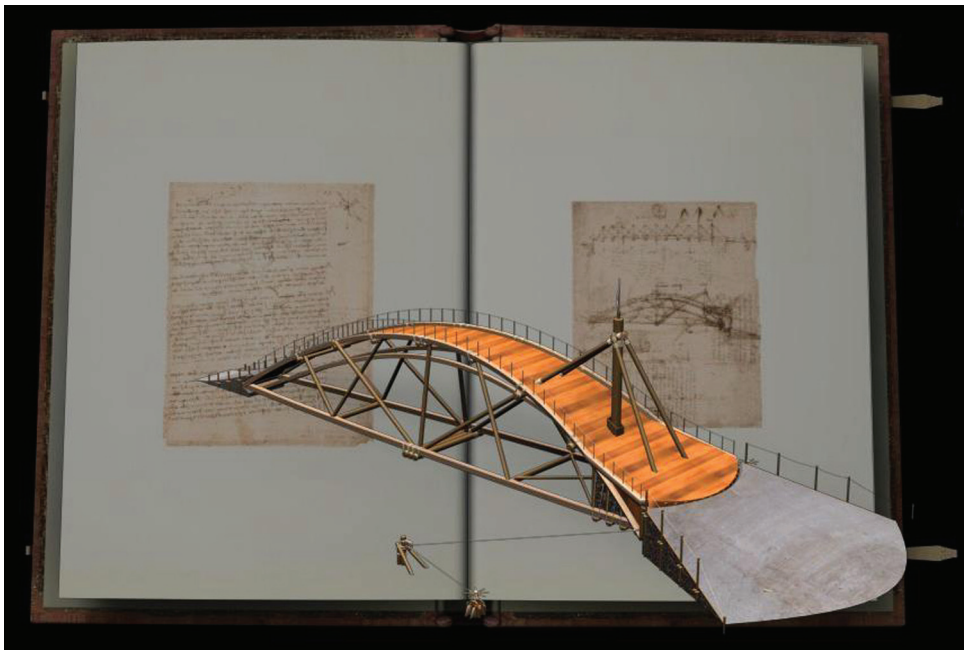


Figure 3. Flying machine.

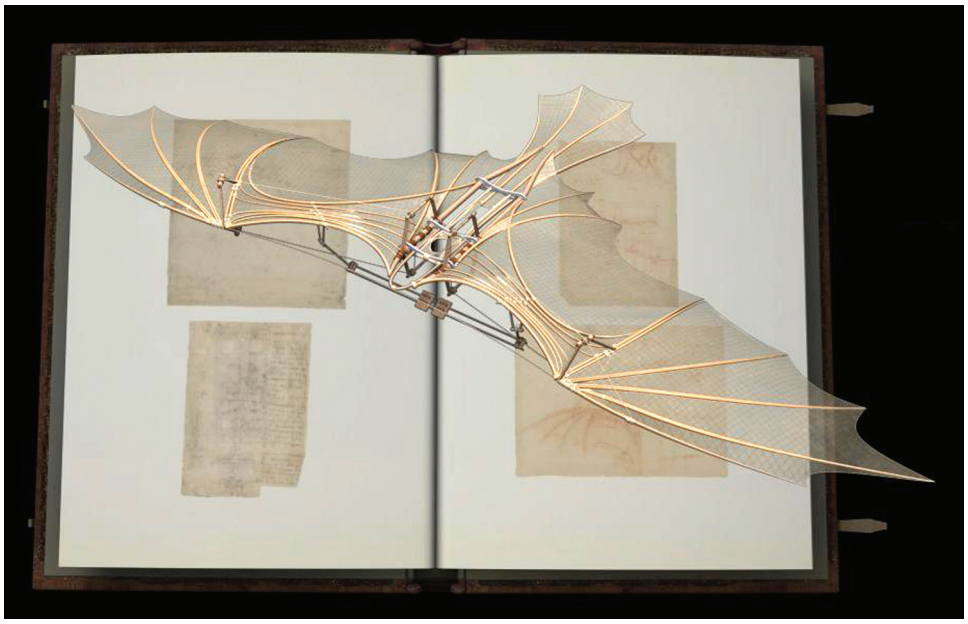
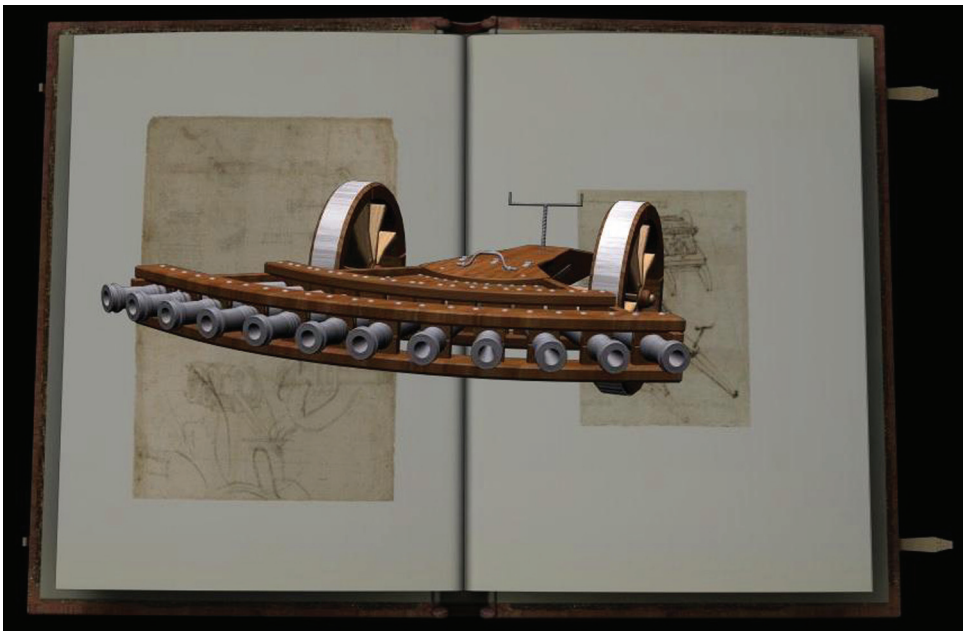


Figure 4. Multi-barrelled machine gun.



However, before the Renaissance the arts were considered in the society of the time, as an inferior manual activity. And it is one thing to refer to Leonardo's mechanical arts, which only denote and connote admiration for his genius, beginning with the notion of perspective in his works and his inventiveness to solve practical problems of everyday life, in times of peace or war. A very different one is the decadent panorama of graduates in fine arts or digital artists, from the end of the 20th century to the present day, in Catalan educational audiovisual contexts (i.e., University of Barcelona, Autonomous University of Barcelona, University of Pompeu Fabra, in Spain), for example, with their inexperienced and superb forays into computer animations, virtual reality, cognitive sciences, embodied interaction, exertion interfaces for children, robotics, social communication, marketing, UX (user experience), HCI (human- computer interaction), etc. (Cipolla-Ficarra & Ficarra, 2013).

We can to observe confusing actions and knowledge that will lead to being authors of destructive criticism, egocentric or narcissistic protagonists online, camouflaged agents of cyber bullying, promoters of alienated human beings, falsifiers of reality, and so forth. In the role of teachers, they resort to the use of flipped learning in university classrooms, to hide their lack of skills, knowledge and abilities for subjects related to new technologies, regardless of the exaggerated proliferation of photos, videos, radio interviews, and so on, in the new and traditional media. They also promote the idea that the problem solving paradigm is replaced by soft skills.

That is to say, they no longer teach theoretical / practical contents of the subjects, but rather what students should think, how they should think and with what words they should express it. In short, the university as a control and alienation of students and future scientists, considered as a mass of future workers in new technologies, to devoutly obey the orders of the elites, under a false and partial interpretation of truth and reality. In the following references you can consult examples of this typology of artists and their mentors in Catalonia (diametrically opposed to the legacy of Leonardo Da Vinci and

the Renaissance arts), compiled over the last three decades (Cipolla-Ficarra, Quiroga & Alma, 2013; Cipolla-Ficarra & Ficarra, 2013; Cipolla-Ficarra, et al., 2017).

Only when Renaissance painting began to represent reality in the most exact way possible, did art begin to acquire a transcendental importance in the relationship between human beings and nature (Cipolla-Ficarra, 2013). In brief, the painting had to be a kind of photograph or film of that reality. Realism is a tendency regarding the artistic fact (basically pictorial, sculptural and literary) that values the similarity between the forms of aesthetic representation and the very reality that inspires them. Technically, this objective of reproducing reality as faithfully as possible requires high levels of detail and accuracy, which boost the effect of reality obtained by the work. In simple words, it evaluates the similarity or faithful reflection of the work of art with the real world.

Some classic examples in Renaissance painting and sculpture are Lady with an Ermine (work by Leonardo Da Vinci, whose animal in the arms of Cecilia Gallerani's portrait belongs to the mustelid family —little wolves—, like the marten), the Birth of Venus (Sandro Botticelli), Abduction of a Sabine Woman or Rape of the Sabine Women (Johannes of Boulogne or Giambologna), etc. The evolution of realism is naturalism. Naturalism is often considered a step beyond realism, where the human being is related to genetics and the social context. This demanded absolutely faithful artistic representations with the human social reality. The invention of photography, its maximum possible expression of fidelity to reality: The possibility of capturing real life in an image. The French writer Émile Zola was the main representative of naturalism (Vizetelly, 2014).

Realism is usually associated with a secular, everyday, empirical doctrine of thought. It is an artistic movement that cyclically reappears in the history of art. For example, it is in the 20th century with the social or mass media, through photographic or cinematographic images, in colour (Vita, 1998; Balassone, 2001). Currently, it presents in social networks with applications such as Facebook, Instagram, YouTube, TikTok, and so on (Falcinelli, 2020). The purpose of these applications is to generate content

Figure 5. "The Birth of Venus" —Sandro Botticelli. This painting is in the Uffizi Gallery (Florence, Italy).

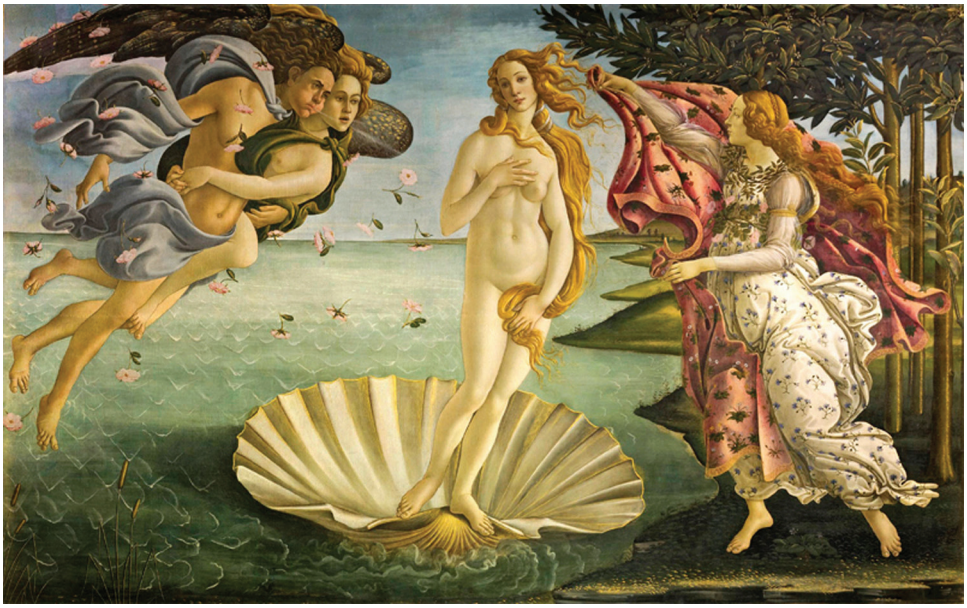


Figure 6. "Lady with an Ermine" —Leonardo Da Vinci, which is located in the Czartoryski Museum (Kraków, Poland).

for social networks, without considering the damage caused in society by the cult of the digital image, whether static (photography) or moving (video). The image and the text have declined in their value of veracity and representation of reality in the current digital culture, managed from the formal and natural sciences (Regis, 1995; Cipolla-Ficarra, 2013; Cipolla-Ficarra, Vivas & Romo, 2009).

A management where the artists, psychologists, anthropologists, philosophers, pedagogues, among other professionals of the social sciences, have to turn themselves into entrepreneurs, technological entrepreneurs, investors, and again entrepreneur. In other words, we can see the science merchants. Hence, the abusive and inaccurate use of the notions of innovative, creative, emotional, friendly, empathetic,

Figure 7. Marble statue "The Abduction of a Sabine Woman" —Johannes of Boulogne, in Loggia della Signoria or Loggia dei Lanzi (Florence, Italy).

inclusive, feminist, ecologist, techno-critical, etc. Anything that opposes this sham of reality is "toxic." This is a negative side effect of social networks and the cult of digital self-image, towards science education. Finally, other areas, where realism from a technical point of view has been fundamental since the 20th century is computer graphics and its extensions in AR (augmented reality), VR (virtual reality), MR (mixed reality) and metaverse (Hirose, 1997; Abouaf, 2000; Radley, 2014; Latoschik, 2017).

REALISM AND LINGUISTIC ACCURACY IN SCIENCE EDUCATION

The precision of language derived from the description of reality no longer practically does not exist in the new media because textual messages on the Internet must be very brief, inclusive, including abbreviations (conventional or not), emoticons, etc., previously presenting the reading time in minutes, excluding the information of those who do not accept the contents in video format (Youtube) in the virtual community (some examples are in Figures 8 and 9). Furthermore, international conventions through academies and institutions that standardize languages are constantly overtaken by activities, so that terms from the scientific field are adopted, with practically no discussion, if there are previous similar terms, before including technological neologisms. **Neologisms that can become synonyms of a whole technology, positive or negative, towards the social movements of acceptance or rejection of the same, either in reality, as well as in social networks.** One example is the acronym GS, which refers to the fifth generation of mobile telephony technologies (Kim, et al., 2020). This acronym has acquired negative connotations since the beginning of the pandemic. It is important to take into account these linguistic aspects and to use them correctly in the new social media, since the alphabet is the basis of Western civilization (Veltman, 2006; Veltman, 2014).

Since childhood human beings are educated to read. In this process, language has been introduced inside the being and not from the front as it is done in the plasma screens of the new technological devices: Smartphones, smartwatches, tablet Pc's, and so on. Language allows to build a content in people's minds, in the form of thoughts, judgments, memory, etc. Digital culture is not interested in alphabetic culture (Veltman, 2014). Moreover, **with artificial intelligence algorithms there is no referent in the triangle: Signified — Signifier — Referent** (Holdcroft, 1991; Stables, Noth & Olteanu, 2020). **Therefore, objectivity in the face of reality, through digital data and information, is in crisis and in many cases has disappeared.**

Contrary to this current context, and with reference to the period of Internet democratization, the ideal textual style in off-line multimedia systems for didactic purposes was that structured in an inverted pyramid format, and where the triangulation "Signified — Signifier — Referent" was always present (Cipolla-Ficarra, 1997). Interactive educational systems in which the text predominated over static and dynamic images. Content that occupied less space in the database and access to audiovisual information did not require synchronism between audio and image, for example. Simultaneously, the inverted pyramid paradigm would become another component in the design based on usability engineering (Nielsen 1993; Nielsen, 1996) of hypertext, multimedia and hypermedia systems. Schematically and usually with informative text writing, in social media, the normal pyramid has 5 areas or sections (Cipolla Ficarra, 2016):

- The first area is the presentation of the topic or lid. In this area there is a summary of the content of the other areas.
- The second area is the expansion of the topic, that is, the explanation of the main idea.
- In the third section are the sub-topics. They highlight or present other aspects related to the main idea.
- The fourth area contains contextual or background information.
- Finally, in the fifth section there is more information about the initial presentation or lid. It is a section of redundancy of information, where minor data and the conclusion are located.

Figure 8. Section A: Yahoo News and the copy interactive design models from scientific portals — see section B. News: "Boris Johnson says goodbye to the British parliament speaking in Spanish" —reading time: 2 minutes. Section B: News of scientific interest in Spanish (www.univison.com) where the reader knows in advance the time required to read it (see the minutes into the little photos / icons), as long as the system works correctly at the moment of fruition.

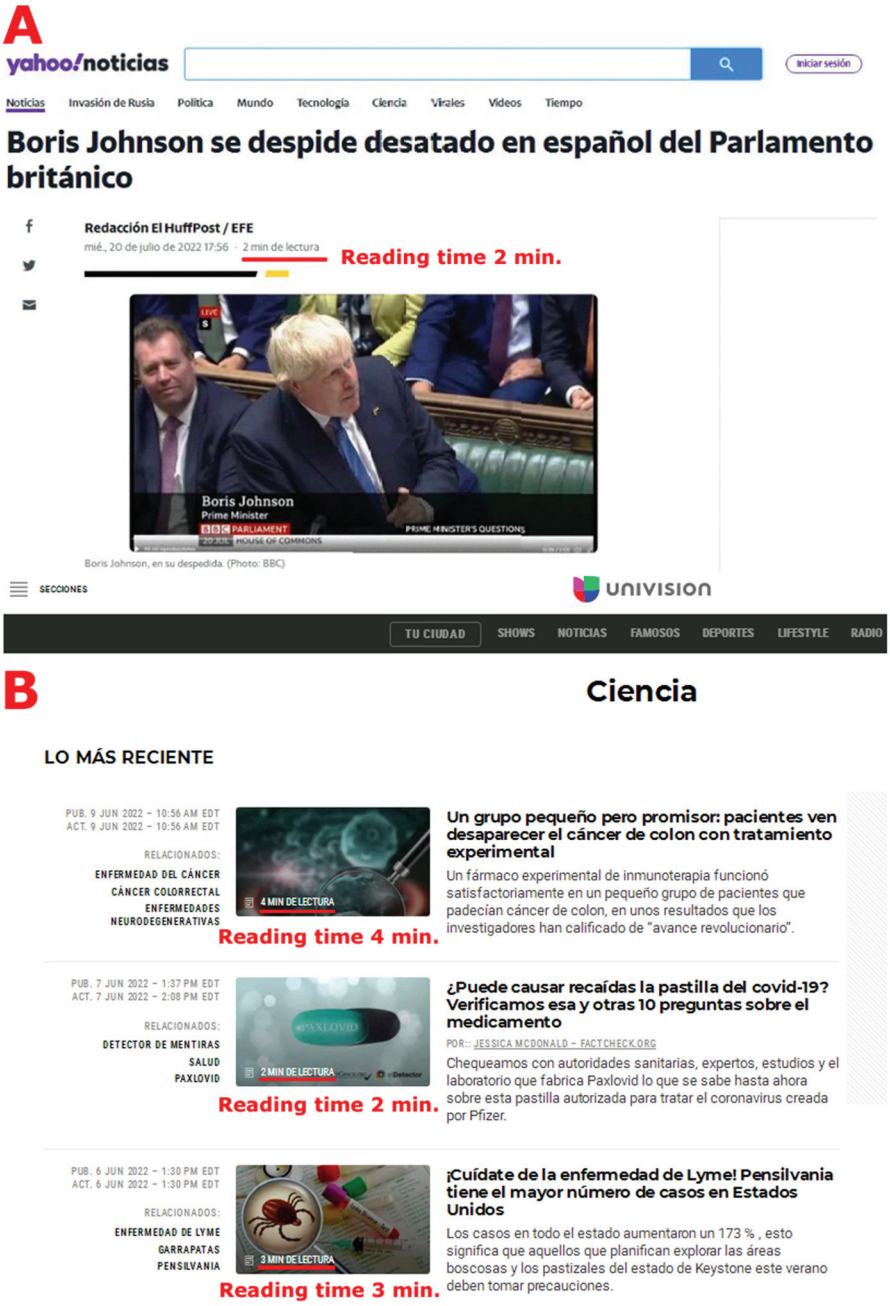


Figure 9. YouTube has excluded information with regard to the total number of views that did not like the content of the video —symbol "?" into the figure (www.nasa.org).

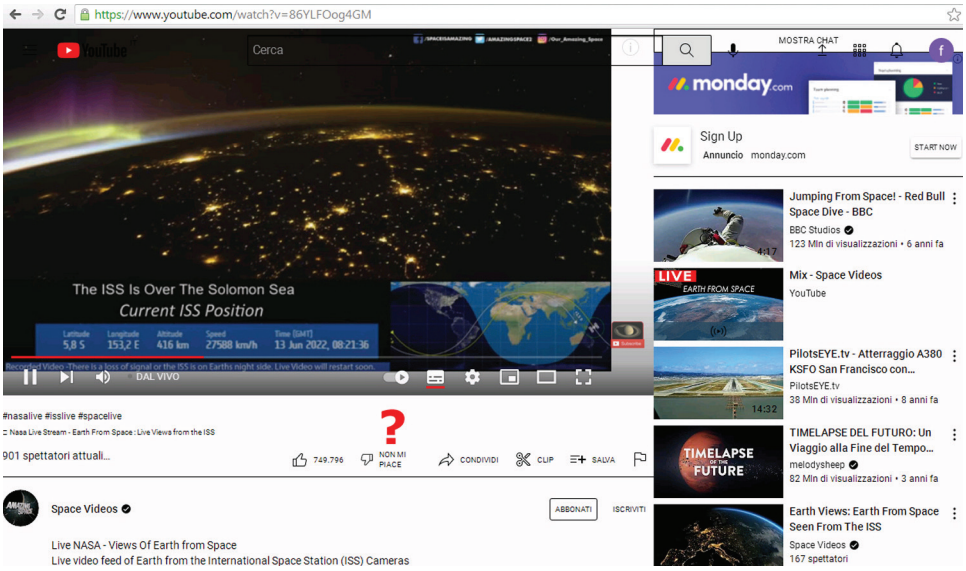
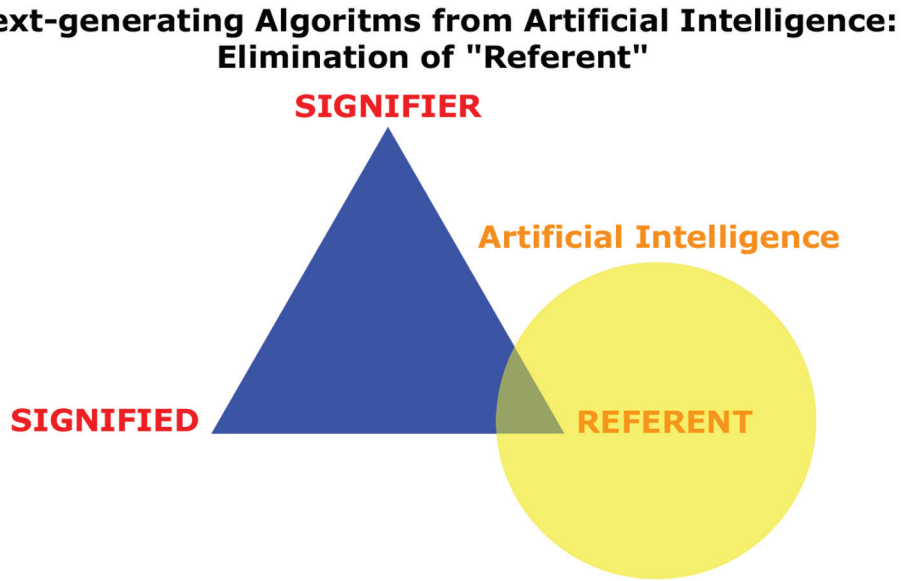


Figure 10. Some text-generating algorithms (AI) eliminate the third component of the triangulation, i.e. the referent.

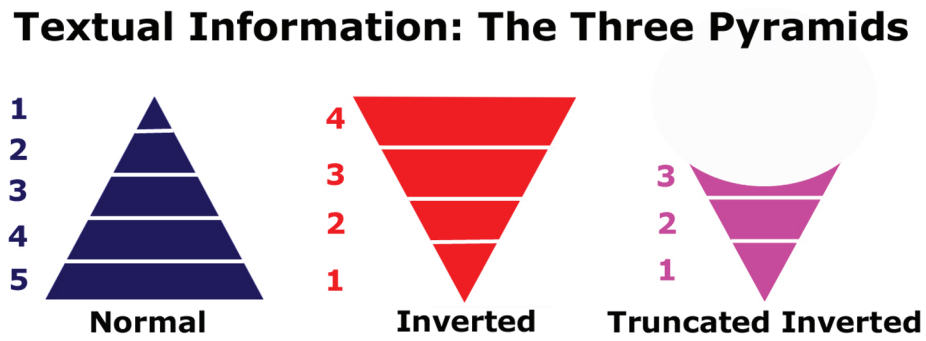


The inverted pyramid, used in the first interactive systems, has four areas. Areas two and three of the normal pyramid have been joined in the inverted pyramid. Consequently, the structure is as follows:

1) The lid is the main section where a conclusion or summary of the main topic is presented, with a total of words, equal to or less than 30.
2) Explanation of the main idea and development of eventual sub-topics.
3) Contextualization of the information.
4) Expansion of the lids.

In both types of pyramids, the different areas were well differentiated and interrelated. In the new millennium and with the expansion of the new media, we are facing what is called a truncated inverted pyramid, i.e., a single area. In the truncated area, there is a synthesis of the lids and eventual contextualization of the information. The total number of words ranges between 25-30, they usually resort to the use of abbreviations and the referential links to expand the lids are optional. These three pyramids are graphically represented in Figure 11.

Figure 11. The three pyramids for textual information: Normal, inverted and truncated inverted.



The use of the inverted pyramid is a writing technique that simplifies the content, since from the first moment the user is accessing the core of the textual information, resorting to about 15 — 20 words. Since interactive communication, paragraphs in normal and inverted pyramids should not exceed 20 words. A good ratio is about seven words for each verb used. These recommendations that favour communicability in the new media, come from successful projects in the academic-scientific field, for decades (Cipolla-Ficarra, 1996; Cipolla-Ficarra, et al., 2009). It is also related to journalism whose mission in the new media is to guarantee the presence of referents in the face of fake news.

Fake news can take various forms in the scientific context (Cipolla-Ficarra, Nilson & Alma, 2018). Some of them are listed below:

1) **The awards.** Generally they are awards fixed in advance, among the members of groups promoting monolithic clericalism, associations for delinquency, corruptly managed universities, etc. It is the way clericalism pays for the services received in favour of its destructive activities, inside and outside the national borders. Usually, these universities religiously governed under the nomination

of private, public or hybrid institutions, resort to the names of deceased persons who have worked in the field of ICTs. An Iberian example is the "Martin Wolpers Award", awarded by the Research Institute for Innovation & Technology in Education (International University of La Rioja UNIR, www.unir.net), since the beginning of the pandemic in 2020. In Spain, for example, these false religious awards enhance the narcissism of pseudo-scientists, in the new media.

2) **Scholarship.** Normally, in a serious educational-scientific context, obtaining a scholarship for university studies means that it has been for intellectual merits and the candidate's own merits. However, since the end of the twentieth century and in some Italian regions of the Western Alps, there are pseudo-ultra-nationalist universities, where the opposite of reason and scientific logic, qualitative education and the common good of fellow citizens prevail. Intellectual merit is replaced by the economic or financial aspect. For example, in many countries of the euro zone, master's degrees, specialization courses, professional training, etc., in the university field of the new information technologies, nominally usually have high costs.

   Final values that for the student and/or their families can be between 4 and 6 figures of euros. That is, previously and hypothetically, inaccessible for many members of the European middle class. Therefore, access to these studies would be limited to all those who have sufficient financial resources. The truth is that these costs represent an artificial bubble of 50% or more. The eventual requirements / exams to be passed for admission to these courses or master's degrees are a mere bureaucratic matter. Automatically, scholarships are activated so that candidates can subsidize 50-70% or more of their tuition fees for these studies. That is to say, the costs have been inflated in advance, to swindle the attendees with the hypothetical benefits of scholarships or financial aid. Economic subsidies that arrive in decreasing order from autonomous (local and regional) governments; banking entities (foundations, associations, organizations, etc., such as: Banco Bilbao Vizcaya Argentaria, Caixabank, Santander, among others), telecommunications (Telefónica, TV3, and so on) and institutions that represent national and European governments. Only those who are native or previously sponsored get a 100% scholarship.

   In fact, this is one of the propagandistic marketing strategies related to mercantilism and savage clericalism, in the educational-scientific context, and with international projection. The main objective is to attract potential student-clients, with the scam that they have won or obtained a scholarship. The advertisements of scholarships in the press, radio, television, Internet, etc., only enhance a deceptive marketing and/or propaganda circuit. This is a stratagem used very frequently by universities founded in the 20th century, with the aim of promoting autonomic pseudo-ultra-nationalism, which is still intact and in force today.

   Furthermore, it is a way to be present in the lists of overseas universities, which offer scholarships for short international stays, gaining online visibility for free. The goal is to conquer specialized labour at low cost, from remote parts of the planet. There are several examples of this in the 12 and 13 figures. If we analyze the amounts offered in this list, in many cases, it is not enough for the student to take a cab from the airport to the university where he / she will carry out his/her studies and/or research.

3) **University degrees in periods of great social and educational transformations.** Double, triple, ..., doctorates, post doctorates, etc., in times of pandemic, for example. Obtaining university degrees when there is a change of curricula in large geographical regions, such as the Bologna plan in Europe at the beginning of the 21st century, or situations of health emergencies such as the Covid-19 pandemic. These degrees obtained do not have 100% academic rigor, connote a myriad

of failures in university control mechanisms, and mark a before and after, between the quality of the competencies, knowledge and skills of professionals belonging to the same academic unit.
Therefore, they are qualifications of low reliability and insufficient professional validity, especially in the case of doctorates or post doctorates whose authors do not have individual publications, but group publications. They are publications with a validity equal to zero, essentially, when the doctoral student is the individual or group organizer of seminars, workshops, etc., in the conferences in which he / she participates, or editor of articles for specialized journals. This is the tactic used by the "narco-education" (Cipolla-Ficarra, et al., 2017), in order to escape the controls of the review of their papers, thus achieving that their papers are indexed in the ACM, IEEE, DBLP, SCOPUS, etc., databases.

4) **The high volume of publications, in short periods of time, added to the disparity and/or dispersion of the topics covered.** These subjects are coming from a very large number of scientific disciplines. Scientific databases make it possible to quickly analyze whether this anomaly exists, its authors and where these centres are geographically located. An example of the dispersion of topics treated among them are some doctoral theses in Barcelona (Spain), related to new technologies and user experience, which under a pandemic, supposedly the doctoral student and his tutor have managed to combine: Artificial intelligence, machine learning, multimodal evaluation, physiological measures, wearable's, mixed reality, embodied interaction, autism spectrum condition, children, social interaction, psychophysiology, video coding, questionnaires, and so forth. In brief, it is a false reality because there was a lockdown of laboratories, libraries, universities, etc., due to the pandemic. Besides, a priori, it is the sum of subjects and disciplines related among others to mathematics, computer science, children- computer interaction, artificial intelligence, statistics, sociology, data analysis, psychology, counselling and guidance, behavioural therapy, psychopedagogy, cognitive processes, and a very long etcetera.
All this dispersion, whose originality equals zero are the consequences of the "butterfly" style research, amply described in (Cipolla-Ficarra & Villarreal, 2010). While the exaggerated number and disparity of subjects treated denotes the presence of the phenomenon of "shooting comets" (obtaining five or more academic degrees in less than a decade, in parallel, developing jobs of presidency, management, direction, supervision, etc., in private or public spheres). The only way to eradicate both evils, in the Italian university system and in the Latin European context, is through the random participation of notaries from all over the European territory, at the time of the presentation of these farces, under the deceitful banner of "doctoral theses", related to formal, natural, factual sciences, etc.

5) **Guaranteed job opportunities.** In the advertising campaigns in the new and traditional mass media, it is usually stated that the students of certain study centres, certified with the logos of "educational excellence" (private, public and hybrid, national and international) will find a job, before finishing their academic training. What nobody specifies is the type of work (scholarship holder, assistant, collaborator, assistant, and so on), the place (governmental entities, private companies, etc.) and the type of contract (temporary or indefinite). Now we can add to this educational fraud, that by studying in certain elitist places, they will not be workers but rather entrepreneurs of small companies (SME), start-ups, scaleups, etc. because they have a transversal training in ecosystems of innovation, experiential business management, creativity learning, flipped classroom, and so forth. In fact, these students are a fundamental part of the subsidy mechanism of these educational centres (read academies, foundations, associations, organizations, universities, continuing education

institutes, municipalities, etc.). The centres need all of them to receive, together with the diploma, an employment contract, so as not to break the continuous loop of income through European subsidies.

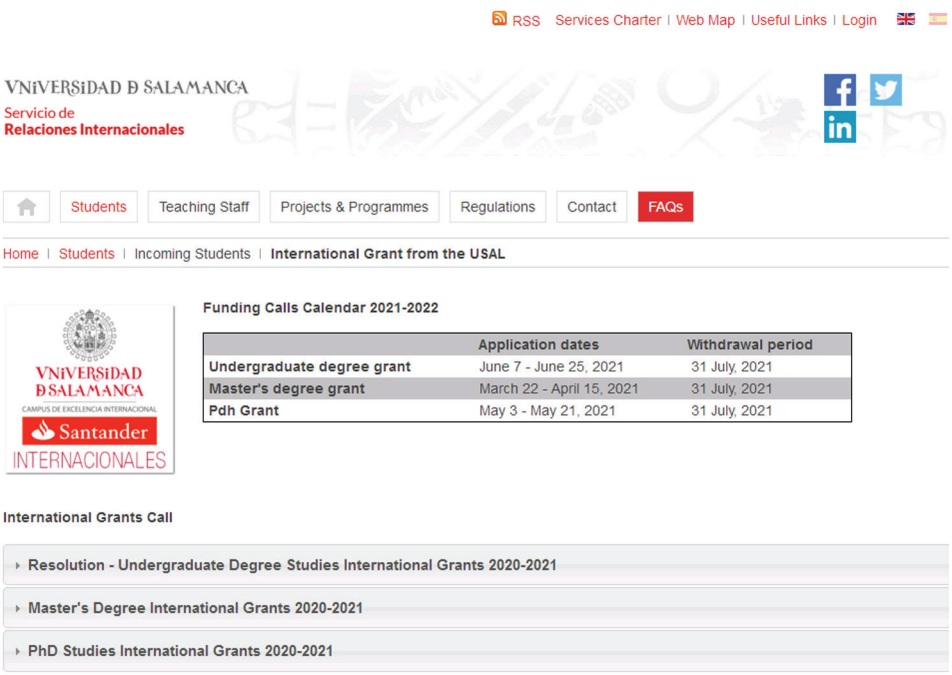
Subsidies paid with the taxes of the rest of the European citizens. Citizens who are not only battered by the world wars of the 20th century, the two international crises of the 21st century (financial and health), etc., but who are observing how these funds do not improve the quality of life of the rest of the community (failure of distance education in times of pandemic; destruction of the industrial fabric of small and medium-sized companies; closure of commercial activities, with centuries of history; alignment of the population through the contents of the new technologies, etc.). Moreover, subsidized scientific research is not at all adjusted to the daily and local reality. The creation of a network of laboratories, teams, professionals, students and R&D&I (research + development + innovation) departments connecting the university with SMEs remains a utopia in the Iberian Peninsula, for example.

The reason is the low level of training and the eternal fraud of job stability for young professionals. These professionals, once their work period (temporary contracts) in universities, city councils, multinationals (Telefónica, Santander, BBVA, and so on) is over, are forced to become self-employed (SME, spin-off, star-up, scaleups, etc.). However, with globalization, if they do not achieve immediate financial success, they not only run the risk of closing down their activities and emigrating abroad, but they will also be below the economic income and survival conditions of a local bricklayer, carpenter, electrician, mechanic, and so forth. These are professions that have been maintained over the centuries.

Generally they are tasks developed by professionals with complete or partial studies, from primary schools and/or secondary schools. Some of them have dedicated themselves to these tasks because their parents have not had the financial resources or the social, clerical, political contacts, etc., sufficient to pursue master's degrees, specialization courses, etc., with or without scholarships arranged in advance. Therefore, the guaranteed job opportunities do not exist, apart from the advertising and propaganda campaigns, in the social networks (Hyman, 1977; Chomsky, 2004). Many former students of elitist academic centres (artists, industrial designers, nuclear physicists, anthropologists, psychologists, mathematicians, etc.) are engaged in distorting the reality of scientific education through the new media.

Figure 12. Scholarships in Spain (www.european-funding-guide.eu/scholarship).

Figure 13. Sometimes the amounts offered as scholarships, which involve an extensive bureaucratic process for future overseas students, do not even cover the local costs of public transportation, accommodation, enrolling in the courses, and so on.



These five items are the tip of the iceberg with regard to the use of misleading language in science education. **The distortion of reality begins in elitist educational environments, with advertising and alienating propaganda, which they carry out from the traditional media (press, television, radio and cinema mainly) and that have been exported, adapted and enhanced in the new media.** Evidently, there are other items that will be left as open lines for future research, since all of them are located in the dark zone of the web but are disseminated on the surface of the web, through the new media.

LESSONS LEARNED

Many of the scientific publications have zero impact on the local community, although these contributions involve high human and financial resources. Therefore, the transfer of knowledge and innovation between business and industry, on the one hand, and science education / research in universities (Check & Schutt, 2011; Bordens & Abbott, 2013; Brewer & Dittman, 2018), on the other hand, have a great challenge to overcome in the short term, in the elimination of lies and deception, through the new media (Vita, 1998). The same happens with education to generate content in the new technologies, without resorting to banal applications for the dissemination of photos and videos, in social networks such as Youtube, Facebook, TikTok, Instagram, etc. An interesting exception to these dilemmas and limitations is computing. In a way it is the reflection of a successful reality of the Logo language (1967). In Logo, three paradigms converged: Functional programming, procedural programming and logic program-

ming. Today, this multiplicity is in the objective of motivating and training the Alpha generation from elementary school, so that many of them become AI programmers and can be included in their youth in the labour market of quantum computing.

Another constant challenge in digital communication is the transparency and veracity of data. New media and digital culture are being used for distorting purposes by some sectors of Western society, which have remained unchanged over the millennia. The social sectors were not part of the educational system at the time of the inauguration of the first European universities in the eleventh century. Furthermore, these institutions have control of scientific education, through false educational excellence, rigged prizes, illusory scholarships, guaranteed job opportunities, etc. We also note the interference in the oldest universities of the continents, through the union of private institutions, whose founders have been at the service of pedagogy, with the first universities of a State. For example, Jean Baptiste de La Salle and the University of Salamanca, in Spain. Therefore, this old educational institution is no longer a guarantee of scientific, educational and labour excellence. The French-Spanish example (religious teacher / university) highlights two limits impossible to overcome in the sciences, including education.

The first is leopardism combined with rigid clericalism. That is, changing everything so that nothing changes, maintaining a monolithic status quo. The second is the lack of control by the controllers, formerly known in the Roman Empire with the phrase: *"Quis cutodiet ipsos custodes?"* —Who will watch the watchmen? Obviously, the answer is no one. Since the origin of the sciences, these are two eternal challenges. Moreover, the new media have reinforced them in the new millennium, directly harming secular and free education, and indirectly harming science education.

Usually, the Renaissance is resorted to every time that the scientific-educational leopardism seeks financial funds for projects that have no continuity in time, that do not respect the human and natural context, that do not increase the quality of life of people, that do not embody local requirements, that do not represent the reality of the problems to be solved, etc. Innovation and creativity require new working conditions, starting with the equalization of workers' rights between the private and public sectors. The pandemic has opened an infinite gap between the two sectors. This is detrimental to the implementation of R&D projects that have a horizon of 2030, 2040, 2050 ... The baby boomers, X, Y, Z, and alpha generations must oppose the omega generation, as the latter are mainly responsible for generating chasms in the labour market and the erection of walls between generations. Chasms that will grow in depth and walls that will rise with the advance of artificial intelligence, through the automation of the production of goods and services.

CONCLUSION

The technology parks erected at the end of the 20th century and the beginning of the 21st century (BCN 22@), as engines of educational progress, renaissance of sciences, modernization of R&D, knowledge transfer models, etc., have become totally obsolete in the face of the dynamism of small companies related to new technologies. These companies are capable of rapidly differentiating products and services in emerging markets. Consequently, some presidents of these technology parks in large European Mediterranean cities, dedicated to influence peddling and the generation of implausible resumes, through the accumulation of academic qualifications of any kind (webinar, seminars, virtual meetings, etc.) but coming from prestigious institutions (MIT, Harvard, Berkeley, Oxford, Cambridge, etc.) have been relegated by the managers of small ICT companies, R&D laboratories, and so forth.

The priority mission of these entrepreneurs is to consolidate their position in the global market in the shortest possible time. Therefore, the failure of technology parks as a resource for science education in the old continent is basically due to four reasons. The first is that they have been used as a temporary job outlet for students from elitist universities. Second, the most innovative and dynamic ecosystems at international level have strong ties with the most prestigious universities in the territory. Something that is non-existent in some European geographical regions, if we analyze the perennial shortcomings in terms of digitization of university campuses and faculty training, for example, through requests for financial funds, post pandemic, called Next Generation. Third, not everyone (artists, psychologists, teachers, physicists, chemists, mathematicians, computer scientists, etc.) is suited to the continuous metamorphosis of entrepreneur, technological entrepreneur, investor and again, entrepreneur. Fourth, we can observe an abusive use of new media to promote distorted realities.

Consequently, focusing all aid on the top of the university environment has been, is and will be a serious mistake. The main culprits of scientific backwardness are perpetuated there. They will do little or nothing to introduce (r)evolutionary changes, even if they resort to concepts without referents but which are in vogue, such as: Inclusion, emotion, empathy, innovation, ecology, digitalization, and so forth. It is the traditional reusability of methods and techniques of information manipulation, akeady seen with education and health, in the last decades. Moreover, the lack of support for small and medium-sized human activities (individual or group) would mean the definitive disappearance of an autochthonous fabric of societies, forged since the industrial revolution in the l9th century. Many of these makers of industries, businesses, companies, etc., have been self-taught, that is to say, they have not passed through certain elitist cloisters. However, for a long time and autonomously, they have demonstrated competence, capacity and ingenious knowledge, in the business, industrial, scientific, educational, and so on, context, both within and outside the national borders.

Finally, linguistic and semiotic aspects play an important role in the limits and challenges of science education through new media. The inverted pyramid model in the texts has been replaced by the reduction of the text to the maximum, through the truncated pyramid. Fragmented knowledge, with lax and inaccurate connections between them, has been reduced to the maximum since the end of the 20th century. In today's digital culture, users can no longer differentiate between true and false audiovisual information. The novelty is not the fake news but their sustainability. The elimination of referents in the algorithms of the autonomous text- generating AI can definitively destroy the mosaic culture, which originated with the democratization of the Internet and the spread of the first online and offline interactive systems at the end of the 20th century. This audiovisual culture is the one that to attract the attention of students and motivate them to carry out research, outside their fields of knowledge and/or everyday knowledge.

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Chapter 7
Quantum Information Technologies Applied to Nature and Society

ABSTRACT

In the chapter, the main areas of science that will impact the social diffusion of quantum computing are analyzed. The analysis begins by outlining some of the fundamental notions of this new technology and its need to be adapted to the common knowledge of citizens in order to understand its potential from the perspective of communicability and informatics. The educational aspects that must be reformed and/or improved to increase interest in the study of science, and in particular towards this new paradigm of digital and interactive information, are also disclosed. Finally, the results of a heuristic experiment based on science fiction and with users of new technologies belonging to generation Z are disclosed.

INTRODUCTION

Interactive communication between human beings has been enhanced in an exceptional way, with the development of the first interactive systems for mobile telephony (Roman, 2004; Brown, 2016). Today, thanks to smartphones, the members of a family nucleus, even if they are physically locatable in each of the planet's continents, can communicate qualitatively with each other, with telephony costs and audiovisual communication modalities (videoconferences, chats, messaging mobile, etc.) unthinkable in the '90s. Communicability, that is, quality in communication, has opened up endless new horizons in information technology and new technologies, ranging from job creation to education, not to mention research (Cipolla-Ficarra, 2010). One of these new areas of R&D (research and development) is the combination of quantum computing, nanotechnology and artificial intelligence (Ali, Yue, & Abreu, 2022; Kamali-Sarvestani, et al., 2020; Kulkarni, Bhat, & Moritz, 2021; Hawking, 2011).

In a nutshell, we are moving towards the new era called "Quantic-Nanotechnological-Self- Sufficient Era" (Cipolla-Ficarra, et al., 2018), where the emergence of artificial intelligence will occur. In that sense, a few years ago, the transformation of traditional computer science started, whose minimal

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unit of information is the "bit", towards to the "qubit" (quantum bit). A qubit uses the superposition phenomena of quantum mechanics to achieve a linear combination of two states (Bernhardt, 2020). In other words, when an object simultaneously acquires two or more values of an observable quantity, such as, for example, the energy of a particle (any observable quantity corresponds to an eigenvector of a Hermitian linear operator). It is precisely the superposition that provides quantum computers with superior calculation capacity (Hawking, 2011; Ifrah, 2002). Furthermore, a qubit can represent a 0, a 1 (as in the classical binary system), or any proportion of 0 and 1 in the superposition of both states, with a given probability of being a 0 and a given probability of being a 1. In such a case we have an overlap. Simultaneously, the values of 0 and 1, which can be represented as follows: $|0\rangle+|1\rangle$

Besides, the qubits can assume all their values. There are four values that they can acquire at the same time. That is: 00, 01, 10, and 11. Although the number of states is equal to 2 raised to the number of quantum bits, the difference is in the superposition of the states (Bernhardt, 2020). Traditional large computers, based on a binary system, would take millions of years to find the prime factors of a 2048-bit number, which are important for maintaining the current cryptography system. That is, the protection of data when it travels on the Internet or is stored in the clouds, to cite two examples. The qubits could perform this calculation in just a few minutes, with which the entire current cryptology system would be obsolete (Kasirajan, 2021). Hence the need to promote the study of this new technology as it will be the "ABC" of future communications.

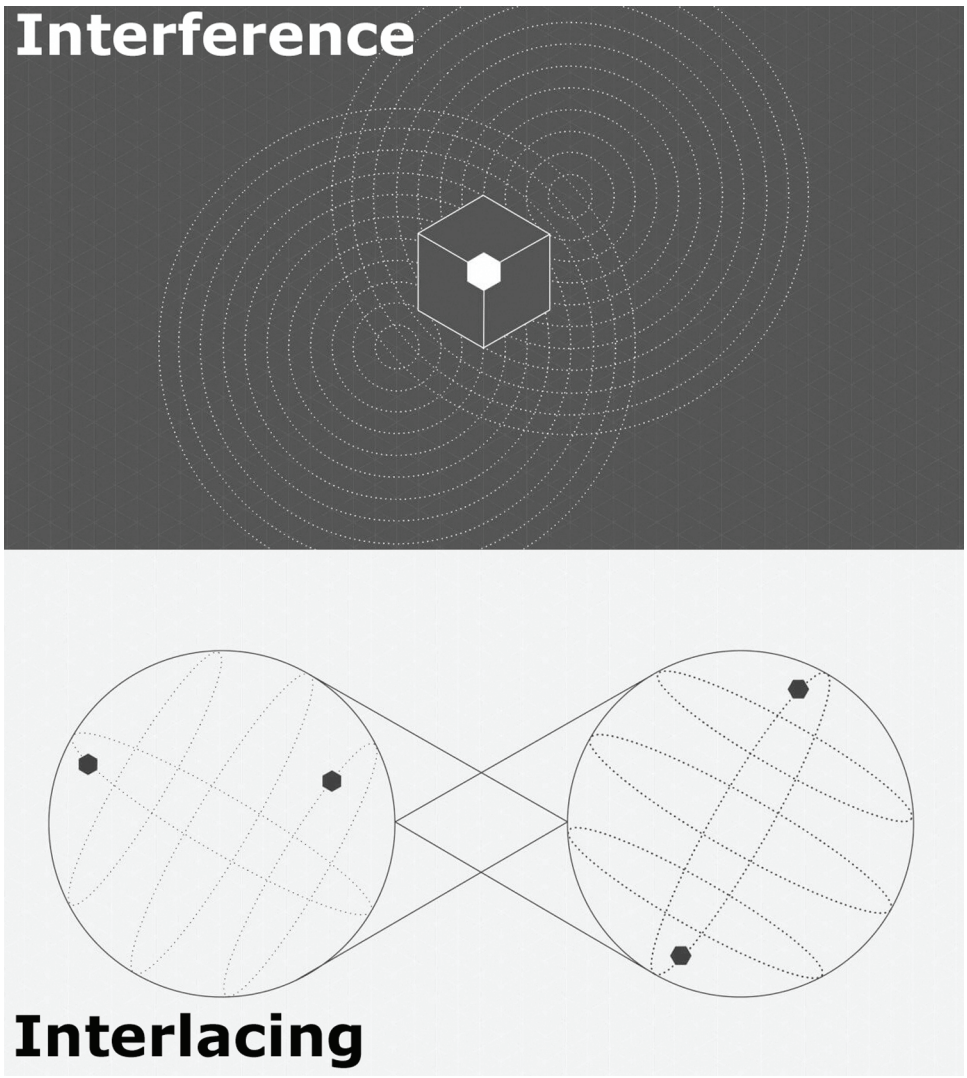
Interference, entanglement and superposition are three basic and fundamental notions when solving highly complex problems with quantum computing (Mermin, 2007; Bernhardt, 2020; Kasirajan, 2021). Interference is a consequence of superposition. In short, the states of qubits can interfere with each other, because each state is described by probability amplitude, just like wave amplitudes (figure 1). Furthermore, several qubits can exhibit quantum entanglement. Entangled qubits always correlate with each other to form a single system, even though they are far apart. Entanglement is necessary for any quantum computation and in particular when using Grover's algorithm or Shor's algorithm. In a classic computer, interlacing cannot be carried out efficiently. In figure 1 there is a graphical representation of these concepts.

From a hardware point of view, today's computers basically rely on the use of silicon chips. **With quantum computers, a universe of possibilities opens up from a physical, chemical, mathematical, etc. point of view, since they can be based on technology of trapped ions, photons, artificial or real atoms, and so on. In parallel and depending on the architecture and the qubit systems, some equipment components may require the qubits to be kept at temperatures close to absolute zero.**

Although in the 20th century the bits have revolutionized the new information technologies and interactive communication, the qubits will bring new innovating winds for all humankind and the society of information towards an exponential revolution and transformation of the human- computing-nature interactions (Nielsen & Chuang, 2010). The limits of those interactions and interrelations, orthogonal or not, exist only in the imagination and creativity of human intelligence and artificial intelligence. The current chapter intends to set up those first fundamental links between the bits, quibits, the human being and the context whether it is natural or artificial.

The current overcoming of the limits of miniaturization does not only constitute a challenge to the factual and natural sciences, but also a great opportunity for the new horizons of quantum computing. We are facing new paradigms in the sector of the new technologies, since we will move from the laws of classical physics valid for the macroscopic world, to the realization of calculations based on the laws of quantum physics, which control the smallest components of the universe, such as

Figure 1. Interference is used together with entanglement to allow quantum acceleration, which boosts the speed of calculations.



the atoms and the particles. Simulations, for instance, through the quantum computers, will open a host of new disciplines and lines of research, especially in the field of the communications between human beings and computers, biology, medicine, chemistry, astronomy, trade, new materials, among so many others (Brown, 2000; Williams, 2010; Ashktorab, Weisz & Ashoori, 2019; Ali, Yue, & Abreu, 2022).

These are natural areas of work for chemists, mathematicians, physicists, bioinformatics engineers, biomedical engineers, nuclear engineers, aeronautical engineers, industrial engineers, environment engineers, computer engineers, among others will emerge. These new fields will require researchers unlike those who, for decades, have been trivially dedicating themselves to the handicapped and/or disabled people (blindness, deafness, autism, etc.), thus destroying the scientific and exact contents of the human-computer interaction, interfaces, usability engineering, user experience, education, and cultural heritage, to mention some examples.

These simulations will allow the realization of models of any physical system and predict behavior, which entails a better understanding of the microscopic world that surrounds us. At the moment in which the democratization of the quantum computers takes place, an endless series of revolutionary developments will occur in all the branches of the formal, factual and technological sciences, awaiting their good use in medicine, education, renewable energies, agronomy, the preservation of the natural parks, etc. In simple words, we are at the beginning of a new era, such as was computer science in the 60s, when nobody knew for certain where the birth and development of the internet could take humanity, and especially since its democratization in the 90s. In short, these are times of major breakthroughs, and with a huge repercussion on both everyday life and the progress of scientific knowledge. Therefore, we are facing a kind of natural and artificial selection of the contents of the bits towards the qubits.

Consequently, a first and functional way of grouping the various areas that will become fields of current research and in the immediate future is as follows:

1. Qubits: Algorithms; Artificial Intelligence (AI); Communication; Complexity Theory; Computer Graphics; Cryptography; Information Theory; Measurement, and Simulation.
2. Computing and Quantum Technologies: Machine Learning; Nanorobotics; Networking Models and Neural Networks; New Materials with Programmed Properties; Program Structure; Representation of Data at Scale; Scientific Visualization and Interfaces; Sensors and Superconducting Circuits, and Virtualization.
3. Quantum Phenomena Oriented to Nature and Society: Agricultural Robotization and Greenhouse System; Communicability and HCI Applicable to Quatum Computing; Creativity Oriented to Visualization of Real Microuniverses and Human-Computing- Nature Interactions; Education and Fundamental Sciences for Quantum R&D; ICTs Applied to Agriculture, Ecosystems and Environment; Industrial Automatization and Renewable Energies; Information Visualization to Horticulture; Quantum Computing to Develop Skills in New Professions and Jobs, and Quantum Solutions Thinking in Artificial Intelligence, Biology, Chemistry and Physics.

Certainly this first group will be expanded and updated as time goes by and new experiments, inventions and discoveries are made (Cipolla-Ficarra, et al., 2021).

SCIENCES VERSUS STATISTICS

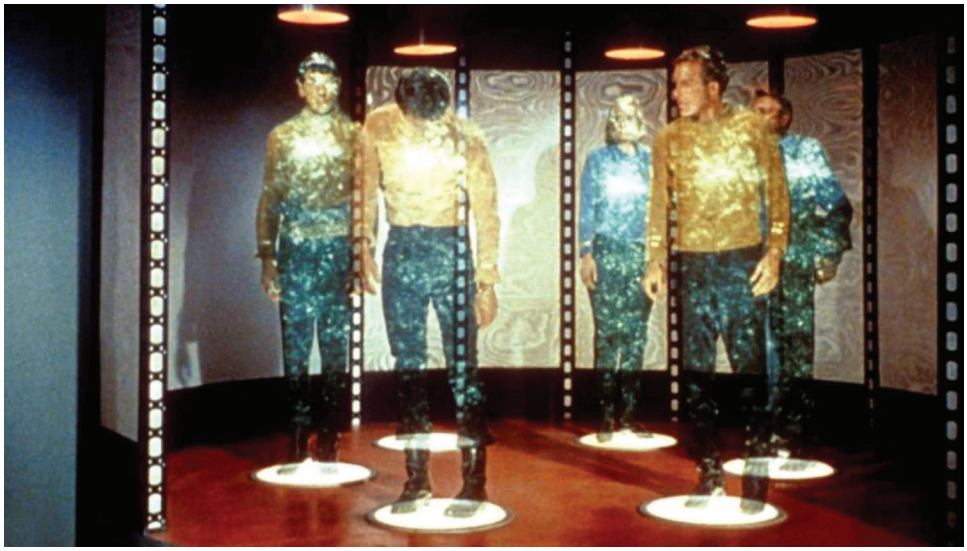
In the history of humanity, the two world wars of the last century have marked advances and setbacks for human beings. The advances are related to the scientific progress that was developed in the field of formal sciences, especially those that were applied in the field of attack and defence. Setbacks in the context of the social sciences, beginning with respect for the fundamental principles of the rights of people and other living beings on our planet.

The dilemma of superiority between formal and factual sciences has been transferred to our days. In the field of factual sciences are those related to nature —astronomy, biology, geology, chemistry, physics, etc., and society —linguistics, semiotics, sociology, geography, history, economics, etc. Frequently, disciplines related to nature and the formal sciences rank higher than the formal sciences. In this sense, the following reference (Bunge, 2018) can be consulted to know the evolution of

these and other differences, in relation to the degrees of real and perceived importance within societies, among the different sciences.

The truth is that over time what does not change is the use given to the inventions and discoveries of the sciences, their disciplines, domains, fields and specialties. In this sense, we consider nature and society as two structural pillars of this work, along with science fiction, as a kind of engine of human imagination and creativity. For example, the future quantum computers for personal use are based on the diagrams of Richard Feynman (1918 - 1988), the concept of "quantum tele-transportation" that allows almost instantaneous communication between two users (visually and imaginatively it can be associated with the special effect of teleportation in the 1960 Star Trek television series), Shor's algorithm (allows finding the prime factors of any number quickly, which is the end of security in communications, as it is currently conceived), and so on (Rammer, 2004; Williams, 2010; Cipolla-Ficarra, et al., 2021). A brief review of Feynman's history reveals that he participated in the "Manhattan project" for the development of the first atomic bomb. From there, he became interested in simulation, through the use of computers. In 1965 he received the Nobel Prize for his work on quantum electrodynamics. Analyzing the limits of simulation, in 1982 he wrote his article "Simulating physics with computers" (Feynman, 1982). In that article he presents the idea of using the laws of quantum mechanics to generate a new type of computer: The quantum computer.

Figure 2. Special effect of tele-transportation of people in the television series Star Trek. In quantum teleportation the property of a particle is destroyed. A property that can appear in another particle, even located very far from the first. That is, information can be teleported but not matter. The matter (people, objects, etc.) was teleported in the Star Trek fiction, when carrying and / or bringing the characters from the Enterprise ship to other planets, spaceships, and so forth.



The importance of that article would be almost impossible to achieve with the current system of statistical indexes implemented by algorithms on the Internet. Some algorithms that have been developed or acquired by the leading search engines in the US, for commercial purposes, through online advertising,

e-commerce, etc., and that will now be enhanced with the metaverse. In our days, the Ibero-American authorities regard these indexes or those related to scientific journals, databases, citation links, and so on, as guides to be followed. However, all these metrics can be manipulated from the three areas that the Internet iceberg can be divided into: Surface, deep and dark (Cipolla-Ficarra, 2021).

For example, among the measurement criteria, SCImago (www.scimagoir.com) considers the most relevant factor to be research and the institution where it is carried out, based mainly on the total number of publications, their impact factor, the acquired scientific leadership at the institutional level (local and international), international collaboration (signatures of agreements between universities, participation in R&D projects, basically weighing the financial figures that move within them, etc.), the percentage of published documents in open access journals and the quality of the publications: Q1, Q2, Q3 and Q4 (figures 3 and 4). Q1 is absolute excellence and is the group made up of the first 25% of the journals on the list, Q2 is the group that occupies 25 to 50%, Q3 is the one that is positioned between 50 and 75%, and, finally, Q4 the one that is located between 75 and 100% of the list of publications.

Another more weighted factor is the one that measures innovative knowledge and technological impact (Cipolla-Ficarra & Ficarra, 2010). There is also the social factor, which brings together indicators related to mentions of scientific-technological production made on social networks, the number of pages associated with the agency's website and incoming links to the domain, etc. In short, the quantification of scientific information versus qualification, but without considering issues such as: Job instability of researchers; Salary differences between the members of these investigative structures; Managers' behaviour towards employees and vice versa (for example, group dynamics in matters of stalking, bullying, bossing, and so on); The protection of copyright in discoveries, inventions, etc.; Constant modernization

Figure 3. SCImago Institutions Ranking, measures since 2009, the ranking of higher education institutions and research centers, using the Scopus scientific database (www.scopus.com) as a source. A database whose geographical location of the places where the research work has been carried out (to cite an example), means that its reliability is not 100%.

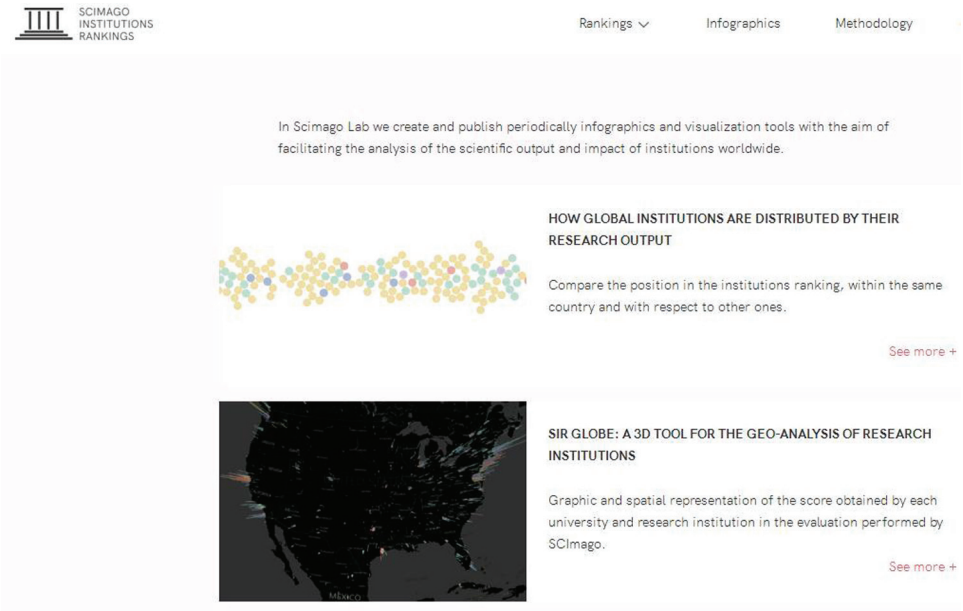
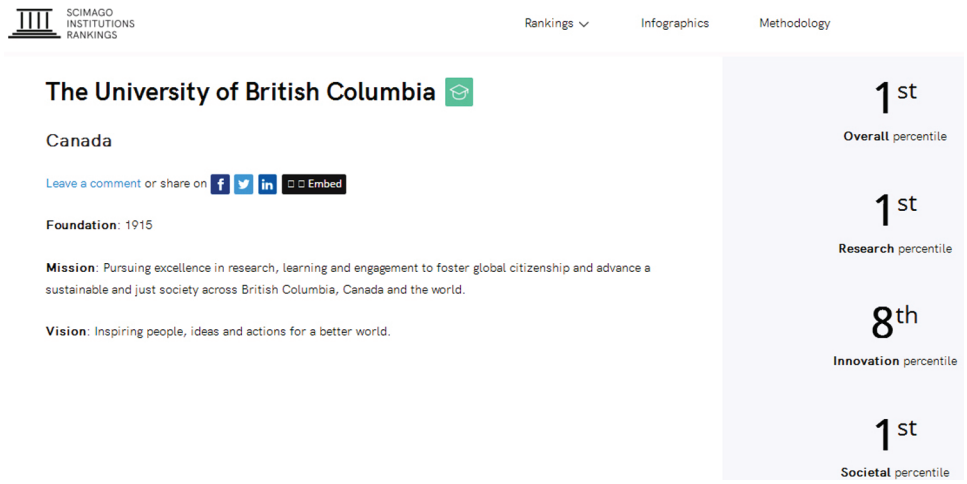


Figure 4. Results of the evaluation of the University of British Columbia (Vancouver, Canada). These high rates represented on the portal (www.scimagoir.com) mean that many local students cannot access to study at said university, due to the high cost of their science courses. Costs that are independent of the gender of potential students.



of laboratory equipment; The continuous training of researchers; The transfer of innovative knowledge to the community where the research institutions are inserted; The resolution of local problems, putting them before international interests, among many other variables that influence the evaluation of activities in the scientific field.

These variables are important because usually in the new institutions that begin to develop activities of a scientific nature and under an ultra-nationalist spirit, there is a tendency to humanly and professionally abuse young researchers. In short, not only would the development of ideas such as Feynman's quantum computer proposal be almost impossible, but autonomic creativity is overshadowed by negative group dynamics. The interested reader can find a wide set of examples and considerations with regard to these indexes, databases, etc., in the following references (Cipolla-Ficarra & Ficarra, 2014; Cipolla-Ficarra, Alma, & Carré, 2014).

MATHEMATICS AND QUANTUM COMPUTING

In the history of the evolution of the sciences, scientific works serve as the basis for future research (Ifrah, 2002). When these works are not overshadowed by some "anti-social animals", contemporary to the scientific activity of the pioneers, it is possible to easily verify in the current information technology and communications the theories, theorems, laws, equations, functions, etc., of those innovative and transforming precursors of the sciences. For example, the Swiss mathematician, Leonhard Euler (1703-1783), with his research laid the foundations for graph theory, which studies the relationship between objects (Euler, et al. 2000). This is essential to understand the interconnections that are the common denominator in certain areas of ICTs. So much so that his theory is applied nowadays in search engines, social networks, smart cities, cyber security, and so forth.

In the case of online security, if we add the work of the theory of numbers, by the French mathematician, Pierre de Fermat (1601-1665), it is found that it is associated with cryptography, which is essential with the emergence and democratization of the Internet, in areas such as data protection, digital signatures, cryptocurrencies, etc. (Mahoney, 1994). On the other hand, for the analysis of the extremely high volume of data in the current network, through statistics and machine learning, mathematicians such as the British, Thomas Bayes (1702-1761), the French, Adrien-Marie Legendre (1752-1833), the German, Carl Friedrich Gauss (1777-1855), and the British Alan Turing (1912-1954) have made important contributions over time and that today converge in deep learning, Turing machine, neural networks and linear algebra (Pickover, 2012; Ifrah, 2002; Kneusel, 2021). In other words, reference is made to artificial intelligence, virtual assistants, big data, recognition through images, quantum calculation, etc. The works of these authors highlight the importance of the temporal evolution and application of the same in new technologies, of one of the disciplines of the formal sciences such as mathematics.

In that set of mathematicians and wrongly following the current rules, that is, excluding the time context, all these precursors mark a first imbalance in gender equality, for example. There are also other imbalances at the time of verification, such as professionals who define themselves as experts (a name issued by themselves or through journalist friends) in Turing machine, AI, robotics, telecommunications, learning management system (LMS), gamification, and so on, they dedicate themselves to other tasks, which do not require a high knowledge in mathematics, such as to organize events (talks, seminars, workshops, conferences, and so on), manage the media institutions, generate advertising / propaganda content for social networks, manage laboratories, departments, faculties, etc. In simple words, social and not scientific tasks, therefore, with an intellectual effort equal to zero. In addition, they have at their disposal teams of rotating professionals (temporarily hired) who carry out activities that require a high rate of neurons. For example, a civil engineer or an architect native to Spain, France, Portugal, Greece, Italy, etc., and who has studied in his country of origin, is professionally qualified to sign projects in his native country.

On the other hand, the rest of our European colleagues previously require validation of their university degrees. Therefore, those from Eastern Europe are generally in charge of carrying out all the construction calculations (better academic training in formal sciences) and the Spanish, French, Portuguese, Greek, Italian civil engineer or architect, etc., will only have to sign the plans or projects. Consequently, what exists today is a group of astute characters (women and men) who obtain fast certifications of studies, in complex areas of scientific knowledge. It is through digital and analog communication media (social networks, newspapers, magazines, television, radio, podcasting, etc.) that they manage to quickly and permanently occupy the top of the pyramid of power, in the institutions where they carry out their activities.

In these political management activities, it should be noted that from certain areas of society, the "self-defined experts" will constantly request new highly qualified professionals (local or foreign) in ICTs, mathematics, physics, chemistry, engineering, etc., but with minimum salaries and very poor contractual conditions. Another of its functions is to generate combinations of neologisms that can end up in new technology programs in master's degrees, specialization courses, doctorates, etc., of the universities with which they are interrelated. Some contemporary examples, with regard to mathematics and ICTs, can be the following: Cryptocurrencies and algorithmic complexity; Virtual assistants and the Turing machine; Smart cities and network theory; Pandemics and differential equations; International conflicts and game theory; Nanotechnology and mathematics; Personalized medicine and statistics; Quantum computing and vector spaces; Human resources and talent management in blockchain; VR design thinking, Transmedia storytelling, and so forth.

Here is a strategy to constantly request new training programs, generate international exchanges of professionals, raise financial funds for scholarships, etc. The rhetorical questions that arise naturally in the face of such a state-of-the-art are the following:

- **Why are there always lacks of professionals in the formal sciences?**
- **Why do students abandon university careers related to these sciences in the first courses?**
- **Will gender equality policies overcome the gap between women and men dedicated to programming tasks for the new intelligent systems that will use quantum computing?**

NATURAL APTITUDES VERSUS UNINFORMED REALITY

In the human aptitudes detected at an early age, among the students of the first courses of the EGB, it is feasible to detect those who have a natural inclination towards the artistic, social, scientific, technological, etc. Aptitudes that can make the boy, the girl, the young person stand out, in relation to their belonging group, within their school or institute. Currently, there are several feminist movements within the academic field (following the opinions of associations, organizations, foundations, and so on, whether private, governmental, banking or financial, etc.) that promote the interest of girls at an early age and young women towards the scientific- technological field. They commonly start with mathematics and the rest of the formal science disciplines.

The manifest objective is to achieve gender equality in the field of these sciences, which have historically tilted the needle of the scale towards the male gender. Socially, the female members of these movements who resort to pseudo-feminist rhetoric and flaunt their titles as computer engineers, graduates in mathematics, doctors in robotics, information architects, experts in HCI (Human-Computer Interaction), UX (User Experience), UE (Usability Engineering), etc., are not dedicated to the programming of energy systems, automated industrial equipment (AI — Artificial Intelligence), robotics, telecommunications, IoT (Internet of Things), MR (mixed reality), assistants virtual health, and so on, or to the resolution of problems related to the theories of numbers and cryptography (i.e., random graphs, chaos and dynamic systems, etc.); The Navier-Stokes, Black-Scholes equations, and so forth; The Markov chains, and an extensive etcetera (Constantin, 1989; Loxton, 1990; Szpiro, 2011; Graham, 2014). Summarily, everything remains in a simple rhetoric promoted and fostered from the human-computer interaction, blurring the epistemological limits of this discipline by introducing negative social components, through mathematics, politics and religion (Cipolla-Ficarra, 2021).

This interference has generated a 180-degree inversion of the mathematical model enunciated by Shannon-Weaver (1949), related to the theory of communication (Cipolla-Ficarra, 2021). A model, where the people involved (sender and receiver) were not the central axis of the communication process. Besides, more aggressive behaviours ranging from teaching to organizing international events can now be detected. A couple of classic examples from the Latin context are the pitched battles between university master's degrees or doctorates that address the same fashionable topics, or conferences with identical themes. In these two examples, it is necessary to ask now, if the function of these female staff(trained in science and self-included in HCI) is to dedicate themselves to education / research, or to the war between the living genders, resorting to university cloisters.

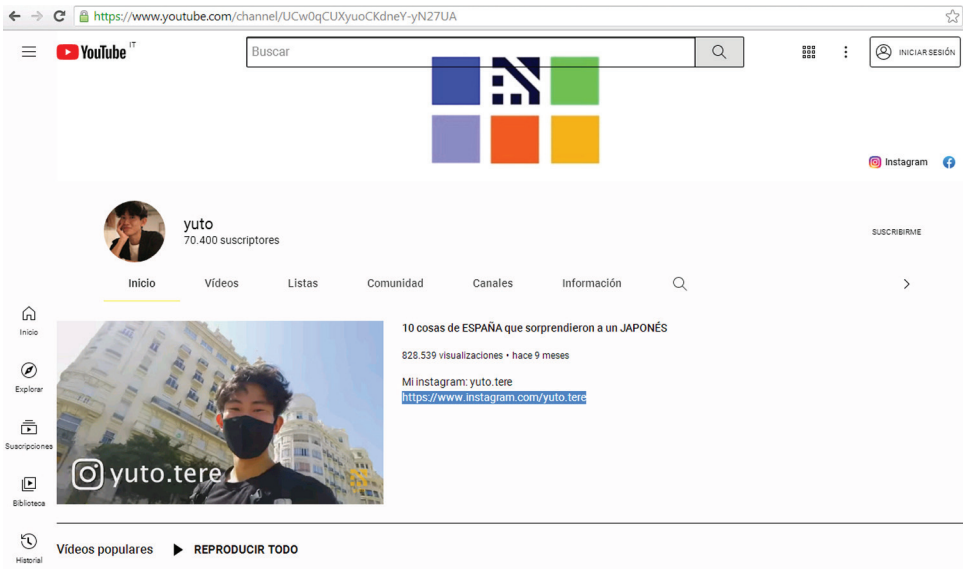
Natural skills can be realized in real environments, when the State guarantees a secular and free education for all its citizens, from the moment they enter an educational institution. In other words, it

protects and guarantees all cycles of primary, secondary and tertiary education. The problem is that in many developed states, this egalitarian principle among human beings is simply non-existent. The costs involved in the studies increase as the students grow in years. The field of private education is a galaxy that continues to expand for small elite to train "professional comets." In the Latin galaxy of private / public / hybrid education (i.e., Catalonia, in Spain) it is feasible to obtain five or more university degrees in a decade (bachelor's degrees, engineering, master's degrees, doctorates, post-doctorates), simultaneously occupying high management positions (i.e., Telefónica, CaixaBank, Bank Bilbao Vizcaya / Argentaria, Planeta publishing, etc., in Spain).

Inflexibly, there is a lack of guarantees and controls that derive from government institutions. The movement to generate interest in girls to study science and use universally homogenized study programs responds more than anything to the eternal demand for workforce of specialized personnel in computer science, telecommunications, robotics, etc., coming from industrialized countries, with lower costs than native staff. An easy method of detecting this flow of people, at an early age, is, for example, the Math Olympics, with the granting of scholarships or short-term stays, in institutes or universities of industrialized countries. This experience of staying abroad generates in adolescents and young people a kind of emergency exit, before the daily reality, in which they are immersed. Many of them, sooner or later, will try to go to those countries to continue their studies or work.

Social networks contain endless personalized video channels, where experiences are reported in the first person, in both activities. Paradoxically, in the abundance of information on the Internet, there are videos on YouTube where Asian university students are unaware of the local languages spoken in the universities where they have enrolled. So much so that a Japanese student, with university experience

Figure 5. Japanese student living in Valencia (Yuto Tere —www.instagram.com/yuto.tere) and he did not know that his university classes would be in Valencian and not in Spanish. Therefore, in the third decade of the new millennium, there are totally students' disoriented and uninformed in the face of daily and local realities, in certain Iberian geographical areas. Therefore, the Internet is not always synonymous with information for all users of generation Z.



in Finland, and with the possibility of continuing his university studies in Valencia (Spain), does not know that he will attend classes in Valencian (dialect or local language) and not in Spanish. This is an ancient example of artificial reality, in some places of the old continent.

Furthermore, it denotes the high degree of misinformation abroad by the Spanish university infodemic (Eysenbach, 2002; Han, & Steur, 2022). The responsibility for these voluntary and/or involuntary failures falls on the universities, autonomous regional governments and the educational authorities of the State. These situations have been widely described in the following research references (Cipolla-Ficarra, 2018; Cipolla-Ficarra & Ficarra, 2013; Cipolla- Ficarra, 2013; Cipolla-Ficarra, et al., 2011), since it entails a series of problems for the exchange of international students, granting scholarships, signing collaboration agreements and the development of sciences, aimed at the common good of the society where they belong.

QBITS TO READ THE BRAIN

The passage from bits to qbits, through quantum computers, will allow us to have a better vision of the world around us. An example is the simulation of complex systems such as the human body, starting with the brain. A brain is currently being studied in each of its components either to expand cognitive abilities and / or achieve direct interaction between itself and computerized interactive systems, especially in virtual environments (Tan, & Nijholt, 2010; Bernhard, Allison & Pfurtscheller; 2010; Sharma, A., et al., 2021). Hence the work aimed at mapping the brain (understanding the connections of the structure and the activity it develops) or neurotechnology (complex systems to connect the human brain to machines), to find solutions to problems of degenerative diseases such as Alzheimer's, Friedreich's Ataxia, Parkinson's, and so on.

Many mathematicians in departments of ICTs, bioinformatics, audiovisual, industrial engineering, architecture and computer technology, systems and automation, architecture and telecommunications, etc., began to study the brain, passing from serious investigations carried out by doctors, to those typical of science fiction, such as: "3D representation of the human unconscious"; "Conscious and unconscious reactions in immersive mixed reality"; "Embodied exploration of neural data and (un)consciousness visualization"; "Mixed reality and subliminal perception of the human brain network", and a very long etcetera.

The reason for these scientific mismatches lies with those who wanted to be doctors but ended up with a bachelor's degree in mathematics. Other amateurs do it for reasons of fashion or to easily obtain financial funds, through European subsidies. These deviations not only harm the seriousness of neurological research, biochemistry, molecular biology, etc., but also harm the future of one of the main advantages of quantum computing, in terms of the possibility of observing in detail everything that is complex to represent, with current bit-based computing.

The brain-computer interface (BCI) could have a strong boost through quantum computers, either for the use of intelligent prostheses or robotic arms, etc. (Millan, et a1., 2004; Latif, et al., 2017; Lynch & Park, 2017). In the field of robotic arms and computer art, the artist Stelios Arcadiou (www.stelarc.org) began to spread the potential of the third arm (robotic, connected to the human being) at the beginning of the '90s, in several of his performances, reminiscent of bionic / cybernetic characters from television and cinema: The Bionic Woman, Six Million Dollar Man, Terminator, and so forth.

These experiments where reality and new technologies are combined can serve as a source of inspiration for future research within the BCI. For example, in the new millennium, experiments carried out in laboratories, combining chips, microchips, computers, software, etc., recorded the electronic activity of neurons to move mechanical arms at a distance. Such is the case of the engineer Kevin Warwick, who managed, with cyborg technology, to move a mechanical arm to the US from the United Kingdom in 2002 (Warwick, 2004; Warwick, 2011). The evolution of these advances has allowed the implementation of artificial limbs, which can be moved from the brain.

Since the last decade, there are cases in which patients can perceive even the sensation of touch, through these cybernetic prostheses. Prostheses that, with the advancement of new synthetic materials, ceased to be robotic and began to emulate human skin (in the plot of the second Terminator film, there are the two robotic versions of this cybernetic evolution). Two generations of robots are represented in that film. The new and more advanced than in the previous film, is made of liquid metal and is able to change shape thanks to special effects, made three-dimensionally by computer (figures 6 and 7).

Regardless of the sophistication of brain mapping and neurotechnology, exciting progress has been made with today's computers. However, with quantum computing in such fields, added to the calculation potential and the simulation of complex realities, it could serve to resolve some **issues that** are **being raised in research laboratories, such** as **the reading of human thoughts, in a** few seconds. Connecting the brain to this new typology of computers would allow us to quickly obtain a sufficient amount of data to understand how the neural activity related to an experience or an idea is translated. Then, hypothetically, with ad hoc software, they could be read.

Figure 6. Terminator 2: Judgment Day (1991). The actor, Schwarzenegger as in Terminator I, is an android, constructed as a synthetic organism composed of living tissue on a titanium "hyperalloy" endoskeleton.

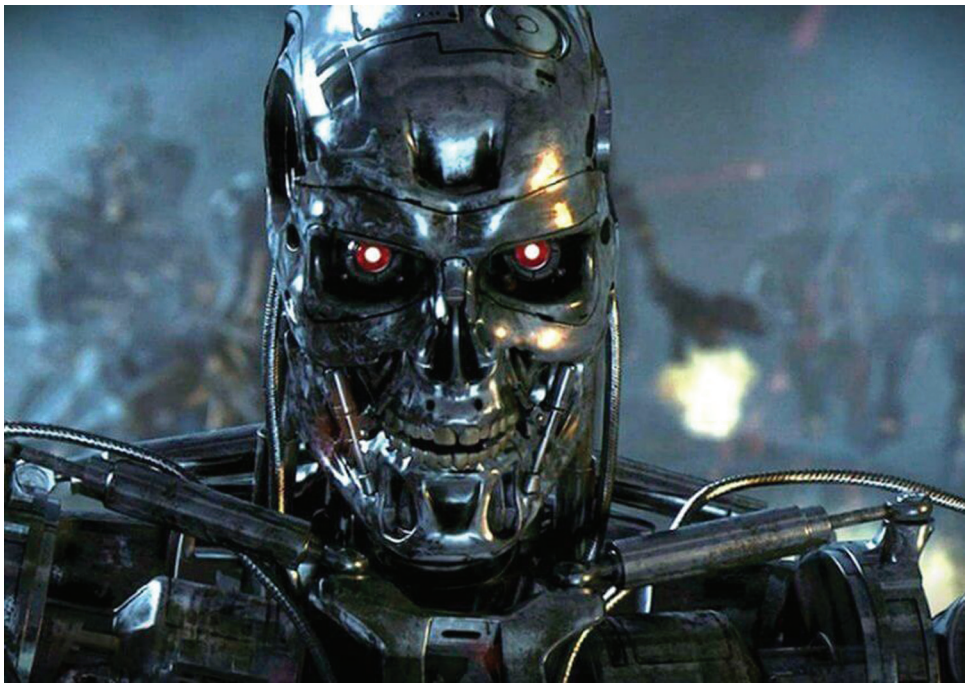


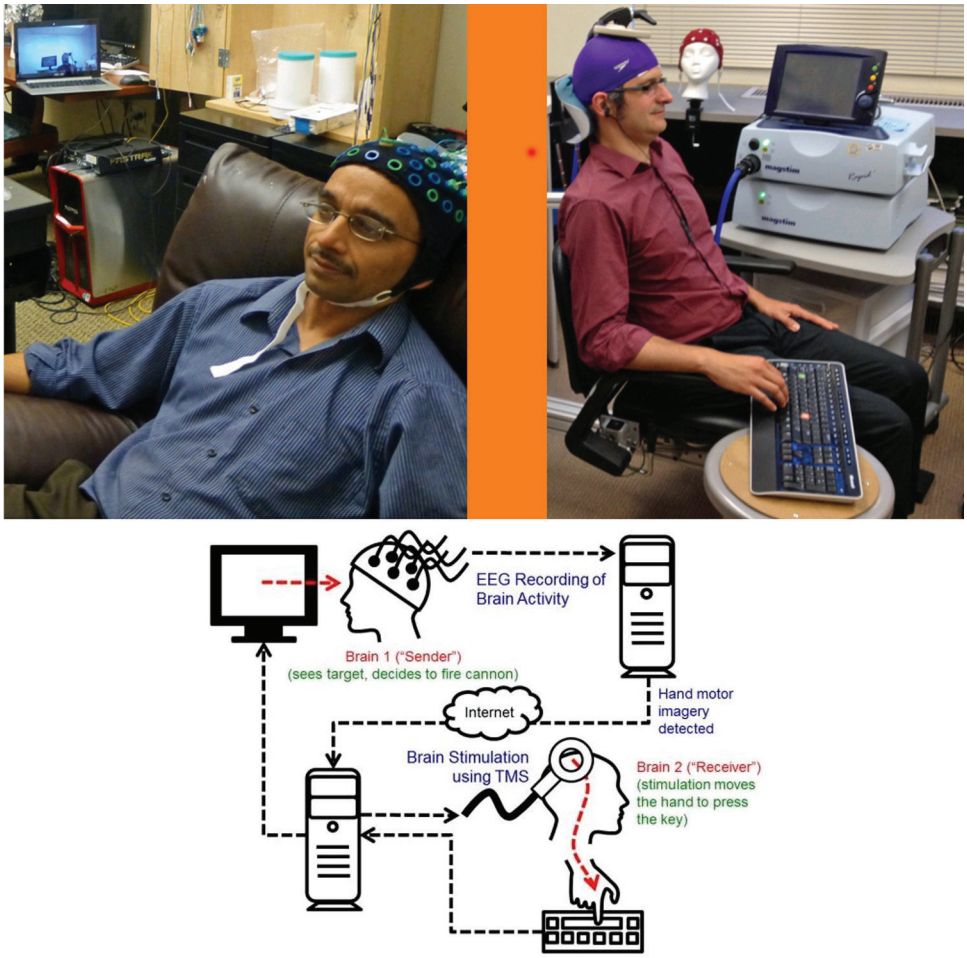
Figure 7. Terminator 2: Actor Robert Patrick as T-1000 is an "advanced prototype" shape-shifting robot composed of liquid metal. This is a natural human movement for a computer created character. The few seconds of the scene of Patrick going through the cell gate is one of the most expensive in the history of computer cinema of the 20th century.

Once read and like binary information but in this case using qbits, interactive communication between individuals/computers would break current time records through the use of the brain. There are already positive results from the field of interactive games and using non-invasive technology (from the point of view of the human body, that is, the non-implantation of microchips, electrodes, etc., under the skin, for example). Through the BCI, the possibility of interacting with the real arm of a user has been demonstrated, through the use of a helmet with TMS (transcranial magnetic stimulation) and EEG (electroencephalography).

In figure 8, there is the basic scheme of the experiment carried out in the USA, by Rajesh P. N. Rao with Andrea Stocco (2013). It is the first time that two brains have been connected to play through the computer, without resorting to invasive techniques. This experience enhances the BCI area and the transmission of quantum information. Besides, it motivates research to map and analyze brain activity to generate new non-invasive electronic and computing devices, as can be seen in Figure 8.

These first results have been obtained through the use of bits, but neurologists and computer scientists know that the future of the research areas in these two sectors is huge, once quantum computing is developed, empowered and democratized. **What is not certain is that all these advances make the human being a more intelligent being, even if it is possible to control emotions or expand memory capacity. In our days, communicability studies denote a loss of natural capacities of human beings by abusively resorting to social networks and the Internet, through new educational paradigms, where *"laissez faire"* predominates in the face of the convergence of transmedia and inverted media in the classroom** (Sun, et a1., 2022; Gannod, Burge & Helmick, 2008). Therefore, big science (biological sciences), neurology and quantum computing have a great future, since the human being will depend on them not only to perform mathematical operations, interact with the context (real or virtual) but also to remember their own experiences, sensations, thoughts and ideas.

Figure 8. Rajesh P. N. Rao (left) and Andrea Stocco (right), at the time of performing the BCI, EEG and TMS experiment (August 2013), using a video game, at the University of Washington (www. washington. edwnews/2013/08/27)



THE PILLAR OF SCIENCE FICTION IN THE NEW GENERATIONS

Science fiction, superheroes, and cartoons books occupy an important place in bookstores on American and Canadian university and school campuses, to name a couple of examples (Kinder, 1991; Kakalios, 2005; Jackson, 2010). Until the end of the 20th century, it was a strategic way of promoting interest among the new generations in the immediate challenges. That is, broaden the research horizon, looking to the future. In our days, the interest towards reading has decreased vertiginously in the Z and Alpha generations (Cipolla-Ficarra, 2022). The time allocated daily to reading the press (digital or not), in the student stage, in many cases is equal to zero. Television and radio have lost their hegemony over the network. Television has been transformed into YouTube channel videos and radio audio has been re-cycled into podcasting. In both cases, the transformation includes a strong presence of egomania from the sender towards the receiver of the contents. Social networks powerfully attract the attention of students

and teachers. So much so, that the latter resort to it for the assignment of research tasks (individual or group) within and outside of school hours, excluding analog information supports.

In this sense, it is currently a complicated task to assign the reading of a dozen science fiction books to adolescent students in high schools, high schools or to university students, even if they are studying literature, philology, journalism, etc. With the adaptation of university programs to the educational reform in the European space, through the Bologna Plan at the beginning of the new millennium, there was a cut in the bibliographies of the subjects. For example, in some Lombard universities (Italy), which until 2000 stood out for their high educational level, in foreign language and literature degrees — *Lingue e Letteratura Straniera* (German, Spanish, English, French, Russian, etc.), automatically, teachers could not recommend more than three books, in their subjects and that did not exceed 80 pages.

Therefore, in this adaptive process, between the old and the new educational system, many students who were getting their degrees in foreign languages, in Spanish or English, without fully reading "Don Quixote" (de-Cervantes-Saavedra, & Grossman, 2005) or a famous work by William Shakespeare. These new degrees, with a poor academic level, enabled the new professionals to teach, carry out tasks as official translators, access European institutions, etc. This is a reality that must be considered when understanding some of the motivations for which members of generation Z and alpha have not developed an interest in reading.

After three presentations of forty minutes each, with topics related to science fiction, quantum computing, the future of human beings and their natural / virtual context, the importance of computer graphics for information visualization, and the neurotechnology, an experimental evaluation of a heuristic type has been carried out. The main goal was to examine attention in interactive multimedia technological devices to establish several results. The first is the degree of knowledge acquired through the three presentations, differentiating those components or technological horizons, of the present and the future. A future divided into short, medium and long term. For this purpose, science fiction and its various film genres have been used. Simultaneously, the maximum time of attention / viewing of audiovisual content has been investigated.

In our studio universe made up of 120 films, on DVD, from the 20th and 21st centuries. We worked with a sample of 10% of that universe, that is, 12 in total, after a random draw of the titles. The titles viewed, following an alphabetical order, are the following:

- Alita: Battle Angel (2019),
- Avengers: Infinity War (2018),
- Dune (2021),
- Inception (2010),
- Lost in the Space (1998),
- Mortal Engines (2018),
- Self/Less (2015),
- Spider-Man: Far From Home (2019),
- Star Trek: The Motion Picture (1979),
- Star Wars: The Rise of Skywalker (2019),
- Terminator 2: Judgment Day (1991), and
- Transcendence (2014).

The evaluators of these works are 16 students (8 women and 8 men). They have watched each of the films without resorting to the latest generation devices, such as smartphones, tablet PCs, personal computers, etc. Each of them was assigned a simple portable DVD player and the DVDs of the films.

The selected DVD player model is the Telesystem TS5011 PX/02, with a 9" plasma screen (www.telesystem-world.com). It was explained to each of the participants that this device model lacks a mechanism that allows memorizing how far it has been seen to automatically resume viewing at another time. In the case of turning off the DVD player, the viewing of the film had to be repeated from the beginning. Consequently, the viewing had to be done in the times that the film lasted, with the possibility of taking breaks.

Breaks of several minutes (5 - 10) allowed them to take notes on previously assigned tasks, or other activities typical of commercial breaks, of films broadcast on television. They only had to record the total number of breaks and the time spent on them. This was the second objective of the experiment.

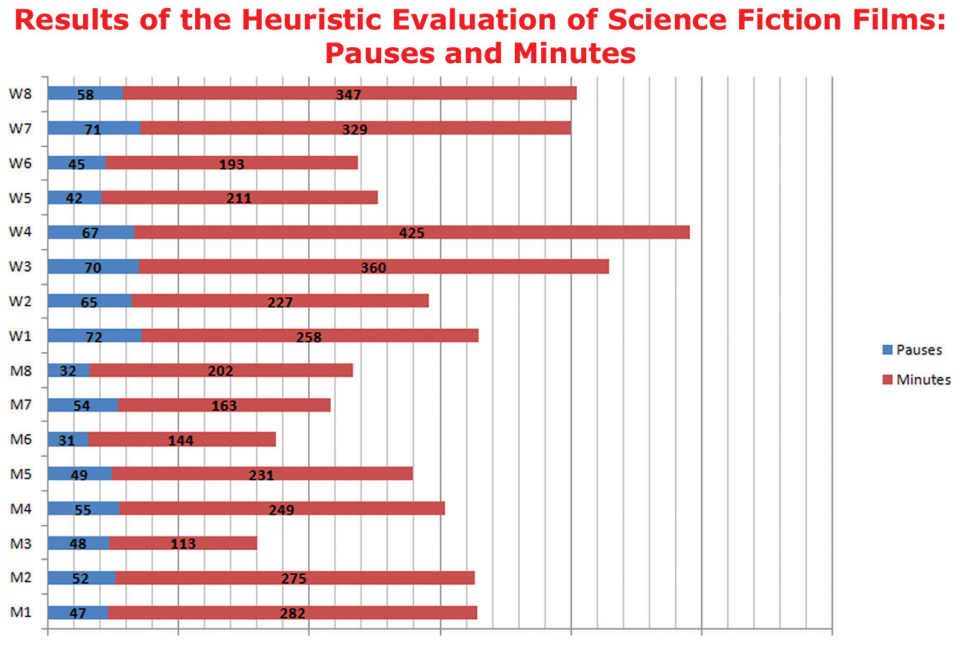
The tasks of the first objective are grouped as follows: Determine the type of graphics that predominates in the interfaces —2D/3D [T1]; Analyzing the three-dimensional design of the technological objects used by the characters belongs to the past (PA), Present (PR) or future (F [T2]; Inquire if the presence of mechanical or humanoid robots are self-sufficient (A) or need to be programmed (P) [T3]; Examine the use or mention of quantum technology (QT) [T4]; Establish the presence of neurology in the communication process between human beings and/or devices with artificial intelligence (N) [T5]; Verify the collaboration of machines to safeguard human beings and nature (C) [T6], and observe the predominance of pacifist (PM) or warlike (WM) machinery/device [T7]. The following table and graph show the first results obtained (NA = no answer). In parentheses are the references and in figures 9 and 10 and eventual average values.

Figure 9. Results of the heuristic evaluation of science fiction films to detect the presence of elements of quantum computing (QC), neurology (N), bio-informatics (BI), robotics (R), artificial intelligence (AI), futuristic industrial design (FID), safeguarding the planet (SP), realistic virtual environments (RVE), enhancement of the arms race (EAR), and control of individual freedoms (CIF).

Science Fiction in the New Generations:
Results of the Heuristic Evaluation

TASK/USER	T1	T2	T3	T4	T5	T6	T7
M1	2D	PA/PR/FU	A	QT	N	C	PM
M2	3D	FU	A	QT	N	C	PM
M3	3D	PR/FU	A/P	QT	N	C	WM
M4	3D	FU	A	QT	NA	C	WM
M5	2D	FU	A	NA	N	C	PM
M6	3D	PA/PR/FU	P	QT	NA	C	WM
M7	2D	FU	A	QT	N	NA	WM
M8	3D	PA/PR/FU	A/P	NA	NA	C	WM
W1	NA	PR	A	QT	N	C	WM
W2	3D	PA	NA	QT	N	NA	PM
W3	NA	PR	P	NA	N	C	WM
W4	2D	NA	P	QT	NA	C	NA
W5	2D	FU	A	QT	N	C	WM
W6	2D	FU	A	NA	N	NA	WM
W7	NA	PA/PR/FU	A/P	QT	NA	NA	WM
W8	3D	PR	NA	NA	N	C	NA

Figure 10. It is the total number of pauses (average) made and their duration in the viewing of science fiction films of the 20th and 21st centuries, by women and men, belonging to generation Z.



User/Pauses	Film 1	Film 2	Film 3	Film 4	Film 5	Film 6	Film 7	Film 8	Film 9	Film 10	Film 11	Film 12	Pauses	Minutes
M1	3	4	6	4	5	4	3	5	3	2	4	4	47	282
M2	4	5	3	2	3	3	5	7	6	7	4	3	52	275
M3	2	3	5	3	6	4	4	4	3	5	5	4	48	113
M4	5	4	8	3	7	6	3	5	6	3	2	3	55	249
M5	4	3	4	5	5	3	5	3	4	5	6	2	49	231
M6	2	3	3	4	2	3	4	2	3	2	1	2	31	144
M7	3	5	6	4	3	5	6	6	4	5	3	4	54	163
M8	2	2	3	2	2	3	3	4	2	3	4	2	32	202
W1	5	7	6	7	4	3	8	5	9	5	7	6	72	258
W2	3	5	5	4	5	4	6	4	5	4	9	11	65	227
W3	6	5	6	8	6	6	4	5	6	5	6	7	70	360
W4	4	6	7	6	5	4	7	6	5	4	8	5	67	425
W5	3	4	4	3	4	4	3	4	4	3	3	3	42	211
W6	4	5	3	4	4	3	5	4	5	2	2	4	45	193
W7	5	6	4	7	8	5	6	5	6	7	7	5	71	329
W8	4	6	9	5	6	4	4	3	5	4	5	3	58	347

The results of the first objective show the high level of detailed examination of the contents of science fiction films by young users of interactive systems belonging to generation Z, with few margins of error. However, in them a constant interruption in the visualization of these contents is denoted. Therefore, the enjoyment of science fiction films generates constant distractions in the female students. In other words, their level of attention is more dispersed or interrupted, compared to men. The students are more focused on the plot of the film, since they take fewer breaks and these last a few minutes. Indirectly, a priori, these first results may indicate a motivational preference of men towards the progress derived from the formal and natural sciences.

LESSONS LEARNED

This change in a new unit of information (qubit) implicitly entails a wide spectrum of transformations beginning with the mental (personal) and philosophical conception (social point of view) for what this modern technology applied to the entire community will entail. With the current binary system, the bases of artificial life are gradually being developed to achieve immortality for human beings, through three-dimensional digital clones, created in the American company, Somnium Space. Graphically, these avatars are similar to the software developed in a Madrid company in the 1990s called "REM Infographics" (Ficarra, 1999). These clones will be able to interact, advice, and remember, etc., with the descendants of real people. These clones will surely be included in the triad of the new era. This is why it is necessary to begin to understand, inform and educate about the basic components of the new unit of information: the qubit. Those actions cannot be based solely on models or cliches from obtaining financial aid with issues related to gender equality, care for the disabled, sustainable tourism, energy transition, etc. It is necessary to generate serious content and without resorting to transmedia as a mere hobby, so that students understand the revolution that is being generated with the advance of time, within the era that we call "Quantic-Nanotechnological-Self- Sufficient" (Cipolla-Ficarra, 2018).

The experiment carried out in this research work, highlights the importance of science fiction given the low interest in new technologies on the part of young women. Consequently, most of them will remain outside the programming processes of future quantum computing systems. This denotes not only the lack of interest in mathematics but also that the female models they have do not fit the reality of science.

Some models based on "comet education" that only serve to occupy the pinnacle of indestructible power, through persuasion, manipulation, lies and deception. The boomerang effect of this distortion is in the marginalization of women at the centre of the scientific revolution, current and future, with the vast amount of information technology. Hence, the existence of a mirage promoted by pseudo-feminism can be affirmed, thanks to political and religious support. It is time to eliminate the mirage of the perpetual institutional staff, which has climbed and is rapidly climbing the pyramid of scientific power, thanks to comet education. They must begin to work autonomously on topics that are included in their academic certifications in the natural and formal sciences. In summary, fewer social networks and that they dedicate full time, in their work activities, to differential equations, non-Euclidean geometries, Navier-Stokes equations, chaos theory and dynamic systems, Black-Scholes equation, and so on (Konstantin, 1989; Greenberg, 2007; Artzi, Croisille & Fishelov, 2011). Issues of great current and future interest depend on them, such as virtual reality, digital maps, pandemics, financial markets, climate change, and so forth.

Despite the contradictions that may arise in closed fields of educational / scientific power, quantum computers will have to resolve these and many other issues related to them for the common good. Some educational / scientific fields anchored in the past of old glories, whose headlights not only no longer illuminate sailors in large, medium and small boats of knowledge, but large sums of money must be invested in their maintenance so that they do not fall into oblivion or definitively collapse, like the tower of Pisa, in Italy. Precisely, that tragic downward tilt (to the ground), prevents them from looking up (the sky) to locate realistic and probabilistic horizons within their reach. In terms of Dante's Divine Comedy, it would be between paradise and Pisan hell. All this contradicts the principles of a perceptive Pisan: "Galileo Galilei" (Galilei, 1997). He looked towards the firmament, without following fashions, meddling or demolishing everything that meant "scientific novelty." One of them is the triad presented from quantum computing and that has opened the current era, in which all the doing and knowing of the human being is immersed, directly and indirectly.

CONCLUSION

The limits that are opened with quantum computing are in the imagination of the human being. Hence the importance of revaluing and updating science fiction as a motivating instrument towards science in the new generations, always, is placing the human being and the common good as the central axis. Quantum computing will introduce a new generation gap between designers, programmers, users, etc. Some experiments within the BCI are marking important milestones for interactive communication between human beings. The current high school and university education system is not being or aimed at this new way of conceiving computing and interactive communication. That is, from a more physical / chemical / mathematical point of view than from the current psychological / anthropological / mercantilist rhetoric. We are facing a universal paradigm shift that implies a collective effort to understand the new horizons that will open up with quantum computing, since the current communications security system will become totally obsolete. Although it is true that the security and privacy of digital data today is more of a dream than a reality, it is necessary that the theory of numbers and cryptography continue to be studied by new generations. Data protection, digital signatures, blockchain, cryptocurrencies, cryptography of communications, etc., will depend on such studies.

Such studies must escape the tyranny of online statistical algorithms, the savage commercialism of educational advertising, the infinite expansion of professionals in the formal and natural sciences towards other disciplines of the social sciences, and the abandonment of the generation of educational content to social networks. Transversely, these are the main causes of student dropout, in the first courses of studies related to formal and natural sciences. For example, many students interested in video game programming drop out of related careers due to inaccurate information about the compulsory subjects to be taken.

Algebra, mathematical analysis, graphs and complexity, and so on, are the main subjects that cause thousands of students (regardless of their gender) to drop out in the first courses of computer science, telecommunications, electronics, for example. This is an unresolved problem for decades in science education, although there has been a constant investment in technological means, study methodologies, teacher training, and so forth. Current educational systems still do not have suitable content, although VR, AR, MR, transmedia, inverted classroom, etc., are used. Proof of this statement has been the problems that have arisen with distance education, in times of pandemic, or the lack of interest in the future shown in the experiment carried out with audiovisual science fiction content, to measure its impact on the generation. Z. Apart from these results, it is important to point out that the technology will try to be more invisible to the human being, and without it, the members of the global and local village will not be able to carry out future tasks that require high memory capacity, greater speed in data management and accurate and immediate information. All this will be done with the qubits.

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Chapter 8
Transforming Digital Challenges Into Digital Opportunities: Truth and Lies

ABSTRACT

In this research work, the true and fictitious components are presented that underlie the metamorphosis between opportunities and challenges related to the context of new technologies. A guide and an effective heuristic evaluation mechanism are also developed based on communicability to quickly detect the degree of veracity of information on the internet related to university education. In this first investigation, the examination is carried out in the "human capital" of educational entities. In the field of challenges, a first set of challenges is established that derive from the experiences of global and local crisis situations. Finally, the consequences of concentrating the power of action and digital transformation in few and small groups are presented.

INTRODUCTION

Before analyzing a couple of particular cases, it is necessary for the reader to keep in mind that this topic "digital challenges —point of view technological—was widely discussed with examples since the first decade of the new millennium, resorting to a key term such as communicability, since its failure, largely due to human factors that are located in the educational field and are then transmitted to the rest of society. In the last decade, it has expanded faster with social networks. In those cases where the examples disappear from the Internet because their authors proceed to delete them, it is advisable to always consult the following portal (www.pirateando.net), since true and verifiable cases are also listed and constantly updated there, in the old and new world. Below is a list of books and/or handbooks in which, using an endless number of communication techniques that range from rhetorical questions to heuristic evaluation, they can serve as context and formation of a state of the art of the cases that are examined later:

DOI: 10.4018/978-1-7998-8721-8.ch008

- Handbook of Research on Software Quality Innovation in Interactive Systems (Cipolla- Ficarra, 2021a).
- Optimizing Human-Computer Interaction With Emerging Technologies (Cipolla- Ficarra, 2017).
- Technology-Enhanced Human Interaction in Modern Society (Cipolla-Ficarra, et al., 2018).
- Handbook of Research on Interactive Information Quality in Expanding Social Network Communications (Cipolla-Ficarra, 2015).
- Advanced Research and Trends in New Technologies, Software, Human-Computer Interaction, and Communicability (Cipolla-Ficarra, 2013).
- Quality and Communicability for Interactive Hypermedia Systems: Concepts and Practices for Design (Cipolla-Ficarra, 2010b).

While most of humanity tries to return to a new normality after the new mega crisis caused by the global pandemic, a few other individuals located in a kind of social glass bubble, in high watchtowers or towers, reinforce the mechanisms to deform the future generations of citizens. They do it by resorting to new technologies in education, or rather "narco-education." (Cipolla- Ficarra, 2021b). For example, they try to eliminate bad stereotypes of adults, in the child population when they start attending elementary or primary school. However, **stereotypes or clichés in communication depend on adults since children are simple victims of advertising or propaganda campaigns,** as can be seen in figure 1.

One of the objectives of these intrusive actions in the educational field is **to form generations without critical or questionable capacities to the context, where they are immersed.** The other goal, the most important and camouflaged, is **to end the current democratic system.** Little by little, the latter is being achieved in those countries where voting is not compulsory. It is enough to read the figures of the participation statistics at the time of electing their political representatives, in many EU countries, for example (Chomsky, 1989; Chomsky, 2002b; Han & Steur, 2022). In short, **in early childhood education, new technologies are used to undermine the foundations of democracy, based on false premises such as that the early childhood stage offers teachers the opportunity to lay the foundations for a "comprehensive quality education."** This no longer only affects fake news on social networks; the algorithms to influence voting intentions; the equations that make an automatic vote counter become a manual vote accumulator, and an extensive etcetera, as has been found in a wide variety of examples in this work, but also with the current rise of the issue of gender equality. A problem that is beginning to be aimed at boys and girls, before they begin to read and write, but who are receiving content through the new media. The main mission, manipulative and deceitful, consists of: *"The promotion of an online education, which eliminates stereotypes at an early age."* Just analyzing this phrase, it is detected that behind it there is a network of swindlers in education and destroyers of the European and world democratic system.

In the first place, the pandemic has called into question the entire educational teaching system through the network because there is no didactic content. Those responsible for them today, defining themselves as scientists, researchers, professors, academic tenure, holders, associates, and the rest of imaginable nominations, have shown that they are totally alienated from the reality of their fellow citizens. That is, they work for personal purposes or outside the scope of which they receive their salaries. In addition, when a potpourri of these denominations exists in a university, it indicates serious problems of labour relations within it. Therefore, a varied solution is sought, with all these qualifications for contracted and permanent teaching staff. The purpose of these ghost degrees is the establishment of links of labour and/or financial collaborations with other universities, government institutions, companies, industries,

foundations, banks, associations, organizations, and so forth (Cipolla-Ficarra, Ficarra & Cipolla- Ficarra, 2018; Cipolla-Ficarra, 2014).

At the same time, instead of focusing efforts to solve the eternal problem of the lack of educational content, according to the reality of the local student population, the teaching of computational thinking, programming of computer systems, robotics, etc., is used, all under the paradigm of gender equality, inclusion of people with disabilities and immigrants, following the new STEM model (science, technology, engineering and mathematics), and so forth (Lave & Wenger, 1991; Wenger, 1998; Grigorenko, 2012). This model has been changing names for decades and without providing concrete solutions.

Previously, the acronym of this model in southern Europe meant: "Science, Technology, English and Mathematics." In 2001, it was politically abbreviated in Italy to the triple "I": *Impprenditoria, Informatica e Inglese* (entrepreneur/businessman, computer science and English). In other words, it was the model to follow, under a slogan that can be summarized as follows: "Have computer skills, know English and be an entrepreneur." The failure was absolute. In reality, in these geographical areas for economic reasons of the majority of the population, hardly anyone takes English and/or computer courses in private academies, after working or studying, as they exist in other realities, throughout our planet. The sociological motivations prior to the phenomenon of globalization, was access to the industrial labour market (Wilkins, 2019a; Wilkins, 2019b; Ross, 2021). Students from institutes, high schools, and so on, specializing in technical and/or commercial areas (mechanics, electronics, textiles, foreign trade, etc.) were hired before finishing high school.

That is why it can be affirmed that once again the presence of a constant mania to implement foreign models in the realities in which the mentors of these pedagogical ideas are immersed is verified. Who, by the way, resort to an ambiguous word that generates great problems within "judicious" scientific knowledge such as interdisciplinarity: Education, psychology, philosophy, computer science, creativity, design and so on. Here it would be interesting to understand why specialists in creativity and design are needed at the same time, since one of the basic essential characteristics of all design is creativity, as well as what is the role of philosophers. To which are added the neo-specialists in gender equality in the educational field (although there is no study plan that issues this university degree in Spain, to mention an example). Finally, there are doctors and artists. Perhaps, the former are related to the extension aimed at hospitalized children and those with Down syndrome, while the latter, to complete the prevailing chaos of this type of interdisciplinary projects, in the Iberian territory. All this represents the debacle of the epistemology of science, concealed under the acronym HCI (human-computer interaction / interface) and in favour of narco-education (Moran, Card & Newell, 1986; Schneiderman, 1997; Cipolla-Ficarra, 2021b).

Regardless of these considerations, the truth is that in the new millennium it is confirmed that many academic spheres have transferred the local problems of gender violence, through education, to towns where such behaviour practically does not exist, due to the high local cultural level, reached in certain nations. This is a hypocritical, economic, neo-colonialist and audacious way of burdening other distant geographical areas with local problems (Cipolla- Ficarra, et a1., 2011; Cipolla-Ficarra, et al., 2020). The latter who do not have such problems must invest financial resources to find solutions exogenous to their realities and import educational models that are not adapted to their realities. Meanwhile, they experiment and try to find solutions to the problems that have been foisted on them. Cunningly, the makers of these problems will receive solutions to their daily problems, with costs equal to zero from the financial point of view and with no type of intellectual and labour effort.

However, analyzing in detail, it is verified that one of the causes of such problems (gender violence) is the extremely poor working and salary conditions of the majority of the population. Conditions that are not the same for those who are inside a glass sphere and see from their watchtowers the problems of the rest of their fellow citizens, without providing any kind of real solution. In our days and from a sociological perspective, it is easy to see how the pandemic has generated a great rupture in societies, between the private and public sectors. A rupture that will be the source of great conflicts of "human capital", as labour automation advances (Joop, 2007).

Human capital is understood as all those people who do not belong to that crystal sphere, whose members and their descendants, from the ivory towers or watchtowers remain unchanged over time, in the exercise of power. A power used to destroy the authenticity of democracy based on equality, freedom and human dignity, starting with one of the fundamental pillars of communities: Education. Consequently, human capital, made up of normal workers, currently does not have enough resources to buy a child a robot to carry out programming or assembly practices, as children are logically expected to continue in their training process. Now, if all this is the umpteenth triviality like the One Laptop Per Child (OLPC) project (Kraemer, Dedrick & Sharma, 2009). It is necessary to remember the results obtained in Peru or Uruguay, where the results obtained from primary school children with these computers have not surpassed those who did not have computers. In Nigeria, the project was abandoned and the use of this type of computer was ruled out, when it was found that children in primary schools, connected to the Internet, visited erotic or pornographic portals. These observations and information should be previously considered by the public or private institutions that finance such barbarities in certain academic, peninsular and Iberian insular areas, for example, placing the "scientific research" seal on them.

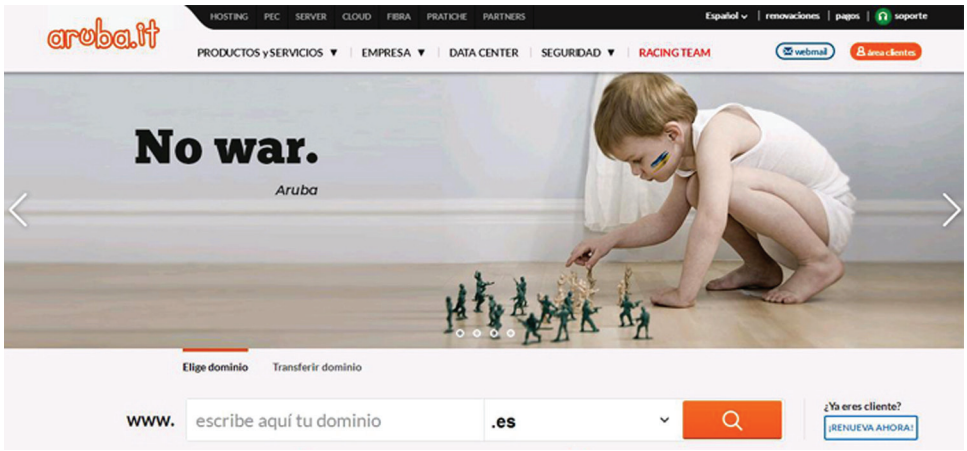
Nowadays, such types of investigations can be financed by banking entities that, in the first global financial crisis, destroyed millions of workers, taking away businesses, companies, industries, houses, etc. Not only lost the real estate (apartments, cars, artworks, etc.) but also the future of those generations of human capital and their families. All of them scammed and/or deceived by bank officials, who continue to act in the same way over time. Another group of individuals who are also in their crystal spheres, in their high towers or watchtowers. The reader interested in this topic and its consequences over time, can consult the following bibliographical references (Cipolla-Ficarra, Ficarra, & Cipolla-Ficarra, 2018; Cipolla-Ficarra & Alma, 2015; Cipolla-Ficarra, 2014). It is a way of operating that has not changed at all over time, despite the damage caused to billions of people on the planet. Therefore, they are always on the lookout for those individuals, institutions, associations, organizations, and so forth, that within the university, scientific, sports, artistic, etc. context, try to impose a kind of new control or world order. This is one of the strategies used to repair the institutional image of the banking and financial sector after the great global debacle that began in 2008 and is not over yet.

Scientific research aimed at the youngest, healthy or sick, has a doubtful validity. The suspicions arise from the funders, the direction and collaborators of the project, the geographical location of the headquarters and the ramifications inside and outside the country, the publication of false results to manipulate opinion, combining child users of new technologies, who enjoy good health with those who suffer from serious cognitive diseases, among many other variables, denote an extensive set of lies, which not only destroy the authentic challenges for the new generations, but also promote narco-education. In turn, it connotes the presence of a network in the scientific-educational context, which is not interested in the well-being of its fellow citizens, if the unattainable or illogical objectives set forth in its activities labelled "scientific research" are examined. The purpose is not only to lie to the taxpayers who pay taxes, and from whom the salaries of public officials for life stem (many of them in crystal spheres), but it is

also the easy method for these officials to continue with their personal and family privileges, totally free (trips, excursions, hotels, and so on). It is a way of presenting themselves busy to society and avoiding being bothered by the issues that all of them should really be working on personally: Generating content for the next crises that their communities will face.

What is certain is that in the face of such chimeras, all of this will NOT encourage the use of creativity, design and the ability to solve problems. In addition, these trivial experiences but with high educational credibility costs, such as those presented by the OLPC project, have shown that they are not suitable methodologies to promote the creation of digital content. **Therefore, the principles of interactivity, social interrelationships, collaborative work, creativity, constructivist and constructionist learning, the student-centred didactic approach, have been, are and will be a utopia in certain geographical areas even if they are interconnected with the oldest or elite universities, inside and outside the state territory.**

Figure 1. Solidarity and stereotyped advertising with the Ukrainian people from a portal that provides data centre services, web hosting, e-mail and domain registration, in southern Europe. In this figure we can see a baby playing with little soldiers, when on the battlefield, there are also women mercenaries fighting. This is an obsolete communicative and manipulative model that wars are carried out by men and not women. The eradication of these stereotypes is not in the formation of the little ones but in the actions of the adults.



This situation forces us to reflect on what are the first mechanisms to detect current and future challenges within education and science, from a sociological perspective:

1) **Local, provincial, national and international projects that are apparently oriented towards constructivist and constructionist learning,** the use of new interactive systems with artificial intelligence, the promotion of social interrelationships and online collaborative work, the potential of innovative creativity, and so on. The protection of children is urgently needed from those who are undermining the democratic system, through education and new technologies, governed by the current and future meaning of the acronym STEAM, equal gender, violence and/or child psy-

chological manipulation, and so forth (Moran, Card & Newell, 1986; Chomsky, 2002a; Chomsky, 2002a; Chomsky, 2002b; Chomsky, 2004).

2) **The financing of research projects** for washing the institutional image due to the damage caused to the community: Banks, financial entities, foundations, organizations, institutions, etc. (Cipolla-Ficarra & Alma, 2015; Cipolla-Ficarra, 2014)
3) **The direction of the project.** Verify if some of the degrees obtained have been in the period of the great educational crises (for example, in Europe, it has been the implementation of the Bologna plan, early 2000) or health (the period of the Covid-19 pandemic). This shows that these staffs are not 100% reliable and they lay in each of the stages of the project that management.
4) **The existence of the so-called "Bermuda Triangle" among the project participants.** In certain university contexts, these triangulations are constant sources of conflict for teachers, students, parents, tutors, etc., since they are governed by dogmas that go beyond the academic sphere and tend to obtain institutional and personal financial benefits, and so on. A classic example is to verify the repetition of the same names and surnames within the groups. Groups that allow posting anything or inclusion in jobs such as returning favours to each other, constantly drawing attention on social media, obtaining awards, scholarships, grants, etc., rigged in advance, and so forth. This is a classic reality in the field of HCI in Spain, Portugal, France, Italy, Greece, and Cyprus to name a few examples (Cipolla-Ficarra, et al., 2012).
5) **The configuration of the network of influences to carry out disparate experiments among themselves** (people who enjoy good health, with those who have physical or mental problems) within the universe of study. Generally, **they** are **experiments that** cover wide **geographical areas of a national territory but that from the sociological point of view require techniques that are never used by the members of these networks.** Therefore, the results obtained are of doubtful veracity.

Evidently, these first five items can be applied later to start reading online information correctly.

MAIN NEXT CHALLENGES FOR THE FUTURE INTERRELATIONSHIP BETWEEN PEOPLE AND NEW TECHNOLOGIES

Many of the technological challenges set forth at the end of the 20th century, with the arrival of the new millennium, have been totally outdated in the face of the great global and continuous crises that all of humanity is going through, either from a financial point of view (first decade of 2000) or from the health point of view (second decade of 2000). The health crisis has revealed not only the inefficiency of distance education models, through new technologies (Al-Smadi, Abugabah & Smadi, 2022) but also the lack of natural or artificial disaster prevention plans by the highest authorities, in countless industrialized nations. At the same time, the history of the presence of scientific, educational, productive, financial elites, etc., is repeated, which in the face of mega human catastrophes, are governed by a kind of false sacred mantra: **"Everything is going well."** This last sentence is typical of the Omega generation, described extensively, in several previous chapters (Cipolla-Ficarra, 2022). They remind one of the classical behaviour of engineers, scientists, researchers, university professors, etc., that in 1939, continued to develop their daily activities normally, while they suffered the invasion of their territories, in the centre of Europe. Those events would later lead to World War II.

The exact same thing has happened with the pandemic. It is enough to read in the databases related to computing and all its derivations, verified in countless cases, an authentic avalanche of the work of the Omega generation, in the midst of the global health emergency due to Covid- 19. Some works (i.e., articles, papers, short papers, posters, demos, etc.) related to ICTs (information and communication technology), HCI (human-computer interaction), UX (user experience), UE (usability engineering), etc., and indexed in the ACM, IEEE, DBLP, Scopus, and so forth, from 2020 to today. A virus that has caused more than 6,500,000 deaths on the planet (from the start of the pandemic until mid-2022), and whose exact figures (worldwide) will never be known. No one of those who have indexed these works has been interested in solving the problem of having access to the exact data of the pandemic, especially in these times when "datacracy", "infocracy", "infodemic", "garducracy" (gardunia + autocracy), and the rest of denominations that refer to this new phenomenon that threatens the democratic system of all societies (Chomsky, 1989; Cipolla-Ficarra, 2021a; Han & Steur, 2022).

Besides, the curious thing about these indexed works is that there are many experiments in university laboratories, when most of the centres were closed. Consequently, many of those works indexed in these databases and related to ICTs, UX, HCI, UE, interfaces, education, gamification, user evaluation, etc., have a scientific value equal to zero. Therefore, in the face of all this painful and alarming scientific reality, the first challenge of the new millennium is presented: **Differentiate information from propaganda.**

Propaganda understood as a methodical, programmed and repetitive act to mentally persuade and manipulate human beings, until certain pre-established objectives are achieved by those who benefit from it (Chomsky, 2002b; Cipolla-Ficarra, 2010a). The benefit reaches only a minority that exercises control of the powers inside and outside a community, whether in the educational, health, labour, religious, political, economic, financial, industrial, etc., fields. The propaganda is in total opposition to the objective and formative information of the first technological means of the 20th century, aimed at social communication. This predominance of propaganda in relation to information has been spread exponentially through the new media, particularly with social networks. Some networks have begun to be manipulated by the Omega generation, through artificial intelligence (AI) and algorithms. A second challenge related to information is to **detect the presence of false content,** generated or not, through artificial intelligence.

Traditional social media and new media must **guarantee the presence of the referent component in the semiotic triangle of Signified — Signifier — Referent** (Noth, 1990). Artificial intelligence models are removing that triangulation, by removing the referent, for example. The algorithms that make up those AI models are scripted but meaningless to current humans. The AI lacks rational thought, so that writing systems with this technology can be a constant source of false news, on the networks, at a planetary level. In addition, there is no one responsible behind these algorithms, but they are leading humanity towards non-belief in the written word, as Plato maintained in some way. He subordinated writing to orality (Cole, 1991; Cooper & Hutchinson, 1997). However, nowadays even the human voice of each person can be cloned with certain types of algorithms. Therefore, the privacy of the human being is already more of a utopia than a reality (Vaidya & Clifton, 2004; Luong & Yamagishi, 2020; Dessouky, et al., 2020).

The unlimited capacity to generate conflicts in the web, through the algorithms of artificial intelligence, will depend on the degree of creativity of all those who are programming them in our days. Removing that danger is not an easy task. The legal vacuum, worldwide, continues to be alarming, since the democratization of the Internet. The big problem now is the ability of these algorithms to write news, from scratch (Anderson, 2012; Ford, 2015; Montal & Reich, 2017; Wu, Tandoc, & Salmon,

2019). Consequently, another current and future challenge is to **prevent humans from being replaced by computers in the news writing task.** Texts that can also be accompanied by moving images (video, computer animations, holograms, etc.) and human voices, emulating real people, thanks to other algorithms capable of cloning voices, facial movements, gestures, and so on.

Artificial intelligence is the latest fashion that is intended to be implemented in the education of students, when they set foot in a primary school for the first time. Robotics is used as a mechanism to generate future professionals in the industrial automation sector. Professionals who will be in charge of the production of robotic goods to the provision of telematic and automated services. Undeniably, a fashion promoted by the Omega generation (Cipolla-Ficarra, 2022), through disciplines such as: Gamification; UX; Children-Computer Interaction; Interaction Design and Children; HCI, and so forth. In this way, not only are children losing the ability to read or perform mathematical operations, without the help of technology, but they will not be able to distinguish between information generated by a human being and that produced by artificial intelligence. These new generations will not know the meaning of individual freedom, creative autonomy and responsibility for the actions they carry out, since they will be replaced by surveillance and social control. **Promoting alphabetic culture in the face of digital culture,** in the processes of endoculturation and transculturation, is a primary task for parents and teachers.

A social surveillance that has increased exponentially, in some nations due to the spread of the Covid-19 virus. Systems that not only remain, but are being perfected and strengthened, such as biometric control, rendering the forecasts of 20th-century science fiction obsolete, such as the literary work "1984" (George Orwell) and the slogan: "Big Brother is watching you" (Orwell, 1950). It is the end of privacy in all its forms since the solution to certain problems does not go through certain models of spying on all its inhabitants. Therefore, a new challenge is **the right to the private conscience of human beings.** This right is interrelated with free will, self- determination and autonomy of the actions of people. Instead of implementing the programming of robots from the early age of children, in contextual realities, where there is a lack of basic natural resources such as water, for example, it would be more viable and interesting to build thoughts, value judgments, memory, and so on. Besides, it is necessary to remind these new scientists and cybernetic researchers, etc., of the natural resources that social networks consume, such as water, every time that videos or photographs are sent through online applications (analyzed extensively in a previous section). Therefore, vital survival factors, such as water, continue to take precedence in people's lives. Without it, the generation of local flora and fauna, the means of sustaining indigenous populations (agriculture and livestock, for example), the settlement, development and progress of communities, etc., are thwarted.

The algorithms developed by mathematicians who promote artificial intelligence, recommender systems, information retrieval, genomics, etc., are already learning more decisions than human beings. However, in the face of failures, people can no longer be held accountable, but rather the systems. These are systems that can already be developed automatically and therefore, there is no responsibility, except that it is a service with costs, such as financial operations, through banks, savings banks, etc., to mention an example. In the case of information and after the pandemic, we are in a post-truth and denial stage. Fake news is akeady an industry, as is the case in some Asian countries, or in Eastern Europe, such as Belarus. The evidence that demonstrates the destructive actions of the agents of those countries, dedicated to the destruction of transparent and objective information, is not considered by the population because there is a process of exclusion of the truth, through evidence (Cipolla-Ficarra, et al., 2016). The novelty is not the false news that has always existed, but rather, the maintenance of it. Furthermore, committing criminal acts online and being immune from international law is considered by many to be a heroic ac-

tion and a role model. **Science terrorists and all their henchmen must be excluded from scientific legality and scientific community.** This is a new challenge for associations, institutes, organizations, etc., related to computing and all its derivations.

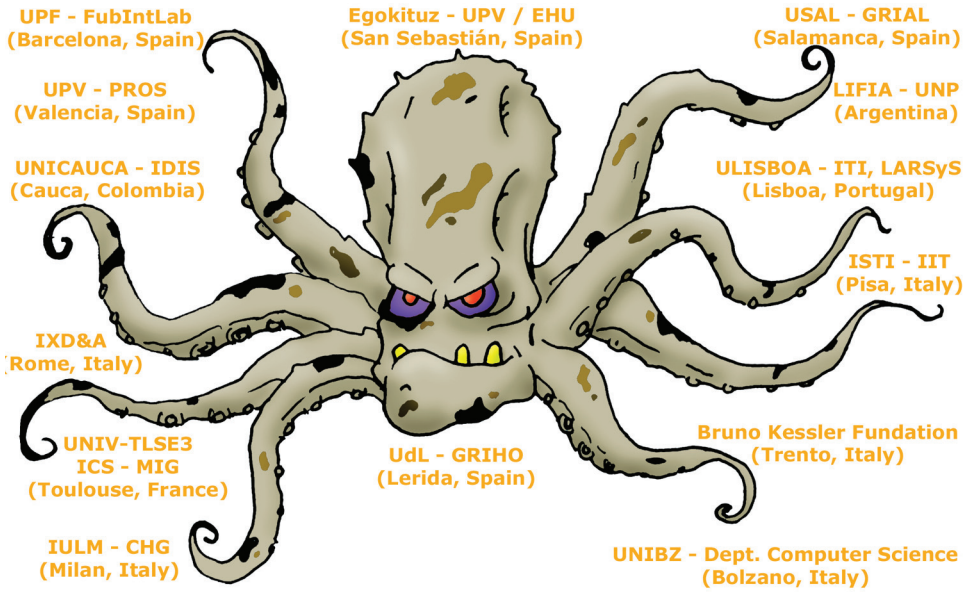
Another challenge is to achieve **a balance between formal, natural and social sciences.** It is necessary that the social sciences acquire the lost status, starting in the '90s with the democratization of interactive systems through the network. The rise of placing people connected to each other, first with cathode ray tube screens and now with plasma screens, has led to the inclusion of professionals from the formal and natural sciences, in areas whose knowledge and/or experiences are null. Through the modelling of reality, from the formal and natural sciences, the changes announced since the '90s have not occurred. On the contrary, if before there was a digital divide, now we have several bottomless abysses, such as the one between the different generations of users of technological devices (pre and post, new millennium), and the one generated during the pandemic, among workers in the public and private sector, to mention a couple of examples.

Defending secular and free education systems for all, in those countries where such a model still persists and resists. To this end, it is necessary for professionals to carry out their activities within their fields of training and experience. In other words, put an end to the disastrous methodology of inter / trans / multi / intra / extra / ... cooperation to make the formal and natural sciences prevail over the social sciences. Through this picaresque false collaboration, in education it has been verified how the former metropolises of the 19th century empires have managed to impose, little by little, alien, illogical and malfunctioning models, thousands of kilometres away, destroying in those places, autochthonous models that have been elaborated progressively, according to the autochthonous reality. The Trojan horse used for this destruction has been the use of new technologies for educational purposes (Cipolla-Ficarra, et al., 2017; Cipolla-Ficarra, 2021b). Currently, the strategies they use to continue exporting their anti-educational models are: Learning by playing, robotics, gender equality in science education, feminism, the role of women in engineering, and an extensive etcetera. If those who have built these Trojan horses are analyzed in detail, we find participants or descendants of those who have sustained and maintained for decades the totalitarian systems engendered in the Old World.

In the software industry, when new quality control methods are implemented, the aim is always to reduce errors and, therefore, the production times of new interactive systems, whether they are intelligent or not (Shneiderman, 1997; Sterne, 2002; Treynor, et al., 2017; Matsudaira, 2018). This is a process which until the 20th century used to include social science professionals in software production teams, to consider variables from the users' point of view. However, little by little, these professionals have been excluded. This exclusion begins in the new millennium, from the first crisis resulting from the explosion of financial bubbles from virtual or online companies. **The new solution would go through the use of the expression "inter / trans / multi / pluri / .. / disciplinary collaboration",** where social science professionals are consulted from a distance. It is a work methodology that has considerably reduced the number of human team members, to create interactive systems, as it was in the 1990s (Basili & Musa, 1991; Ternoven, 1996). Groups where not only social science specialists were present, but also programmers and graduates in industrial design, fine arts, pedagogy, and so forth. All of this has converged in various areas of computing, such as usability engineering, human-computer interaction (HCI) and user experience (UX), generating an international and centralized network, with great decisive power in the industry of software, which transcends the merely scientific and informatics, due to its affiliations with politics and religion. That structure and its ramifications take the form of an octopus. Therefore, one of the current challenges to **maintain software quality is the need to escape the tentacles of the so-**

called "Octopus-computer interaction." In the last decade, this octopus has delegated its functions to the female version, due to the rise of feminism. In figures 2 and 3 you can see the universities, centres, themes, events, publications, etc., which are mere tentacles of the male and female versions of octopuses, which from the dark area of the network, control everything related to ICTs.

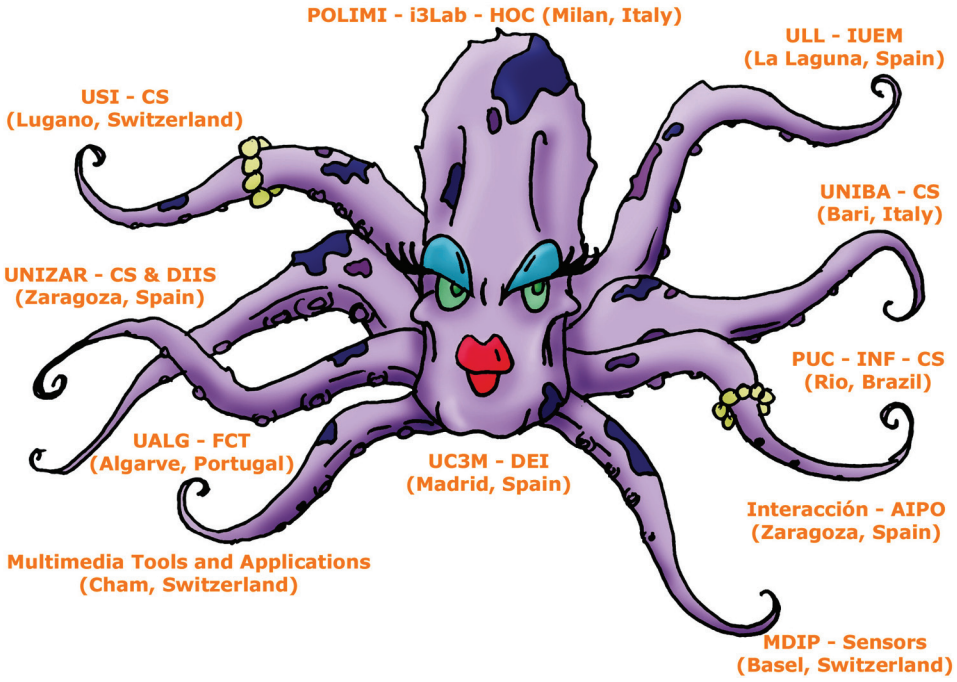
Figure 2. An old octopus of computing, mathematics, physics, nuclear engineering, industrial engineering, etc., educationally trained under the dictatorial models of the old continent, who still today continues to manage the different areas related to education and the new technologies. Author: David Carillo-Frias



These challenges, which can be expanded upon in the following references (Cipolla-Ficarra, 2021a; Cipolla-Ficarra, et a1., 2017; Cipolla-Ficarra, 2011; Cipolla-Ficarra, 2010a), highlight the need for future generations to learn to correctly read the online information of their teachers, study centres, etc., since not only will the financial investments that performed personally or through their parents, guardians, etc. depend on that to continue studying, but also work opportunities. A job opportunity that does not depend on the statistical or propaganda data that appear on university portals, but rather on the quality of the theoretical and practical content assimilated during the training process. A quality that depends on the academic staff that does not contain any of the variables of the G factor (Cipolla-Ficarra, 2021b), such as the octopuses or their tentacles, represented in figures 2 and 3.

Technological advances that help education, medicine, agricultural production, construction of homes, informatics, etc. have been positive (Barker, 2005; Bruderer, 2017; Ratner & Re, 2018). However, it is the human being who can include changes to his inventions for destructive purposes such as war weapons. In this sense, we see how the genius of Leonardo Da Vinci has gone from art to the construction of defensive systems for populations as machines for war (see chapter: "Three-dimensional Images, Computer Animation and Communicability: Pro and Cons Interactive Design into 'Codex Atlanticus' Interactive System.") Hence, the obligation to present the pros and cons that may exist in the methods,

Figure 3. The female version of figure 2 (author: David Carrillo-Frias). She represents the new dictatorial sleight of hand of the old octopus to hide from the rise of issues related to feminism, the safeguarding of the environment, emotions, empathy, new typologies of companies, with precarious workers (spin offs, startups, scaleups, etc.) and an extensive etcetera of old and/or modern terms, related to this sleight of hand. The primary purpose of these octopuses is to preserve centralized power, easily overcoming the mega international crises in the new millennium.



techniques, strategies, and so on, that are used daily for educational and research purposes. Presenting the two sides of the same coin or medal, as is generally said, helps us to quickly detect the advantages of implementing certain teaching methodologies in emergency situations. However, this does not mean that we must forget about the negative aspects that currently exist in the context of primary, secondary and tertiary education. These aspects have expanded exponentially due to the global crises that have been repeated cyclically since the beginning of the new millennium. Here is the need to include in detail the components of those human and technological aspects which should be avoided to save efforts and synergies towards new technologies, scientific fields, social realities, characters, modus operandi, etc., which do not imply any benefit from the human and professional point of view. All those efforts and synergies usually take a long time to build. In our days, that time always implies economic factors, in almost all the activities of the human being.

THE IMPORTANCE OF BEING UP-TO-DATE IN THE FACE OF CHANGES IN SCIENCE CHALLENGES

Contradicting the natural forces of the social being, at the time of settling in the first villages in the history of humanity, it has been found that one of the consequences of the Covid-19 pandemic has been the departure of human beings from large cities towards rural areas. That is, to go from the agglomerated mass to social isolation. In this transition there have been changes in habits / conflicts in the use of new technologies (Liu & Zhou, 2017). Against this background, telecommuting for those employees who provide online services or develop intellectual work, to mention two examples. On the other hand, teleeducation through the new interactive communication media has proven to be a real failure. Failures have been detected in innumerable cases, ranging from elementary or primary education to the most advanced courses at the university level (Al-Smadi, Abugabah, & Smadi, 2022). That umpteenth educational fiasco does not belong to the technical issues of information technology and/or telecommunications, but rather to the non-existent content, according to these new media for distance education and personally developed by teachers. The figures of abandonment of the educational system, at all levels, are millions and millions of students, throughout our planet, due to the inefficiency that has arisen with the pandemic.

In the midst of this sad mess are all those of the Omega generation (Cipolla-Ficarra, 2022), who have tried to maintain their personal "status quo" in the face of humanitarian catastrophe. To this end, they have been distracting the attention of thousands of users connected to traditional communication media and new digital media, from what was really happening with the tragic destiny of millions of human lives. As has already been verified with all humanitarian emergencies, there are two structural bases of any developed nation, that is, health and education. As with the pandemic, healthcare was being seriously affected due to the lack of emergency plans; efforts were concentrated on education, as a news channel to inform the population that educational activities were theoretically being carried out with "complete normality." In other words, it is an imaginary or extra planetary normality. Especially, in those places which were the first European epicentres of the pandemic. For example, small alpine towns and cities in the Lombardy region (Italy), that quickly and far exceeded the total number of deaths in the whole of the Netherlands, during the first wave of the pandemic.

Much of this catastrophe was due to a propaganda campaign, carried out with the support of the highest political, religious, business authorities, etc., instead of resorting to institutional information, through local, provincial, regional, state and European communication channels (figure 4). This is an example of the propaganda in the best style of the totalitarian systems of the Second World War (Short & Dolezel, 2021). The employers and local authorities (political, religious, educational, etc.) in the first phase of the wave of infections encouraged the population to continue with daily activities in a normal way, since it was "a flu virus." Meanwhile, the indigenous health system was quickly collapsing. In short, the infodemic of ignorance reigned and walked freely, among those entrenched inhabitants, in their homes. There are more examples from local newspapers in the Annex #1 —section A.

In these places, the role of the highest university authorities consisted in resorting to the media to broadcast the closing acts of courses and/or delivery of diplomas/certificates of bachelor's degrees, engineering, master's degrees, etc. All this virtually and in the best style of Hollywood films. While, the local population observed the poor prevention actions from the highest local authority —mayor, and mega media expert —former director of the main private television company in the southern Mediterranean (Mediaset), based in the capital of the Lombardy region: Milan. He and all the other people in charge, from his ivory tower, followed that immutable anti-university communication model. The only

visible action from his government cabinet consisted of placing paper posters on municipal fences with basic prevention measures (i.e., stay at home or free test Covid-19, figures 5 and 6). All this lousy local management, with the new social communication media of that community, would lead to what today can be defined as the first European "consensual and unpunished genocide" of the new millennium, legally speaking.

Meanwhile, in other latitudes of the globe, universities and local media have created synergies to carry out extensive prevention information campaigns, since the start of the pandemic, through radio, television, press, Internet, and so on. Visibly, these people are not interested in the acting and narcissistic performances of their teachers, who, as seen in the annex #1, section B, take the leading role away from the rector on duty. In other situations, they even surpass the central role of their deceased colleagues. That is why it is very important to know how to read the résumés of the academic staff of the universities and discover the presence of the classic meteorites or the new missiles within the local and international educational and labour systems; Dig into the official history in granting scholarships; Inspect the hidden truth of international awards, discover the hidden plots of the vertiginous race to the pinnacle of power, examine the intrigues of the interrelationships with other spheres exogenous to secular education, such as politics and religion, among many other issues, which indicate and reveal toxic areas of study, research and work. Therefore, it is always advisable to be very far from such environments and their members so as not to end up as in the bonfires of the Spanish Inquisition, for enunciating truths, as great as the cathedrals of the European Middle Ages, in the new millennium.

Figure 4. Video made by the industrial employers of Bergamo, trivializing the pandemic, under the title "Bergamo is running." Currently, in the main online search engines, it has practically disappeared and/or other videos have been placed with similar titles but that make references to sports activities organized by the city council or entrepreneurs (i.e., A message to our partners: Business in Bergamo is running; Innovation Run Bergamo; Marathons, and so on).

Figure 5. The text message says "I'm staying home. Respect the rules. They are valid for everyone, they are valid for you."

Figure 6. The poster reads that if you are a city dweller and over 18 years of age, you can take a free Covid-19 test, previously requesting an appointment online or by phone. The results are guaranteed in 48 hours.

Both posters, with the background in light blue, the background and the letters, mostly white. In other words, there would be discrimination in gender parity, from the chromatic point of view, as well as by age or place of residence of citizens.

TOWARDS A FIRST READING GUIDE FOR ONLINE INFORMATION FROM UNIVERSITY PORTALS

The examples in this section, a priori, may appear isolated from each other, but it will be shown how there is a common link between them and that only with the passing of time can they be detected. This diachronic common link will be called "Isotopy of Educational and R&D decline." A series of activities will be indicated and at the end there is a synthesis of the same that can be used by students, parents, tutors, financial entities of R&D projects, entities related to the transfer of knowledge between companies/industries and universities (and vice versa), and so forth.

In the first place, it is necessary to save the information that is presented on the web pages of the university portals because they, periodically and logically, change over time, beginning with the design and ending with the contents. However, in this accumulation of changes there is something that should not change as much as it is the personalized information of teachers, starting with their degrees. This is one of the main keys to study in university centres. If constant changes are verified in this section, it is not convenient to carry out studies in such centres because there is an inadmissible *laissez faire* in the academic world that has the label of "serious." In figure 7, we have the dates when a former student at the Polytechnic University of

Madrid obtained a degree in computer science, marked with the letter "A" (1992) and her doctorate, with the letter "B" (1995). That is, a record time of 3 years. Therefore, it belongs to the phenomenon of what is called the "anti-educational model" of the "kitten students" (figure 8).

Figure 7. Anti-educational model and Spanish meteoric system in university degrees. Three years for a PhD with zero "individual" international publications in conferences, workshops, symposiums, etc. (Madrid, Spain)

A.1. Situación profesional actual

Organismo	Universidad Carlos III de Madrid			
Dpto. / Centro	Computer Science Department / Escuela Politécnica Superior			
Dirección	Avda de la Universidad 30, 28911, Leganés			
Teléfono	(34) 916249456	Correo electrónico	pdp@inf.uc3m.es	
Categoría profesional	Catedrática de Universidad (d)		Fecha inicio	2003
Palabras clave	Hipermedios; Interactividad; Realidad aumentada (c)			

A.2. Formación académica (titulo, institución, fecha)

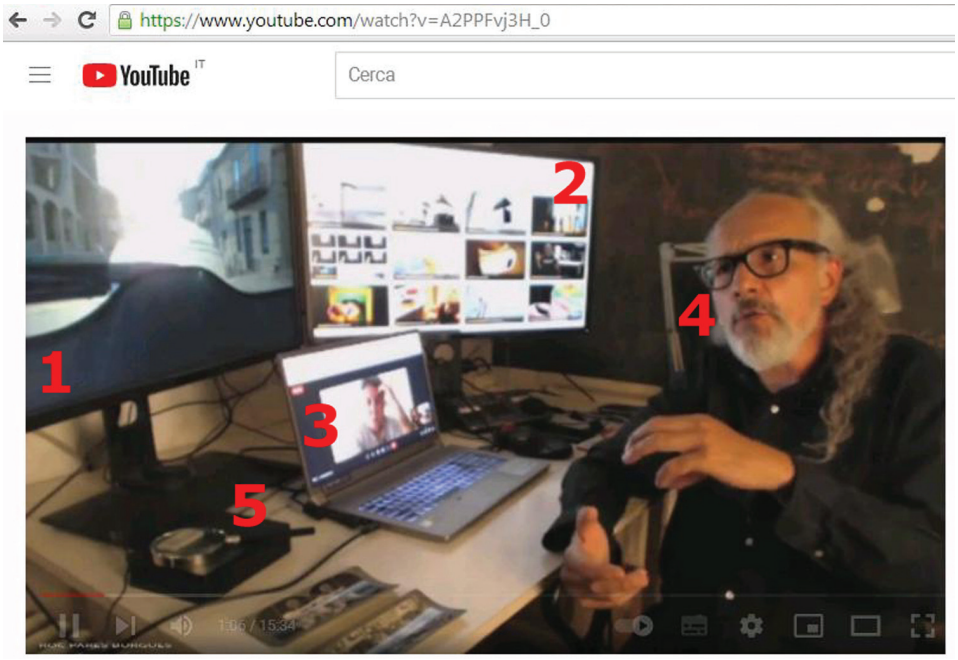
Licenciatura/Grado/Doctorado	Universidad	Año
Doctora en Informática (b)	Universidad Politécnica de Madrid	1995
Licenciada en Informática (a)	Universidad Politécnica de Madrid	1992

Figure 8. Anti-educational model and Spanish meteoric system in university degrees (only one 10 years, in Barcelona, Spain)

This is already the first negative factor: **"Isotopy of Educational + R&D decline."** Then, it is automatically necessary to consult the scientific databases ACM, IEEE, DBLP, Scopus, etc. to determine how many individual research papers have been indexed in that period. If the answer is equal to zero, this denotes the presence of corrupt human factors, which have favoured the granting of the second university degree, in such a short time. Besides, automatically, we have a jump in thematic of interest that goes from the "prehistory of hypermedia / interactive systems", towards augmented reality (letter C). This index indicates a hidden obsession with being in the trend of topics of interest and connotes that he is potentially a person who will abandon R&D projects, since he is guided by exaggerated narcissism (camouflaged or overt). Abandoning projects without being completed is a serious warning signal for all those who make up these work teams, whether inside or outside the university: International agreements between universities, projects subsidized by the EU, labour volatility of collaborators, and so on.

In letter D, we have another warning component about that person, in the short time that she has spent climbing all the academic levels to occupy the lifelong position of professor (less than 8 years). Here the existence of non-transparent human factors within that university, in the field of computing, is reinforced. At the time of consulting the database, it has been possible to verify with which authors he has collaborated over time, the topics addressed, the number of annual contributions, the events to which more works are accepted, etc. Based on this information, it is necessary to investigate whether there is a relationship between people that goes beyond the workplace, for example, blood ties, marriage ties, and so forth. In other words: Inbreeding.

Figure 9. Exaggerated and inbred narcissism through image (www.upf.edu), where a fine arts graduate presents himself as a mega-expert in VR, social communication, robotics, writing multimedia scripts, etc. In the image prepared in advance, resorts to the use of technological redundancy (4 computer monitors, some of them on the screen there are images belonging to scientific visualization). A magnifying glass in the left area serves to force their inclusion in the scientific-computer environment, even if they do not have studies or experience in the field of programming, for example.



Inbreeding tends to exacerbate problems for those who must be integrated into work groups, for example. Integration of people will never reach 100% and will always be subjected to the swings of power generated by inbred agents. At the same time, the tentacles of figures 2 and 3 will be seen in action when they are intertwined with other inbred tentacles, in the face of certain specific ICT issues, inside and outside the borders of a state. These endogamous ties cannot be easily detected in the case of married couples, since they are not legally obliged to include this information in academic curricula.

Blood ties are easy to detect, since they generally have the same surnames and make the same mistakes, as is the case with exaggerated narcissism, of the functionally ignorant for life (figure 9). Brothers and/or sisters who, carrying out a single research work in virtual reality, without independent international publications, have been awarded two doctorates, in universities founded, at the end of the 20th century, under the pseudo-ultra-nationalist model (i.e., www.upf.edu, www.upc.edu, www.uoc.edu, www.udg.edu, www.url.edu, www.uvic.cat, www.uab.cat, and www.urv.cat). The problem of difficult solution for the rest of the third cycle students, read doctorates, post doctorates, etc., before an inbreeding can arise at the moment that they have conflicts to defend their research to obtain the corresponding certifications. In some European states, the regulations apply to transfer the academic record to other universities, and the studies carried out must be validated. However, these transfers are useless because the tentacles of figures 2 and 3 are very long. In short, the student who has changed university may find himself in the same conflictive situation, which he/she has supposedly left behind.

In other realities, the doctorate titles are self-placed in the C.V. resorting to an old linguistic trick, as is the case with Italian. Where, many computer science graduates, at the beginning of the 20th century, used the acronym Dr., instead of the correct abbreviation of dott. *(dottore)* for the man and dott. ssa *(dottoressa)* for the woman. In Italian the acronym Dr. refers to doctors or those who have studied a doctorate (PhD).

A priori, perhaps many in the scientific and/or sociological field still do not see, nor will they see, the seriousness of lying in these degree matters. However, inside and outside academic institutions, it is a vital question. For example, when an engineer from a public university, after studying for 6 years and presenting a final project or thesis, that is, another additional year (a total of 7 years). In some Latin American cities, it can be seen how the position of director of department or dean of faculty, in a private (religious) university, is occupied by someone who comes from Milan, because in his bachelor's degree in computer science, electronics, telecommunications, etc., stands the word *"dottore"* or *"dottoressa"* written on it. When in reality he doesn't have any Ph.D. since he's / she's just a graduate student. In other cases and in the EU, it can be verified how a Lombard *dottore* (for example, a graduate in foreign literature), instead of competing for a place for a doctorate in Italian universities, according to the current regulations of that transalpine country, goes abroad.

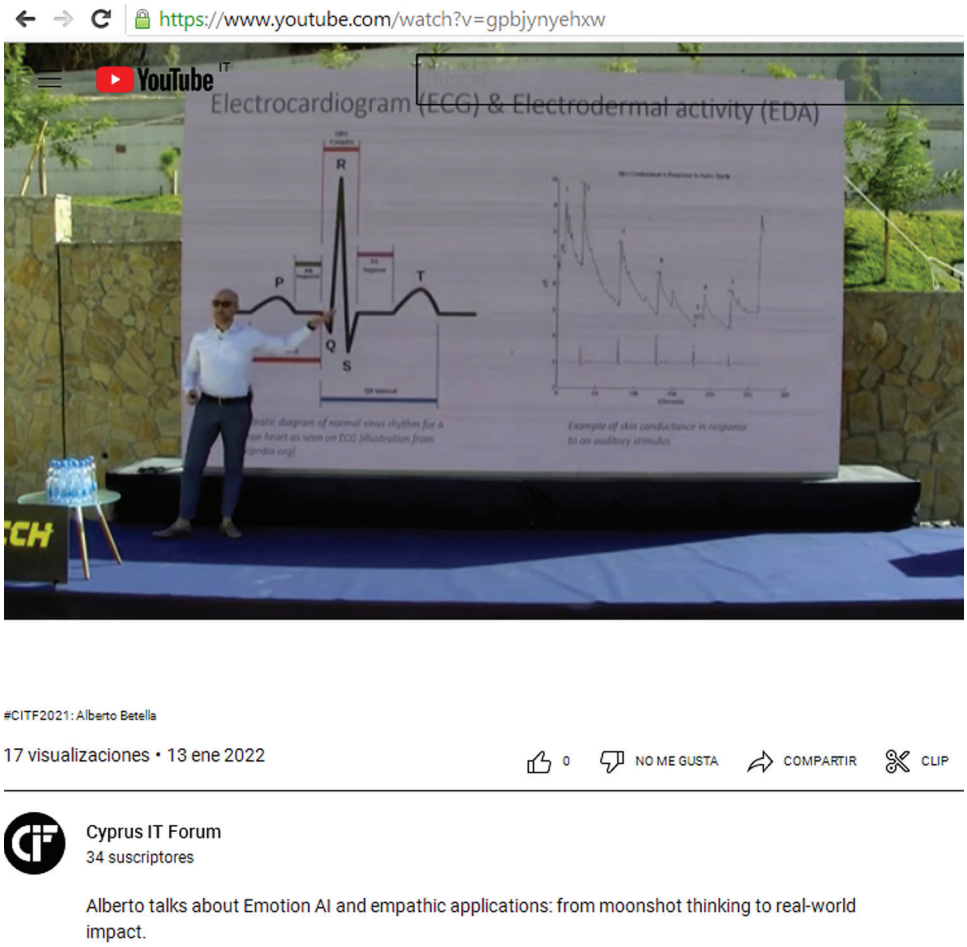
So much so, that in Spanish pseudo-ultranationalist universities, "it can be bought" (thanks to the picaresque of the autonomic government's rigged scholarships in advance, derived from the influence of the pan-European magic circle, read, Factor 'G' (Cipolla-Ficarra, 2021b), in the Monza-Brianza area, headquarters of the political party *"Forza Italia"* and residence of the leader) the master's degree in Cognitive Systems and Interactive Media (CSIM) and the doctorate in ICT, in record time and without great costs. Obviously, the political dilemma between the professor *(i/ professore)* of Bologna (Emilia-Romagna region) and the cavalier (i/ *cavaliere)* of Brianza (Lombardy region), must already have been filed in the books of ancient Italian history, although the current reality is totally contrary to a claudication or abdication of powers and influences, between both.

However, with the passage of time, all that lack of "serious" training, "progressive" experience and professional ethics, is reflected in presentations of medical topics, for his personal self- aggrandizement, in those islands, supposedly destined to technological advance, sciences, education, etc., as is Cyprus (figure 10 and 11). This terrible example, the result of the lack of controls in the granting of university degrees in southern Europe, is expanded in Appendix #1. In it, it is verified how two university departments (Audiovisual & Human and Social Science), supposedly oriented to the humanities and new technologies, generate and have professionals that follow the Pinocchio model, on both sides of the Pyrenees (Bergamo —www.unibg.it, and Pompeu Fabra —www.upf.edu, universities).

Also, there is the picaresque of transforming a computer science graduate into an engineer. This happens in the ministries of validation of academic titles in Madrid. One way to camouflage this lack of qualifications is to resort to international associations related to engineering such as the IEEE. A manipulative and deceitful example is in figure 12 (www.ull.es). In Italy, the validation of bachelor's degrees and engineering, for example, are not concentrated in the ministries related to education, science, etc., but it is a task delegated to the universities. Here comes another dilemma, when in the academic senate of universities, graduates have the power to direct doctoral theses, for example.

The final grades achieved in the doctorates, at the time of the defence of the doctoral thesis, are not an index of professional quality either, particularly when these degrees are obtained in times of global crisis. Besides, it must be taken into account that in many countries of the American continent it is

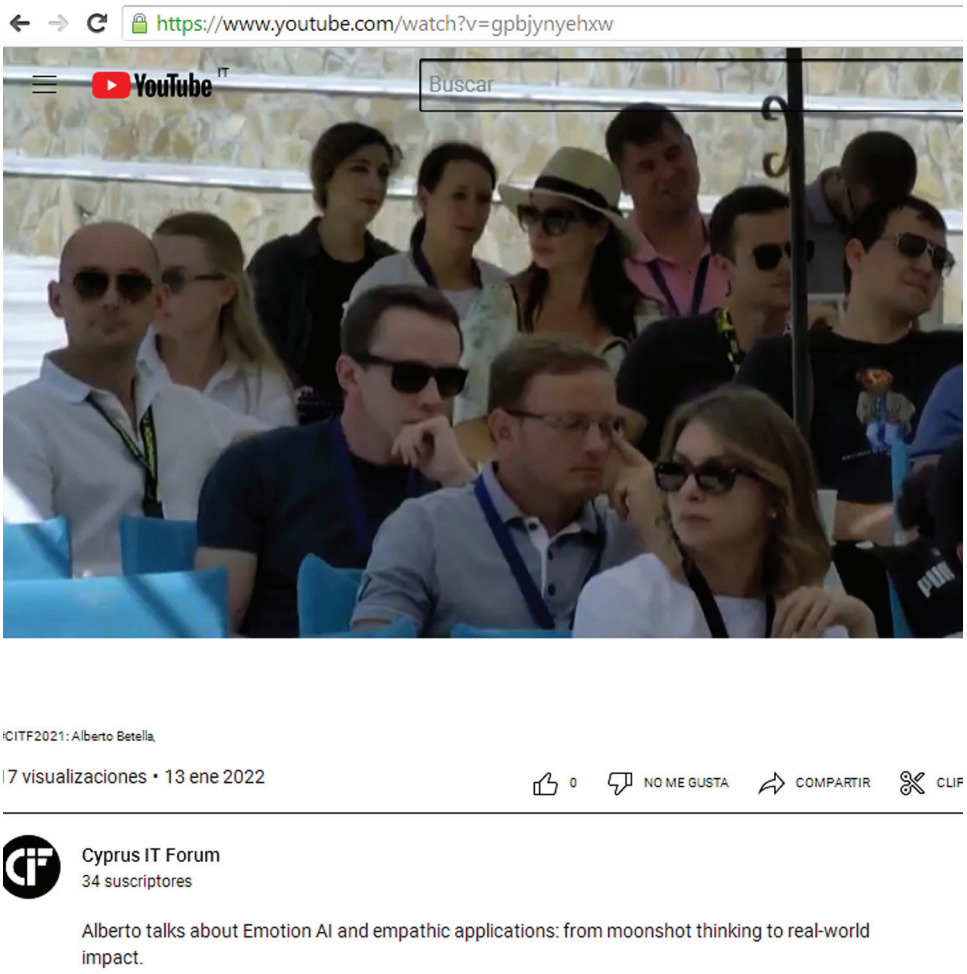
Figure 10. In a square in Cyprus, the graduate in foreign literature explains to the public the importance of electrocardiograms, in the umpteenth event of extremely poor quality, developed on that island (Cyprus IT Forum).



impossible to modify the grades of the degrees, engineering, etc., at the time of presenting the work or final project. On the other hand, in countries like Italy, it is feasible to raise the final average of the grades, until obtaining the maximum of the qualification of the bachelor's degrees and/or engineering. In Italian: *"Laureato a pieni voti (110/110) con lode. "*

Now, all these first variables that make up the teachers' curriculum vitae are complemented by the topics of interest of the teachers and their breadth. Overcoming 7-10 topics of interest, denotes the presence of a dynamic persuader whose sole objective is to be included in the crystal spheres of didactic power. In figures 13 and 14 we have a couple of examples in this regard, which refer to the same person, whose behaviour is based on deceit and lies like the rest of the examples presented in this section. Lastly, the word "HCI" is the common denominator of figures 7, 8, 9, 10, 11, 12, 13, 14 and 22. That is, the isotopy of educational and R&D decline. In summary, it is necessary to corroborate the following points where lies are spread in teachers' curricula:

Figure 11. The scarcity of the specialized public (tourists or elderly residents of the area are observed), in the Cypriot square. This indicator denotes the lack of interest towards the presenter and the topics discussed, since no one takes notes and/or they are leaving in the middle of the talk, which has free access.



1) Place and dates of obtaining the bachelor's degrees, engineering, master's degrees, doctorates. Always exclude the phenomenon of student comets.
2) Analyze in the databases, if doctors, graduates, engineers, etc., have individual publications, prior to obtaining university degrees. The average for a doctorate must exceed 12 publications.
3) Confirm the existence of inbreeding, of any kind, in the place to be studied, investigated and worked.
4) Get completely away from those sites where graduates / engineers can direct doctoral theses.
5) Do not trust those people who constantly change the topics of interest in their C.V.
6) Avoid those people who transform themselves into doctors or engineers, when in fact they are graduates.
7) Do not trust those people who place the final notes of their final degree or doctoral projects, especially if the average can be modified or the defence of these works is carried out in periods of great international crisis.
8) Discard those teachers who practice exaggerated narcissism through images.

Figure 12. Insert the acronym IEEE in front of a C.V. it means that this person is not an engineer but a computer science graduate. Universally, the original university degree has greater value, regardless of the validation carried out.

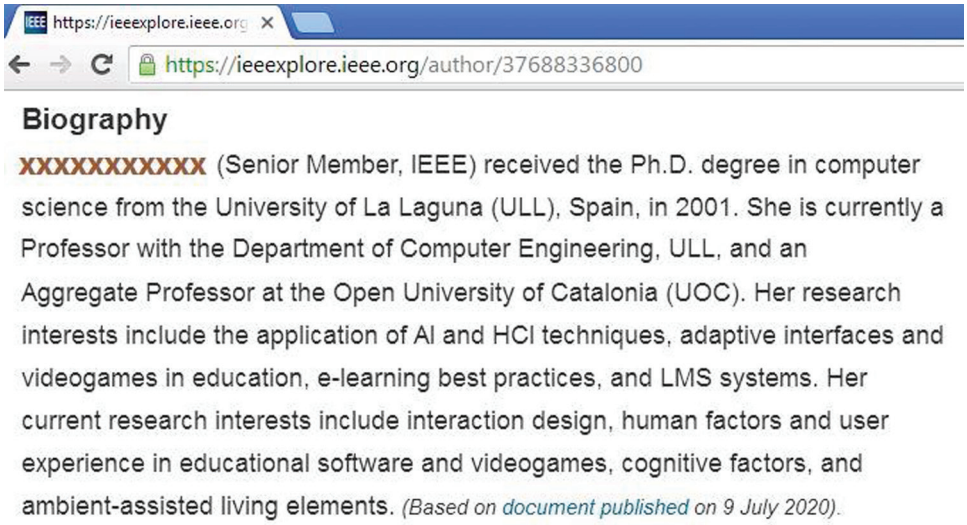
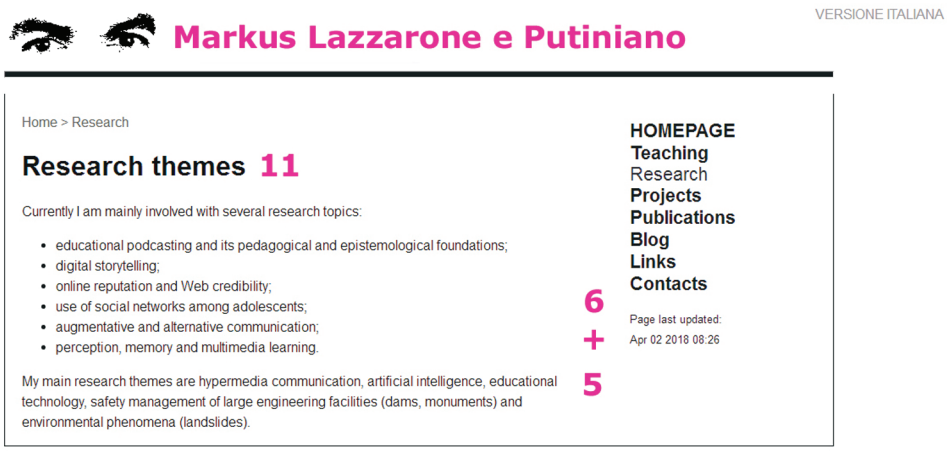
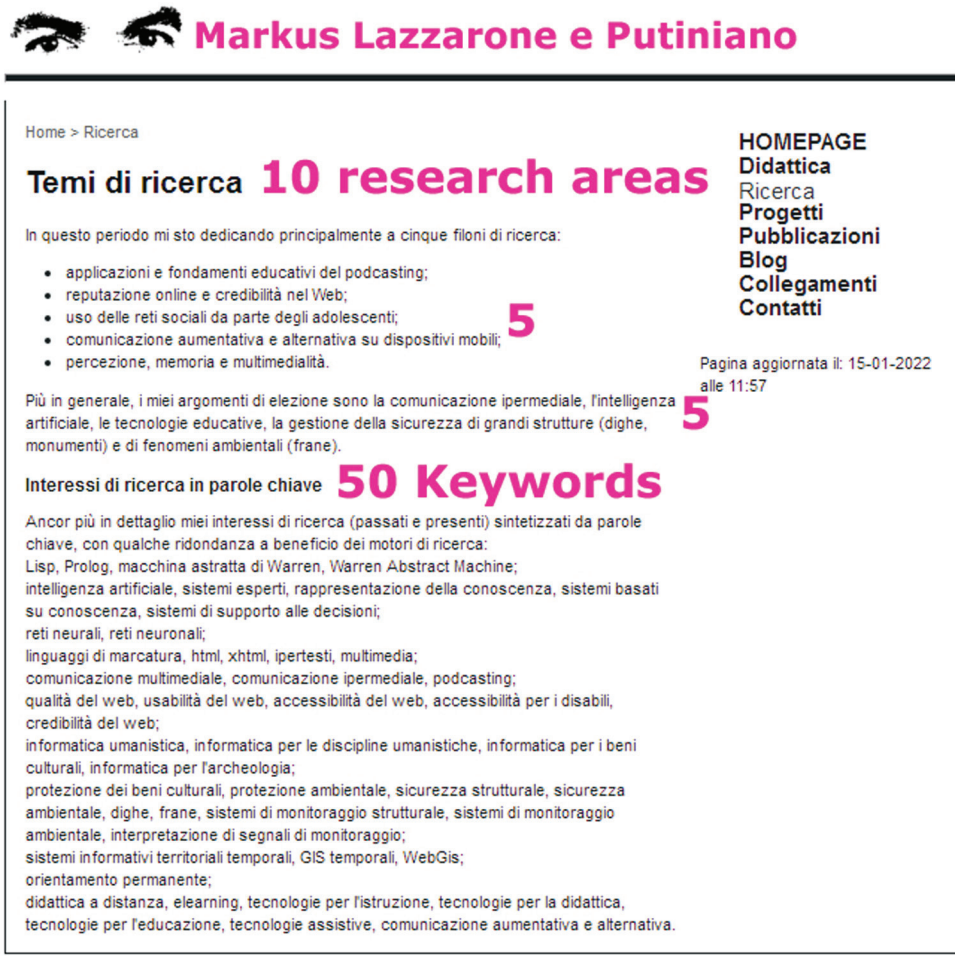


Figure 13. Dynamic persuader and the constant changes in your keywords over time, according to trends: Curriculum vitae, Google Scholar, Research Gate, etc. Besides, he has an exaggerated and varied number of interest topics.



These are summarized as the first items to consider. The future challenge, in the short term, is to expand the interconnections of the octopuses and their tentacles, in the educational context of the new generations, related to new technologies.

Figure 14. Inconsistency, contradictory and false personal information online. Furthermore, we can see more 50 keywords for interest topics: More than 50. The main purpose is to gain online visibility.



LESSONS LEARNED

Although the spectrum of technological challenges for future generations continues to be extensive for the immediate future, it has been verified that the challenges from the human point of view continue without any solution, despite the two global crises of the new millennium. In the health crisis and in the European south of the Mediterranean, an educational emergency has been detected. More than 50% of the student population, in the pre-adolescence phase, have problems with subjects related to science (basically math) and language. More than 70% of these students are not able to correctly relate related topics to each other and more than 30% do not know how to solve arithmetic operations that involve more than one step.

The consequence of this emergency, with the passing of time, will be reflected in the population statistics, although they already denote a decrease in the knowledge acquired in the student age. In many

industrialized regions, young people do not take extracurricular training courses such as languages, arts, etc., since their parents continue to trust the industrial model but forget about the advancement of artificial intelligence and the automation of manual work. In addition, human capital without up-to-date knowledge will be excluded from the productive circuit of societies before the end of this century. In this sense, some international companies such as Amazon, Twitter, Facebook, Microsoft, Nvidia, etc., which are related to Big Tech (e- commerce, social networks, operating systems, graphics cards, etc.) have begun to reduce their human capital, when the lockdown due to the pandemic has ended.

Human capital, with its wealth of knowledge and experience, is no longer respected for its potential intellectual and productive capacities, with the advancement of new technologies, particularly through the virtual world on the web. It has been corroborated that a simple destructive message on a news portal is enough, under the *"urbis et orbis"* style of a cyber terrorist to destroy, years and years of sacrifices, of authentic professionals, coming from the four cardinal points of the planet. Cyber terrorist who in Europe, is not only given access to university studies, thanks to the political power of the country of origin (Belarus) and university / foundation corruption (i.e., University of Trento —www.unitn.it, and Bruno Kessler Foundation —www.fbk; this a disastrous example of territorial and autonomous inbreeding, since the husband was the university rector, and his wife the director of the foundation), but also, these defamatory and criminal actions enjoy not only legal immunity, but also the support of a network, which goes from Moscow to London.

Meanwhile, professionals who do not receive subsidies of any kind to participate in conferences, symposiums, workshops, etc., or write articles, books, and so on (unfortunately it is the common denominator of many universities in the old and new world) were discredited worldwide. Always remembering currently grants, scholarships, awards, etc. (in many places in the nations with their developed economies), are paid for with the hunger of the people. A population naively expects a better future from these professionals. For this reason, it is very important that future generations learn to read the curriculum vitae of future teachers very well and evaluate in advance, together with their parents and/or guardians, those centres where they will carry out their studies. Professionals in the sector should consider the wide range of practical examples to discover in advance with whom they are establishing scientific collaboration agreements, student exchange, technology transfer, and so forth.

Under the pandemic, it has become clear that not only there were no local, regional, national, continental emergency plans for this type of situation, from a health point of view, but there were also none for distance education. It is enough to visit a newspaper library and consult the press of that period, with countless complaints that ranged from students to teachers themselves, including parents or guardians. This shows that the challenges for the short-term future are enormous because it is necessary to dismantle an entire system of fraudsters, interested in parties at scientific congresses and/or in waging camouflaged wars from their college offices. One way to mitigate the influence of these members of the so-called Omega generation is to assign them weekly collaboration tasks and *"ad honorem"* in social work, such as assistance in primary or secondary education, health centres for the elderly, etc., since they are areas where teachers or collaborators are permanently lacking. These are tasks that they can carry out until the end of their academic careers.

CONCLUSION

The challenges presented show that the educational sector is the key for those who permanently hold power, in public, private and hybrid universities. The two crises of the new millennium have not generated any type of change in those areas related to education. The strategies used are multiple to preserve that timeless status quo, and regardless of the contextual circumstances that affect the majority of the population: Exoduses of millions of people due to wars, climate change and lack of food, industrial automation and loss of jobs, etc. Collapsing these crystal spheres from their high towers or watchtowers, definitively eliminating the G Factor, requires a great unified effort from the scientific sector. An effort aimed at marginalizing everything that does not meet the minimum and essential requirements related to the methods, techniques and philosophy that come from the sciences. In this sense, communicability continues to be an effective and economical guide to clarify and glimpse the true objectives for future generations. Some the main objectives that truly serve the common good of all the inhabitants of the planet, whether or not they are connected, through cutting-edge technologies, with or without artificial intelligence.

It has been verified how lies are born, grow and multiply in online information. Regrettably, digital information can be constantly modified by authors, even if each of the pages that make up their resumes are signed, sealed, etc., or their misdeeds are denounced daily, in the various media, and so forth. No one can stop them on their way to those crystal spheres of absolute power. Of course there are methods and techniques to put an end to these modus operandi within HCI, UX, computing, mathematics, robotics, education, health, and so on, such as compulsory and free social work (for example, in hospitals, residences of the elderly, rehabilitation and detoxification centres, etc.) in the ample weekly free time enjoyed by these civil servants for life. However, no one puts them into practice. Meanwhile, they still do not generate educational content personally and professionally, the educational level continues to decrease, as does the intellectual capacity of future professionals. The promotion of online education that eliminates stereotypes at an early age is the umpteenth chimera from the field of HCI and its disciplinary ramifications. A chimera that is subsidized by those who have destroyed the economies of millions of families and honest workers, in the first decade of the new millennium —read, here, banks, savings banks and other financial entities. This reality will favour and increase the implementation of artificial intelligence in almost all human activities.

Issues related to gender equality, child violence, handicapped, disabled, sick, elderly, etc., are a constant source for the manipulation of public opinion from the media of some universities which are replicated in the local media, national and international. The primary purpose is to obtain quick financial and professional benefits and narcissistic notoriety for all those who undermine serious research, which is generally carried out in other international study centres. Deceptively, they resort to robotics, gamification, collective intelligence, ecosystems, full-body interaction, embodied interaction, health and security, among many other topics for hypothetical social inclusion, digital literacy and STEAM at an early age. Computational thinking can be a “kernel” in education, as long as it is developed by authentic professionals and experts who work full time on such R&D projects. That is, people who do not resort to endless stratagems to constantly not respect the principles of the formal, natural and social sciences. Unfortunately, a careful reading of their resumes reveals a mere accumulator of lies and connotes the eternal lack of knowledge, skills and professional skills.

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ANNEX #1

Section A

Newspaper advertisement posters of one of the worst European or world newspapers (www.ecodibergamo.it):

Figure 15. Burioni (virologist) speaks "Alarming data but about Bergamo we will learn." In other words, Bergamo was a laboratory.

Figure 16. The real numbers of the tragedy: 4,500 dead in one month.

Figure 17. 13% of those killed by coronavirus did not have other diseases.

Figure 18. Lightning visit from Premier Conte: "Thank you Bergamo." Below you can read that mortality in Bergamo is worse than in New York.

Newspaper advertisement Weekly news posters in "Prima Bergamo" (www.primabergamo.it) newspaper format.

Figure 19. Poverty alarm, after the virus thousands of families request help.

Figure 20. No heroes! Doctors and nurses are not paid for overtime hours worked.

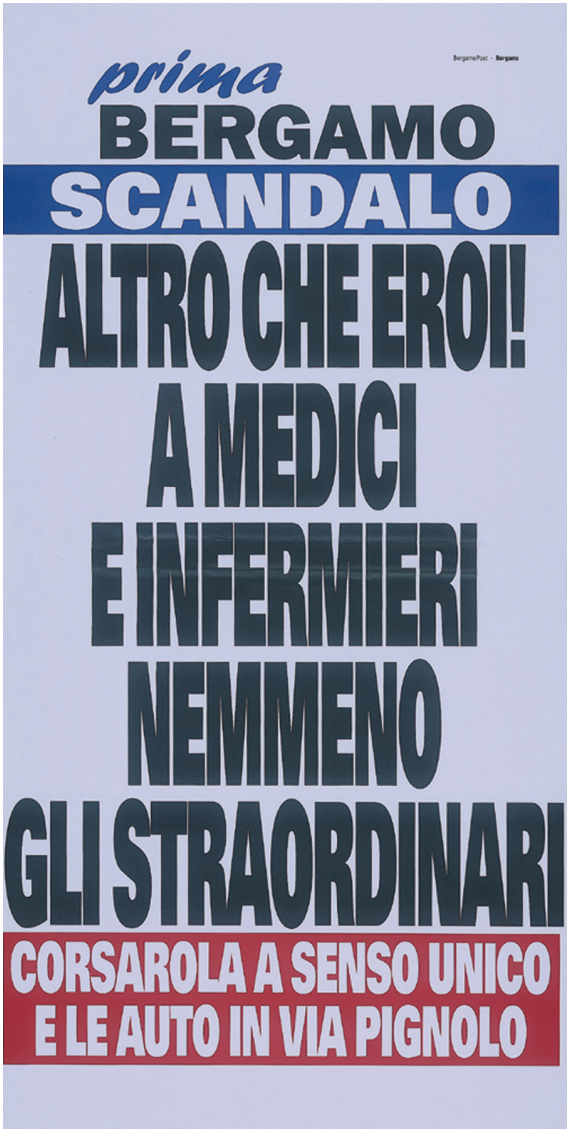

Figure 21. A local chief surgeon: "The second wave of the coronavirus will not come to Bergamo"

Section B

Figure 22. The Bergamasque university show in the first European epicentre of the coronavirus. In this image the reader should discover who the rector of the university is and who the "dynamic persuader" and "personality thiefi' is (Cipolla-Ficarra, 2010a). The answer is the following, who wears a red tie (the selected colour of that clothing item indicates authoritarianism), gold Rolex and FP2 mask is the dynamic persuader and personality thief, in his acting role as specialized in Didactics and special education for children (right). The rector is the one who has an inexpensive "Made in China" mask, on the left of the photograph (www.unibg.it).

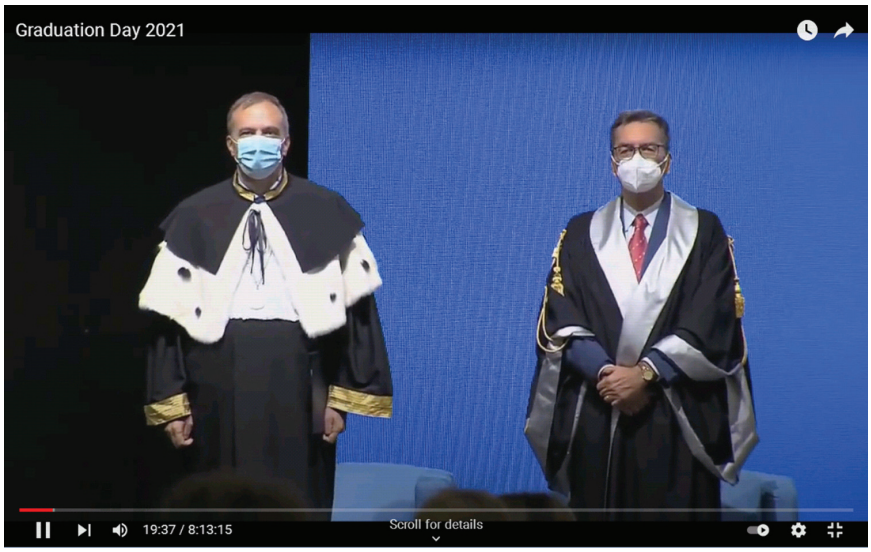

Figure 23. The infinite narcissism of the young Lombard atomic engineers, who even at the moment of paying the last tribute to the deceased manage to take away their prominence, by placing themselves next to the deceased (www.unibg.it).

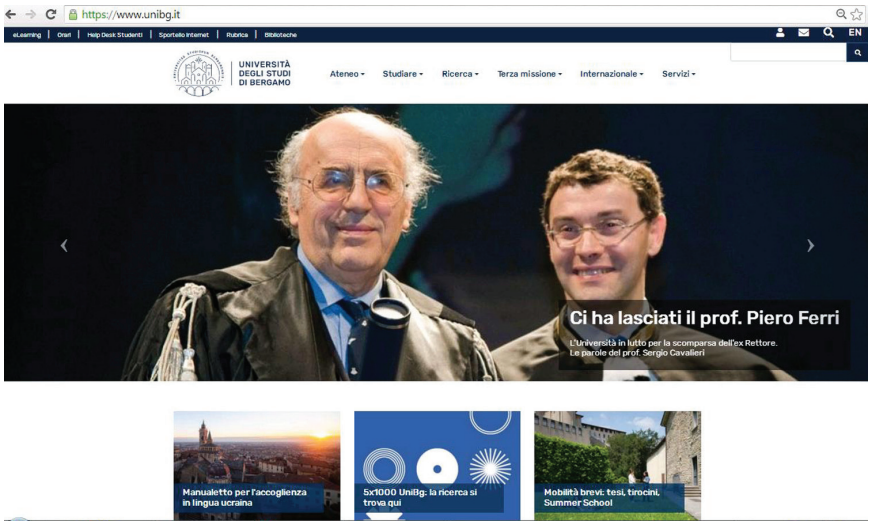

Figure 24. A new task for a "parsley engineer" (made in Brianza). More information, here: (https://www.unibg.it/node/13966).

In figure 24 you can read the news that the university has organized an internal table to collaborate with the ministry, chaired by the **atomic engineer or "parsley"** (this last term colloquially refers to those people who appear everywhere: finance, airlines, technology poles, energy emergencies, education, etc., that is, as is the use of parsley in meals) in the face of the emergency of non-renewable energies, derived from the war in Ukraine.

A parsley engineer who, without his own scientific publications, occupies the university rectory at an early age because his **main "scientific merit" has consisted in attracting to the Bergamo** city **the headquarters of a** low-cost **flight company: Ryanair. However, this "air merit", added to local traffic, from a health perspective has meant the transformation of the city and its surroundings into one of the most polluted** areas **in Europe.** Obviously, all this converges in a high rate of deaths from lung tumours of the inhabitants, for example. However, obtaining true statistical data, as well as those who died from Covid-19, in the first European epicentre of the pandemic (first wave), will never be known exactly in the short and medium term. That's because we are at the perfect geographic intersection of religion, politics, and education.

Figure 25. **Bergamo, the second** *most* **polluted city in Europe** *(controversies with the study). Il Corriere della Sera (Italian newspapers, 01.21.2021 —https://bergamo.corriere.it)*

Chapter 9
Evolution of the Sciences, Informatics, Human Integration, and Scientific Education

ABSTRACT

This chapter presents a novel quadrangular and bidirectional interrelation in the field of science and the modernization of education: ESIHISE (evolution of the sciences, informatics, human integration, and scientific education). To this evolutionary interrelation, the authors add a diachronic and synchronic vision, always placing the human being as a user of new technologies at the centre of all these interrelationships. In addition, they describe the origin of these interrelationships in the sciences, their evolution or revolution, over time, until currently known, the tactics used for the loss of human capacities (natural and/or acquired) in the face of the infodemic of intelligent networks, as well as the generation of divergent parallel lines, between scientific theory and the reality of research and teaching environments. Finally, cases of analysis compiled over three decades are presented through the use of storytelling to avoid the phenomenon of "fleeting kites," which never provide practical and real educational solutions in normal and abnormal teaching situations.

INTRODUCTION

A historical view of the most outstanding aspects in the modernization of science and education is necessary to understand the current state of the art. That is, to know in a summarized way where the fundamental pillars of scientific evolution are born and where scientific knowledge, scientists and the communities that support their scientists are heading in the third millennium. It is very important the exploration about the generation of the two parallel and divergent lines that are currently found in the historical / epistemological vision of science (cosmos) and the educational-scientific world (chaos), particularly, after two global crises (financial and health), in the first two decades of the 21st century. The main objective is to break down and inspect each of the fundamental components of the mechanism

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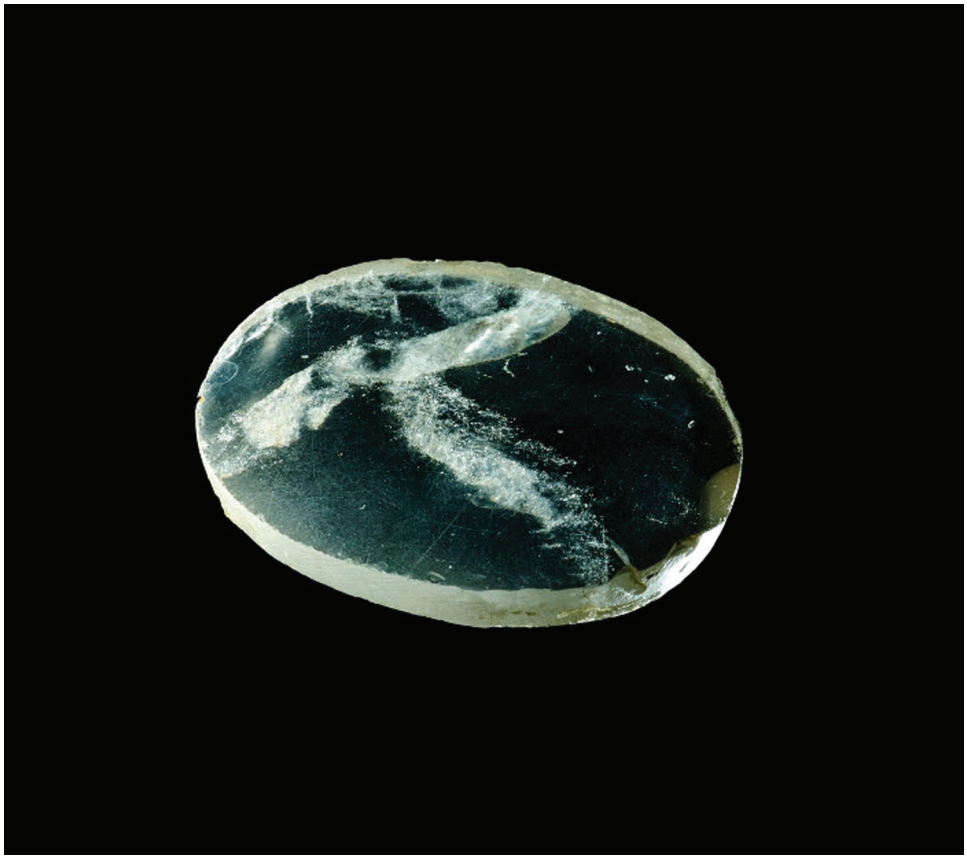
that has allowed, allows and will allow the advancement of sciences, since the remote times in which the human being ceased to be a nomad, and dedicated himself to farming.

A quick review of history leads us to synthetically consider some themes and authors such as: Pre-scientific and mythological cosmologies; The phenomenon of eclipses; Pythagoras and the numbers; Athens in the fifth century; The philosophical and scientific legacy of Socrates, Plato and Aristotle; The physics of Aristotle; The school and the library of Alexandria, Euclides and the mission of axiomatizing reality; The medicine of Hippocrates; Ptolemy and the end of Greek science; The Middle Ages; The Renaissance and Leonardo Da Vinci; The revolution of the eleventh century and the birth of the universities; The development of the natural sciences; The problem of movement; The scientific revolution and the legacy of Copernicus; Galileo; The conflict with the church; Religion in the sciences; Newton and the law of gravity; Francis Bacon and induction; Descartes: Reason and the mechanical universe; Enlightened science and particular disciplines; Experimental science; The chemical revolution; Electricity; Gilbert; return; Oersted and Faraday; Charles Darwin's theory of evolution; Pasteur; Robert Koch; The first theory of atoms; Prout; Mendelev; Marie Curie; Radioactivity; William Thomson and the laws of thermodynamics; Einstein and the theory of relativity; The genetic; Nuclear fission; The Big Bang theory, and an extensive etcetera.

Readers interested in knowing in detail each one of the pioneers in the history of science, together with the fundamental contributions they have made, have a small list of specialized compendiums avail-

Figure 1. The aeolipile invented by the Greek Heron of Alexandria (1st century AD). It is considered the first thermal or steam engine in history and was used as a game / toy. Heron also invented the first windmill.

Figure 2. The Nimrud lens of the Neo-Assyrian culture. It is a rock crystal that has a diameter of 38 millimeters and is about 3,000 years old. An exemplary evolution about the electronic optic: https://theconnectivist.wordpress.com/2022/06/22/the-electronic-optic-networks-value-chain



able on these topics for eventual consultation (Radley, 2015; Frankish, 2012; Henry, 1997; Ifrah, 2002; Moledo & Olszevicki, 2014; Pickover, 2012; Sagan, 1993; Sterling & Shiers, 2000; Tanner, 2006; Taylor, Hare & Barnes, 2001). In figures 1, 2, 3, 4, 5 and 6 there are some ancient technologies of science that do not have an exact explanation but denote the creative and inventive capacity of the human being (Dunham, 1991; Germano, 2017; Freestone, 2007; Balasubramaniam, 2011; Strapp, 2009; Bruderer, 2020). Today, part of scientific creativity is used within a small group of individuals, to wear down the basic principles of science, as will be verified in the case studies of the so-called "fleeting comets" in the storytelling section.

Usually, since the 20th century, in the work of computer programmers, a sedentary lifestyle is one of the most common health problems. However, the term sedentary lifestyle has very important connotations in the sciences and their (r)evo1ution. In this way, when the first populations stopped being nomads and dedicated themselves to agriculture, the sciences would begin, in the long history of humanity. Agriculture implicitly carries with it the notion of land ownership. This is a limited good, since it cannot be produced or expanded like the earth's surface. Besides, this good is associated with housing, which together with food and clothing are the three key elements of the economy. **The notion of individual**

Figure 3. The Lycurgus Cup is an object belonging to Roman culture and has been made with dichroic glass (4th century AD). The type of glass used causes the object to change color depending on the direction of the light.

Figure 4. The stainless iron pillar of New Delhi, a UNESCO World Heritage Site. It is 7.2 meters high, 40 centimeters in diameter, weighs about 6 tons and is 1,600 years old.

Figure 5. The Chinese seismograph, in the form of a metallic golden vessel, of Zhang Heng (132 A.D.)

or collective property would mark a systematic and structural difference, from a social, cultural, educational, economic perspective, etc., between the Western and Eastern worlds. This is a difference that lasts to this day.

Over time, agriculture boosted the formation of towns. Towns became cities until they shaped up the states. In this territorial space, societies were organized and structured according to the division of labour, between growers, harvest distributors, community defenders, and so on. **Consequently, agricultural activity was the genesis of various techniques (planting, irrigation, domestication of animals, etc.) for the survival and growth of populations.** These early techniques spread throughout the planet. Agricultural practices that are repeated in almost all ancient cultures: Mesopotamia, Egypt, China, India, Japan, America, Oceania, and so forth (Rei, 1978; Copland, 2015). The great ancient civilizations that arose in those places were due to agriculture, the use of large-scale technologies, among many other contextual factors. Some of them reached the category of empires and it was there where the foundations of Western science were established.

THE SCIENCE: ARTIFICIAL WORLDS VERSUS THE REAL WORLD

In such a way that since ancient times and according to the reflection made by Bunge, the human being tries to understand the world, and based on his imperfect but perfectible intelligence of the world, he seeks to own it to make it more comfortable (Bunge, 2011). **Through this action, the human being creates an artificial world, increasing the set of ideas called science. All this, can be summarized as a rational, systematic, precise and verifiable knowledge.** This artificial world has its remote origins in writing in Mesopotamia and astronomical observation work, determining some of the components and phenomena of the celestial sphere, with the naked eye (constellations, planets, eclipses, and so on). The writing and the accumulation of data in tables demonstrate the presence between Mesopotamia and Egypt of the first arithmetic tables, the resolution of geometric and algebraic problems, the first inventories of the Armament, etc. Since then, the technique of direct observation has acquired a fundamental role that continues to this day, to carry out tasks of inspection and/or evaluation of interfaces, individual or group behaviour, quality control of fabrics in industries textiles, and so forth (Cipolla-Ficarra, et al., 2020; Cipolla-Ficarra, et al., 2017; Cipolla-Ficarra, et al., 2016, Cipolla-Ficarra, 2015; Cipolla-Ficarra & Ficarra, 2010; Cipolla-Ficarra, et a1., 2010).

In those geographical contexts, astronomical observation and numbers join religion. The priests or shamans began to predict the future of natural phenomena such as eclipses, floods, droughts, etc. Some natural phenomena affected agriculture and other activities in the community. The union of religion, mathematics and politics persists to this day. A union that directly and indirectly affects the harmonious development of the sciences and the modernization of education, when religion, politics and mathematics (in a broad and updated sense, other disciplines such as physics, anthropology, psychology, jurisprudence, theology, etc.) cannot control 100% the development of science and education, their evolution begins to slow down (Cipolla-Ficarra, 2021a). In addition, if that control is not achieved in the short term, then various strategies are activated within a process of concealment or destruction of what is novel or revolutionary, whether theoretical and/or practical.

A classic example is the mathematical systematization of Ptolemy (Egypt) and the physics of Aristotle (Greece), without being entirely interdependent, they reciprocally supported each other, over several centuries, on the hypothesis of the immobility and centralism of the Earth (Rei, 1978). Therefore, con-

tradicting one of the two would have called the other into question. A modern example is the formation of international conference committees in the European Mediterranean, where papers from the same study centres are always presented. With which, the scientific and objective value of these works contain a doubtful validity, when the chairs, associate chairs, program committee, steering committee, sponsors, and so forth are analyzed. Contradicting and freely opposing this opaque network of religious-political-pseudo-scientific association's means lifelong exclusion from the academic and scientific sector in Western culture.

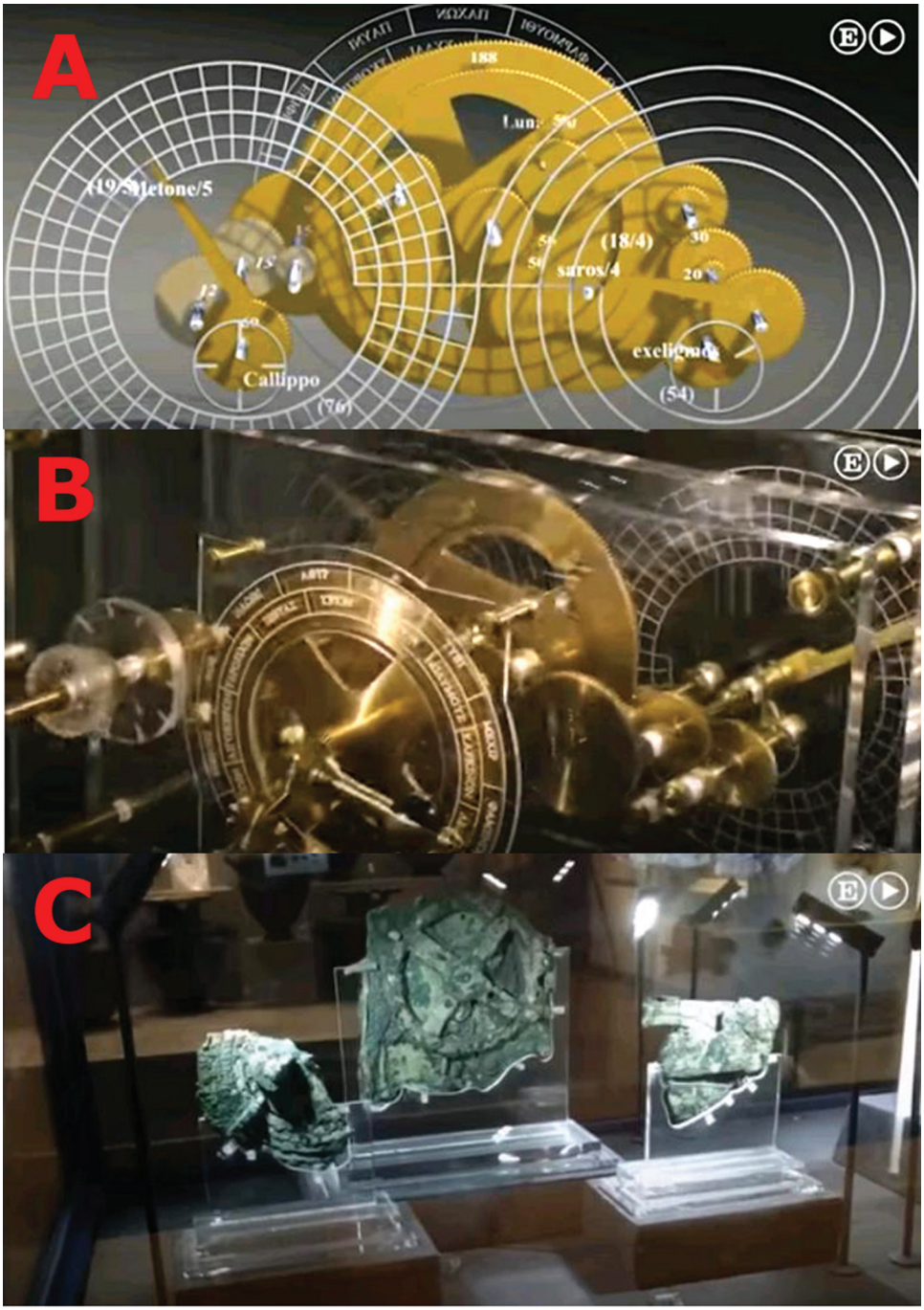
It was not until the 5th century that the fundamental change in the construction of scientific thought took place in Greece. That is, the historical milestone of ideas, experiments, inventions, etc. that synthesized millennia of essays to form Western science. Human beings have always sought to shape nature according to their primary needs such as food, housing, etc., building society, and this is in turn built by it. In other words, he tries to reconstruct this artificial environment to adapt it to his physical and imaginary / mental / spiritual needs, creating the world of gadgets and the world of culture. In the past, those needs were related to survival, such as agriculture. Today, it seeks to satisfy recreational or hobby needs, for profit. An example in this sense is the novel metaphor of the real world, through the so-called "metaverse" (Nevelsteen, 2018; Hackl, Lueth & Di Bartolo, 2022).

A metaverse reformulated in 2020, by one of the main representatives of high tech or high technology, in social networks, such as Facebook. The business objective is to achieve a multidimensional experience of Internet use, hypothetically, favouring access to new social, economic, creative and innovative opportunities, through virtual reality and augmented reality (Ross, 2016). **However, it is a hypothesis because throughout technological history,** these **objectives are not always met, in the short term, considering the base of the population pyramid.** In addition, this conjecture is reinforced from a colloquial linguistic point of view, since in some Spanish-speaking regions, the term "verse" means "something not true" or related to "a story or fantasy." In few words, it does not follow the classic literary notion, such as the one related to the measurement unit of a poem.

What is certain is that science as a search or inspection activity belongs to two fields. The social, on the one hand, since it aims to improve the natural and artificial context, in which the human being is immersed. And on the other hand, the invention or creation of material and/or cultural goods / services, that is, science becomes technology. Therefore, science is a system of provisionally established ideas (scientific knowledge) and an activity that generates new ideas (scientific research). These first notions are related to the aphorisms of Francis Bacon, in his work Novum Organum (1620). Some of these aphorisms are listed in Annex 1 (Bacon, 2015).

Bacon contrasted the manifesto of the new logic of research and experiment with scholarly culture. His innovative view of the sciences developed in England's golden age as a naval and mercantile power (mid-16th and early 17th centuries). Some scholars saw in him a pioneer or guide for a new era, based on the scientific renewal of culture and society. Science being thus considered as one more activity, through which the secrets of nature can be extracted, in a progressive and methodical way. An activity included in the society of the future, where research is a shared, public and communicable event. That is, attributes of the scientific research of the new millennium. Later, Francis Bacon, in his work New Atlantis (1624) describes a utopian society (Bacon, 1991). In it, technical and scientific development enables harmonious and peaceful coexistence among human beings. Unlike other utopian works, he maintained that happiness does not depend on philosophical or political wisdom, but rather on the common effort aimed at the domain of nature, in order to improve the human condition, or what is now called "the common benefit."

Figure 6. Antikythera mechanism: Reconstruction and simulation of movement in 3D (section A), reconstruction physical (B), and the original (section C). The following link has an animation: www.youtube.com/watch?v=WN8uUl4rbkE



The scientific and technical development starting from an agricultural and conservative society of traditional values until reaching the business bourgeoisie and attached to the capitalist model, entailed the apparent convergence of the same forces for the progress of the common good of society. However, there are divergent forces between the two. Science without the social classes interested in imposing it would not have surpassed the exceptional aspect it had in the ancient world. Simultaneously, without science in the bourgeoisie, the organization of production, distribution and management of power would not have reached such a broad development. Therefore, from a historical perspective, the revolution in science implicitly entails a relatively autonomous metamorphosis, starting from astronomy, and more specifically, with the Copernican vision of the universe.

This vision led the human being to think and reason in terms of force, gravity, space, infinite time, etc., opposing the Aristotelian ideas of essences, natural movements, order in the heavens, closed universe, and so on. Although the notion of movement was implicit between the two, what was of interest was breaking down that global movement and knowing its "mechanism." An example, located in the Aegean Sea is the "Antikythera mechanism" (Bruderer, 2020). It is a complex clockwork mechanism, with bronze gears. This device is considered to be the first analog computer in the history of humanity (200 / 100 BC). Theoretically, this computer made it possible to follow the heavenly bodies in the sky, predict eclipses, among other functions.

In ancient times and in the Middle Ages, astronomical schemes were an integral part of a physical theory of the universe, which was included in the field of beliefs such as human destiny and the place it occupied in the cosmos. Beliefs that oppressed daily life and thought. Since then, the logic of the innovators cannot avoid the confrontation with the economic interests, the beliefs and the institutions of the established order. It is not only about ignorance in the face of resistance to change, or that they cannot see things as they are, or fail to formulate hypotheses because they leave the framework of the common and every day. In the framework of beliefs or religion, we have several examples related to prestigious scientists, as pointed out by the American sociologist Robert Merton (Merton & Riley, 1980). One of them is the importance that the Calvinist religious vocation acquired in natural research in countries such as Holland in the 17th century or in England, compared to Catholic Portugal, Spain, France and Italy, and Lutheran Germany. Thus, Puritan Calvinists predominated in the early phase of the Royal Society (London, 1660).

However, in the religious context one must take into account the importance of Francis Bacon, a conformist Anglican; the German Johannes Kepler, whose mystique of nature was contested by both Protestants and Catholics; the Italian Galileo Galilei, who despite his fervent Catholic faith, was on the verge of being tried by the Inquisition; the French René Descartes, cautious in religious questions; the English Isaac Newton, promoter of the English church but with anti- Trinitarian leanings, and so forth (Galilei, 1991; Sagan, 1993; Kepler, 1995; Newton, 2005; Moledo & Olszevicki, 2014). For his part, the German sociologist, Max Weber, introduces a summary from a perspective of the Protestant ethic, as a capitalist spirit (Weber, 2010).

According to Weber's thesis, it is not the scientific spirit, but the interrelation between science, technique and production that can be defined as "technological spirit." This is the reason why the scientific and industrial revolution took place in England at the same time. A thesis that has been shared contemporaneously in the research work carried out by the sociologist Zygmunt Bauman (Bauman, 1999; Bauman, 2000; Bauman, 2017). Here it is verified how sociology is a valid instrument to analyze the influence of religions in the formation of research groups, the directions that certain themes acquire, the degree of promotion in societies of the results obtained. However, the freedom of researchers in the

past centuries is non-existent today, due to group work and the need for large financial resources for self-promotion and narcissism, through the new and traditional media. All this harms the fundamental principles of the factual and formal sciences.

SCIENCE AND COMPUTER EDUCATION

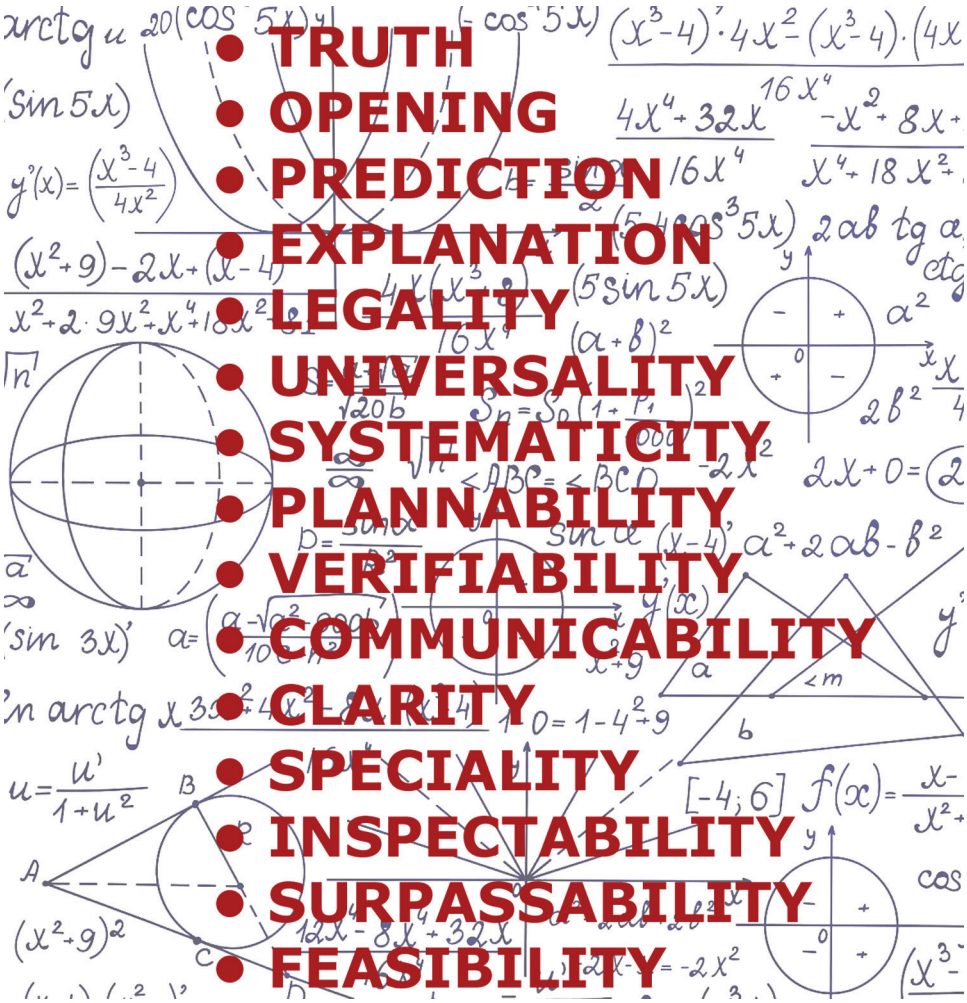
The intersection of formal and factual sciences has been used in countless successful cases in usability engineering, software engineering, interface design, creation of interactive systems for virtual universities, elaboration of content evaluation methodologies, generation of new professional profiles in computing and communicability, re-establishing epistemological principles in human-computer interaction, planning new research horizons for quantum computing, etc., as can be seen in the following references (Cipolla-Ficarra, 1995; Cipolla- Ficarra, 1998; Cipolla-Ficarra, 1999; Cipolla-Ficarra, 2000; Cipolla-Ficarra, 2001; Cipolla- Ficarra, 2003;Cipolla-Ficarra, 2011; Cipolla-Ficarra, 2018; Cipolla-Ficarra, Cipolla-Ficarra & Alma, 2014; Cipolla-Ficarra, Cipolla-Ficarra & Alma, 2011; Cipolla-Ficarra, et al., 2014a; Cipolla-Ficarra, et al., 2014b; Cipolla-Ficarra, Nicol, & Cipolla-Ficarra, 2010). These references that have their origins in the ’90s, within the field of education, the design of off-line / on-line multimedia / hypermedia systems, the democratization of the Internet, generation of methodologies for evaluating the quality of interactive systems, with various purposes, such as educational, commercial, industrial, and so on. In each of these references, the principles of the sciences enunciated by Mario Bunge have always been followed (Bunge, 1981; Bunge, 1983a; Bunge, 1983b; Bunge, 2011). However, these works did not reach an optimal degree of international visibility due to human and/or social factors in the sciences (Cipolla-Ficarra, 2021b). Some factors that do not take into account the inventory of the principles of factual and formal sciences, presented by Bunge. Those principles related to factual sciences, scientific research and scientific knowledge are summarized below as follows:

1. Scientific knowledge is factual since it starts from the facts.
2. Scientific knowledge transcends the facts, since it can select and discard facts, in addition, it can generate new facts and explain them.
3. Science is analytical. Scientific research tackles circumscribed problems, one by one, and tries to break it down into each of its elements, whether they are real or not.
4. Scientific research is specialized.
5. Scientific knowledge is clear and precise, contrasting with ordinary knowledge for being ambiguous, vague and imprecise.
6. Scientific knowledge is communicable, that is, it is not private but rather in the public domain.
7. Scientific knowledge is verifiable; therefore, it must pass the test of experience.
8. Scientific research is methodical, which implies planning.
9. Scientific knowledge is systematic, that is, organized, ordered and detailed. A science is not a set of unconnected information. Rather, it is a system of ideas logically connected to each other.
10. Scientific knowledge is general since it locates the singular facts in universal patterns and the particular statements in broad schemes.
11. Scientific knowledge is legal because it seeks the laws in nature and culture, and then applies them.
12. Science is explanatory because it attempts to state facts in terms of laws, and laws in terms of principles.

13. Scientific knowledge is predictive because it goes beyond the facts of experience, imagining how it has been in the past and how it may be in the future.
14. Science is open. This means that it does not recognize barriers or restrictions that limit knowledge.
15. Science is useful because it seeks the truth, being effective in providing tools that can be used to promote good or evil.

Now, we can make a selection of keywords from this list and later, establish the first differences between theory and reality in the new millennium, in science education, with special emphasis on computing, HCI, UX, the audiovisual, technological ecosystems, multiculturality, among others. Geographically, it is located in southern Europe and with its ramifications in the new world. A schematic overview is in Figure 7.

Figure 7. List of keywords obtained from the inventory of the factual sciences of Bunge, together with the notions that currently contradict the scientific field and denote the inexorable decline of the educational field of science (Bunge, 1981).



The truth (15): Currently, it is non-existent in work groups where the word multi, inter, trans, pluri, ... disciplinarity and/or transmedia predominates. Analyzing the contributions indexed in databases, such as ACM, IEEE, Scopus, DBLP, etc., and coming from Spain, Portugal, France, Italy, Greece, Switzerland, Belgium, Finland, Sweden, and so on, it is easy to detect that not all the members of these works have collaborated in a proportionate manner and true results have been obtained in experiments, multi-methods, ecosystems, and so forth, before or during the pandemic. In addition, telling the truth or denouncing its inexistence in certain political- religious-educational environments is something negative, since it has unpredictable consequences for those who challenge the structural and systematic order of certain organization charts of power. Therefore, scientific knowledge is immersed in a temporary context, in which lies and deception predominate, spreading freely through the infodemic.

The opening (14): The fashions of transversal action in science impede autonomous and individual freedom in scientific production. The genesis is in the formation of national and/or international work teams that are not for scientific work, but rather in obtaining lifetime employment, financial resources to enjoy trips, stays, etc., for individual pleasure or family. In other words, autonomous scientific knowledge is temporarily or definitively closed when there is no personal and individual effort, the results of which should improve the quality of life of the community that finances these expenses. In this sense, obtaining doctoral theses and Andalusian, Aragonese, Canarian, Catalan, Madrid, Basque, etc., and so forth be analysed. Related studies in education, social sciences, gamification, robotics, ICT's, HCI, etc., and in periods when changes in study plans coincide (the passage to the Bologna plan, at the beginning of the new millennium) or the pandemic, for cite two examples. In most of these works, the individual contribution of the students in international publications and prior to the defence of their research is practically equal to zero. There are only contributions in collective works (several co-authors) in more than 95% of the cases.

The prediction (13): It cannot be achieved when academic training and professional training constantly decline, regardless of macrostatistical data. Many data are manipulated, such as: The increase in short-term degrees (master's degrees, doctorates, post doctorates, specialization courses, etc.), the granting of prizes rigged in advance, even though they bear the name of pioneers in new technologies that have collaborated in organizations or associations of great international prestige such as the ACM or IEEE, etc., as they do in some private / hybrid / public universities in the Pyrenees, for example: University of Girona, University of Lleida, University of Pompeu Fabra, University of Vic - Central University of Catalonia, International University of La Rioja, University of Zaragoza, University of the Basque Country, and so forth. The goal is to hide the failure and decline of the entire Western educational system in the 21st century, as has been confirmed by the new millennium pandemic. Furthermore, in the old world, the word future practically does not exist in the vocabulary of new generations of researchers. Some researchers who are focused on the daily task of increasing their narcissistic presence on social networks, before continuing to develop the lines of research they have opened, in presentations and publications.

The explanation (12): The wide variety of global, teleological, dialectical, etc., scientific explanations are not usually understood 100% by the current scientific sector, since training and/or experiences are limited in modern curricula. Theoretical and practical explanations are presented as fragmented knowledge that lacks a reliable and permanent interconnection over time. This fragmented knowledge makes up what is called the culture of mosaic or tiles. A culture increased with multimedia communication from the commercial hypertext systems, in the 1990s. For example, the masters' degrees or doctorates in Catalan audiovisual (Pompeu Fabra University, Autonomous University of Barcelona, and so on) have based more than 70% of their educational programs on practices with commercial software. Today, they

are completely obsolete professionals because they do not have a theoretical basis. Also, much of that commercial software no longer exists, since the rise of open software.

Legality (11): Theoretically, science seeks to be essentialist, that is, to get to the root of things. However, it is not so. There are certain areas of the factual sciences where constant disorder prevails, promoted from the formal sciences, as is the case of mathematicians in HCI. This disorder prevents discovering natural laws or social laws. This is because the agents who call themselves scientists resort to stealing their personality, exercising persecutory behaviour, plagiarizing ideas, projects, and so on. Besides, they are corrupt individuals who seek to hide behind the local legal system, where they easily go from executioners to victims and their victims are infinitely discredited. This criminal phenomenon occurs in real life as in social networks. The goal is to increase your counters on the Internet of references, preferences, followers, readers, etc. However, and despite this negative cultural / social reality, it is not fair to maintain that only numerical relationships can be called scientific laws, in factual sciences.

Universality (10): One of the aspects of this universality is the use of scientific language to avoid deception and confusion, derived from certain phenomena. However, there is a tendency to distance science from contextual reality. In the case of the pandemic, it can be seen how all the activities in certain university groups have been fundamentally aimed at the publication of "rehashes" under the banner of "scientists." These rehashes are related to new technologies, education, ecosystems, multiculturality, and so on. For example, in the Iberian and Italian peninsula, not only has manipulation through scientific language remained unchanged, but these collective sufferings have increased exponentially, despite the global emergency. In other words, these works do not expose the essential nature of natural and human things, as indicated by science, taking into account a global health crisis.

Systematicity (9): Systems of ideas or theories are not logically very well connected to each other. This is due to the infinite expansion towards areas of knowledge that individual researchers are unaware of but do so following passing fashions, yielding to pressure from the entities that finance research, obeying the opinions of the groups to which they are affiliated, and so forth. For example: The expansion in some areas of computer and/or scientific education towards gender ideology; Autism; The visualization of the human subconscious; Explore brain data, Emotion AI and empathic systems, etc. Usually, a new theory is verifiable thanks to the creation of new measurement techniques, with an increase in precision. Now, this does not mean that the use of multi-method must necessarily be resorted to, for example, to obtain a higher rate of precision, in factual sciences.

Plannability (8): It is generally a principle that is based on the wealth of previous knowledge, since a scientific investigation requires a previous scheme or work plan. In this scheme, the random factor is reduced to the maximum. Yet planning has all but disappeared from the dictionary of a myriad of old-world, educational science settings. It is enough to inspect the state of the art, in numerous final projects, master's degrees, doctorates, etc., and that are related to new technologies, education, the role of women in science, and so on. In them, the poverty of the theoretical bases or the concealment of the true sources can be verified, to cite a couple of examples. In addition, the random factors of the academic context favour this phenomenon, such as the changes in the university educational systems in the EU at the beginning of the 21st century (Bologna plan). The goal was to dramatically increase the rate of graduates. The consequences are visible on social networks, through "smoke" sellers or showmen / show- women, on YouTube, in times of pandemic. For example, when Lombard graduates in foreign literature present themselves as experts in VR, AI, neuroinformatics, statistics, big data, and so forth, using the lecture format, in a Cypriot square (see Appendix).

Verifiability (7): There is no longer a massive use of empirical verification techniques in those areas where education and new technologies converge. The verification of hypotheses in the factual sciences implies an experience in evaluation. Now, if the scientist does not have that experience, it is very difficult to achieve it, even if they have a long list of degrees (doctorates in two or three years, master's degrees in one year or less, etc.) because these techniques evolve over time. Commonly, it is very easy to detect how all the supposed novelties in the sciences have an implicit evaluation to verify the hypotheses. This evaluation can be done through observation or experimentation. Besides, this action in many Iberian sites is carried out by inexperienced agents at the intersection of the disciplines that are working. For example, a mathematician, physicist, chemist, computer scientist, pedagogue, artist, and so on, does not have the same level of training as a sociologist or social communicator, in carrying out questionnaires or interviews to obtain reliable data, through the technique from direct observation.

Communicability (6): Today, it is a misused notion. It is erroneously used as a synonym for savagery from marketing or propaganda in academic units or private study centres (read religious in Latin America and in the southern European Mediterranean). What these centres communicate through the new and classic means of social communication is not scientific information, but rather persuasive and manipulative strategies to capture the attention of future clients/students. For example, in the academic units related to ICTs, technology enhanced learning, audiovisual, multimedia engineering, etc., the student is guaranteed in advance, not only a 100% job opportunity, the double / triple / ... university degree among several states, but also the possibility of seeing their names printed in conference proceedings, books, magazines, etc., belonging to associations or organizations, such as ACM and IEEE, even if their contributions in those articles or chapters are little or none. Therefore, the language used is inaccurate even if it comes from a place hypothetically dedicated to training, with a high financial cost for the student and/or their families. When there is no precision in communicability within factual sciences, this denotes the presence of a difficulty in verifying empirical data and scientific hypotheses.

Clarity (5): This notion is linked to precision but begins to be lost when the ability to read texts disappears in the academic units. In short, the correct use of the concepts. The infodemic and smartphones are leading to a generation based on images, which in the new millennium have gone from photographs to video. The consequence is that university students only manage to maintain their attention for 5 minutes. Simultaneously, there is a provocation from private South American universities to generate confusion for commercial purposes, such as "semiotic engineering" applied to the end user of interactive systems, through the notions of usability engineering, experience of user, user-centered design, human-computer interaction, children- computer interaction, advanced interfaces, and so on. The provocation generated in these religious educational environments has as a consequence the daily destruction of the rational progress of the sciences, because scientists lose the ability to formulate problems clearly and precisely.

The specialty (4): It is one of the intrinsic characteristics of scientific research and the way of approaching problems analytically. The application of the scientific method depends on the theme of the problem, which may involve using various techniques. It will depend on the scientist if he / she has a horizontal vision of 360 degrees or a biased and top-down view. These two ways of approaching problems have their origins in the educational systems that have been in force in the 20th century, on both sides of the Atlantic. Generally, the predominance of the specialized vision in the EU and the North American continent is considered. Now, that is a reality that is opposed to the panoramic and realistic 360-degree vision, in the study plans of the universities with more than 400 years of history, in the new world. Clearly, in Spain there are island university fiefdoms as there are in the Balearic Islands, where in a graduate in fine arts, the term "scientist + specialization" consists of a photograph in front of a

blackboard, in a chemistry laboratory. Simultaneously and for decades, he self-promotes his 360-degree panoramic view on social media, after "miraculously" and "without scientific publications" obtaining a Ph.D. in computer science and mathematics, for example (Cipolla-Ficarra, et al., 2018). These unsavoury individuals seriously harm the specialization in the sciences of the new millennium. Sadly, the new generations of students consider these buffoons to be role models because they happily and with immunity manage to tear down and corrupt what little remains of seriousness in the Spanish sciences, in the computer sector.

Inspectability (3): The aim is to discover the internal mechanism as the source of the observed phenomena. However, the human and individual ability to decompose problems down to basic units is currently not easy to locate. This is another of the consequences of the current mania in the formation of work teams, whose members do not have the area of intersection between formal and factual sciences. Furthermore, some groups with loose interrelationships with each other, although they are using the latest technological innovations, in terms of interactive communication. This activity requires new university professionals, where their curricula derive from the intersection of factual and formal sciences, since information technology and all its derivations have practically reached almost 100% of human activities. A curricular profile of this new professional was already explained in the '90s. Besides, since then, it has been found that analysis and evaluation are constant sources of conflict between the various generations of researchers. The new generations, with a lower academic level than the previous ones of the 1980s and 1990s, seek absolute control of these activities to promote and favour the definitive debacle of the scientific sector. A debacle that has begun with the reduction of the times and the requirements to obtain university degrees: Doctorates in computer science, software engineering, systems engineering, telecommunications engineering, etc., in approximately three years and without individual publications for native students. A reality that can be consulted in the doctoral theses of the polytechnic universities of Madrid, Catalonia, the Basque Country, Salamanca, Valencia, etc., in the '90s. These anomalies are immutable with the change of century and millennium. For example, in 2000, when with a single investigation, two brothers obtained their respective doctorates in audiovisual, within the area of virtual reality (Pompeu Fabra University in Barcelona —www.upf.edu). Incredibly one thesis is equal to two doctorates. On the other hand, foreigners need 10 years, transferring the academic record in three universities, looking for foreign thesis directors, passing three academic tribunals, presenting almost 20 individual and international publications, in English. In other words, the students had to cover all the costs for registrations to congresses, international trips, hotel stays and a long etcetera. In few words, this is a racial discrimination to the umpteenth degree. Other examples are in the following website (www.pirateando.net) and bibliographical references (Cipolla- Ficarra & Ficarra, 2010; Cipolla-Ficarra, F., 2010; Cipolla-Ficarra, 2015; Cipolla-Ficarra, et al., 2018; Cipolla-Ficarra, 2021).

Surpassability (2): Traditionally, scientific research must overcome the observed facts and go beyond appearances. That is, it has to overcome what is usually perceived to generate new things. However, if one of the constants of the scientific context is "copying and pasting" in an immune way, the "creative and innovative" human being will undoubtedly reach a point where he will stop communicating news, experiments, results obtained, future research, etc. Although it contradicts the principle of communicability of science, this is the only resource available to the researcher to counteract the immunity granted by the scientific context and the infodemic against criminal actions, such as plagiarism, harassment, demotivation, and so forth.

The feasibility (1): The facts, in the scientific investigation of the factual sciences, are the starting point for a study. A study that requires the scientist, an interest in what is new, a curiosity for research and

a certain mistrust of the general opinion that prevails in the temporal context, in which he is immersed. However, these three components are distorted when part of the scientific community is dedicated to sabotaging and attacking groups or individuals, who modestly, honestly and transparently follow the principles of factual sciences. Motivations are officially labelled human or social factors. Carrying out a deeper analysis of these factors, and from a psychological and sociological point of view, they can be summed up in two words: envy and ignorance. Ecumenically, those two words are detected from the formal/natural sciences towards the social sciences. The first sciences must be above the second, although nowadays they feign a false democratization, as they do with the exchange and interconnection of the disciplines they encompass, through the suffixes inter, trans, multi, pluri ... disciplinarity. We can see, the daily birth of national and/or international groups, which act transversally in the shadow of societies and from the dark web, hindering the modernization of science and education.

Like the inverted order of presenting the keywords with reference to the original list of Bunge (Bunge,1981) —see numbering in parentheses, **the reality is that today, the principles of scientific knowledge are totally distorted and unfortunately, many of them are on the way to extinction.** In the storytelling lines of annex #1, not only these deviations can be verified, but also their expansive inertia towards the future.

SCIENTIFIC EDUCATION AND INTEGRATION OF THE HUMAN BEING

The storytelling's in Annex #1 show how their authors include themselves in the scientific field, both from the point of view of research and education. This example denotes that professionally and ethically they do not belong to those areas, according to the principles of scientific knowledge (Warren, 2012; Williamson & Sunden, 2016). The ethical term together with religion is the central axes of these deviations, which not only affect scientific education, but also the integration of the human being in the community, as are the examples listed in the third section with regard to inspection or evaluation.

In addition, we have those who wrongly hold that science is neutral, with no links to ethics, theology, politics, ideology, etc. Consequently, they do not value the consequences of their acts, inventions, discoveries, and so on. Here is a kind of central pin in the gear that allows scientific progress, that is, being responsible for the consequences not only of the research carried out, but also of the behaviour towards the other. That "other" can be real, such as people, or virtual, such as products and services that derive from the efforts of the "other." That other can investigate / work in isolation or within a set of real "others" (colleagues), with the help of virtual others, for example from AI and/or robotics. It is important to point out that in this field of interrelationships, the use of the term "peer-to-peer" is not always correct and can be applied automatically when it is necessary to evaluate scientific works, which require laboratories equipped with state-of-the-art technology. For example, the work / scientific context of a Haitian or Colombian are not the same as that of a Belgian or Danish. Indubitably, in all these countries the need for continuous training of their scientists can be accepted.

However, continuous or permanent training has a double point of view, depending on the degree of educational development and integration of the scientist in the labour market of the community, to which he / she belongs. A first point of view is the case of economically and scientifically developed countries, where it is a matter of investing correctly in the permanent training of their professionals called "scientists." Another vision is the one where it is verified that within those same developed countries, or other emerging ones, this continuous training can be a way to camouflage the lack of job opportuni-

ties for its university students. Hence, there is a continuous loop of studying to obtain scholarships and personal financing, for the survival of these professionals. This is the situation of engineers, graduates, etc., with double, triple, etc., doctorates, post doctorates, or a long list of master's degrees, which may or may not be interrelated. This is the case of scientists who have not been inserted in the educational / scientific context, either at the secondary or tertiary educational level, generating the phenomenon of non-integration of these professionals in the labour market.

It is a reality revealed with the first financial crisis of the new millennium, particularly in the countries that make up each of the letters of the word "PIGS" (Quiggin, 2010). That is, Portugal, Italy, Greece and Spain. Countries where a graduate of a secondary school (administrative, commercial, technical, and so forth), who has entered the labour market private or public, in the 1990s, are those who hold positions for life (public sphere) or not (private sphere), in the leadership or direction of the labour organization chart. This is a common denominator, in countless industrial, commercial, educational, governmental structures, and so on. In short, seniority prevails, even if they do not have university knowledge. This reality has been widely described in the following works (Cipolla-Ficarra, 2010; Cipolla-Ficarra, F., et al., 2018) and has not changed with the two global crises of the new millennium. Obviously, there are exceptions like the ones presented in storytelling #1.

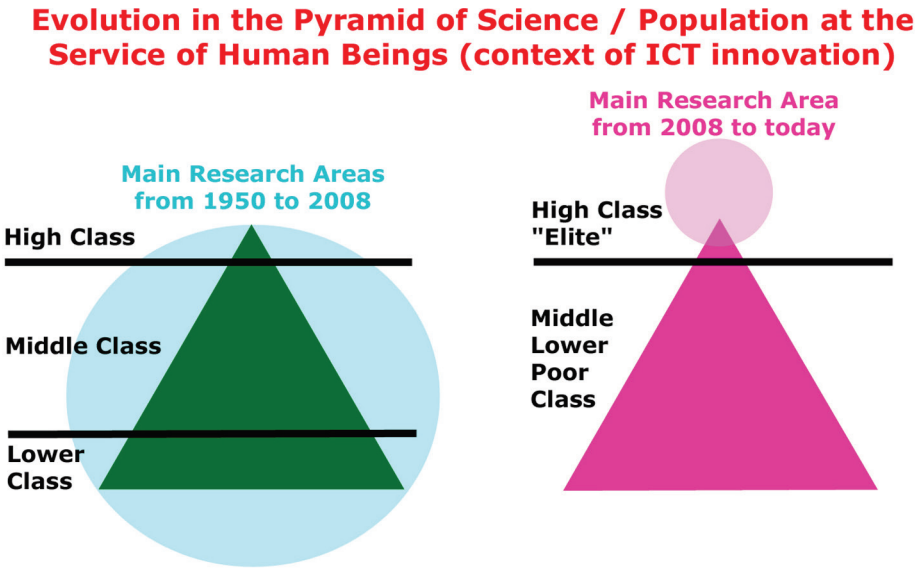
It is a reality that generates social exclusion and frustration for scientists, lack of motivation to solve local problems from a scientific perspective, encourages emigration abroad, increases the loss of competitive capacity of states in the face of globalization, and a long and so on. It is also the main anti-model for future generations that swell the statistics of the Neets —Not in education, employment or training (OECD, 2022). Besides, it is the main source of income for private companies that provide outsourcing services to industrial and commercial groups, universities, town halls, etc., since their leaders do not have adequate training to adapt to the new challenges arising from the ICT's, which change with the passing of days. A work technique, a productive paradigm or a successful theoretical approach in the past, are now obsolete due to the evolution of the context.

Private education (read that coming from religious institutions in the old world) in an obvious or underlying way, actively participates in this commercial process of providing outsourcing services. It does so through specialization courses, master's degrees, etc., tailored to meet the requirements of the industrial, government, commercial sector, and so on. The contents of the programs, the schedules and modalities of the lessons, the selection of the teaching staff, the software / hardware for the practices, etc., respond to the requirements of the clients, in their role as students. Moreover, they have the ability to quickly adapt to the requirements of market demand because they are not tied to the rules that govern public institutions. However, they try to emulate those public institutions to expand the business. They do so by copying the terminologies, paradigms, norms, etc., that regulate the public sector, without any problem in relation to plagiarism because they are above the pre-established legal system. For example, the notion of five-year periods (evaluation of the merits of the teacher, every five years), professors, educational excellence, quality certificates, awards, among many other stratagems and devices, where the relationship between meaning and signifier of these notions are unbalanced or non- existent, if the reality of the educational-scientific-labour context is analyzed, as has been described in the storytelling's Annex #1).

In simple words, all these notions are simple marketing masks to attract the attention of potential clients, under the label of students. Some masks have also extended their use, in public education. All this is due to the fact that the society divided into classes in the 20th century has polarized into just two classes in the new millennium. Therefore, there is a classist use of science,

where scientists are divided between being at the service of the contextual reality at the base **of the population pyramid, or at the** service **of the elitist rulers of societies, at the top of the pyramid. A** schematic representation of what happened with the pandemic and education in figure 8.

Figure 8. Evolution in the pyramid of science / population at the service of human beings in the context of normal and abnormal technological innovation (crisis of the 21st century).



Therefore, figure 8 highlights the existence of a kind of "trafficking of scientists" (studies conducted only for the elite with funds from banks, telephone / telecommunications companies, governments, and so forth) as occurs with the "trafficking of people" who emigrate daily, between the various countries and continents. Some of these immigrants from the countries of Eastern Europe, Asia, Latin America, etc., are the programmers, systems analysts, computer engineers, electronic engineers, mathematicians, physicists, etc., who are carrying out the technical tasks of the research. R&D projects for laboratories or university research centres, which have 5, 6, and 7 figure grants in euros. This lack of local technicians and regardless of gender or sexual issues is due to various historical and/or sociological phenomena. There are three of them that predominate:

- First, the one that interrelates with the social and university paradigm of the 20th century: First study and then work. Little by little, that paradigm would reverse that order or both activities would be combined.
- Second, the polarization of the population based on gender. After the Second World War, the model that brought together men in the natural / formal sciences and women in the social sciences prevailed.
- Third, the implementation of the wild model in the Western economic and labour market, starting in the 1980s. A single salary in millions of families would no longer be enough to cover daily expenses, including education.

Since the end of the 20th century, there has been a lack of integration of many professionals (men and women), with the maximum of studies in the educational system (universities, industries, and so on). With the democratization of the Internet, there is no change in the trend in beliefs (religion), politics and science. Consequently, the future of that pyramid in figure 8 is not positive. We are no longer facing the classic digital divide between users, educational / employment / salary gender equality for technology careers, etc., but rather an ethical abyss. Where we can see the increase in knowledge, through new technologies and education should be accompanied by an increase in wisdom, and not the current chaos, with the infodemic.

MODERNIZING SCIENCE AND EDUCATION: LESSONS LEARNED SINCE 1980

Since the invention of the printing press, the expansion of reading on paper has allowed human beings to build their own identity. Analog reading is not the same as digital. The so-called digital books were not accepted by the vast majority of the student public, regardless of the technological support used, such as: Sony's Portable Reader System (PRS), Papyre (Hanlin eReader), Cybook Orizon, Amazon Kindle, and so forth. Besides, the screen of smartphones and other non-immersive interactive communication devices at 100% (watches, smart bracelets and bracelets, glasses, etc.) with a CPU (Central Processing Unit) distracts the user's attention, since at the moment of the interaction is receiving continual interruptions. However, these new devices and their matching applications are widely distributed among the different generations of users.

In the '80s, communication through educational audiovisuals allowed classrooms in primary schools, secondary schools, universities, etc., a sequential multimedia, where the projection of images could be amplified with the voice of the teacher, in the moment of explanations (Cipolla-Ficarra, 1998; Cipolla-Ficarra, 2000). Which is why the use of computers in classrooms since then, has always drawn the attention of teachers, students, scientists, sociologists, and so on. Now, although trivial investigations continue to be carried out, such as resorting to the emotions of human beings, empathy, popularity in social networks, etc., instead of carrying out educational, serious and respectful content of local and universal cultures, millions of students want to have their laptop for free. In other words, access to support prevails over content. With regard to this gratuitousness, the same thing happens with educational books, whether they are intended for a university audience or not. In this last example, it is enough to analyze the illegal copies of books in Spanish and Portuguese, which circulate physically (photocopied) or virtually (downloads in .pdf, .doc, etc. format), in Latin America: Brazil, Colombia, Chile, Mexico, Paraguay, Uruguay, and so forth. Places where copyright is non- existent.

This gratuitousness can also be examined in the intention of the students to take their notes directly with the computer, in primary school. However, in the latter case, global projects such as the one promoted by Nicholas Negroponte, under the acronym OLPC (One Laptop Per Child), in many countries with emerging economies, have been more of a failure than a success (Perry, 2007; McArthur, 2009; Kraemer, Dedrick & Sharma, 2009). Some of the causes must be sought in a disadvantaged context such as some inhospitable or underdeveloped areas of the planet, with a lack of electricity. Also in the loss of the educational business that is historically intended and/or managed by the private sector. In other words, we refer to the environment of Western culture, religion and politics. To which we have to add certain professionals from the formal / natural sciences sector, who derive from the "fleeting comets" phenomenon.

That is, professionals who obtain from two to five or more university degrees (bachelor's degrees, engineering, master's degrees, doctorates, post-doctorates), simultaneously carrying out high-level work experiences (management, direction, etc.), in less than ten years. In the following references there is an extensive description of the modus operandi of these comets (Cipolla-Ficarra, 2010; Cipolla-Ficarra, Quiroga & Ficarra, 2018). These "fleeting comets", together with professionals in the formal and natural sciences, resort to HCI and UX as a means or instrument to generate constant interference in the evolutionary process of modernizing science and education. Little or nothing can be done in the face of such behaviours and realities, which are immutable over time, today, enhanced through applications belonging to social networks.

These are software instruments that are related to numerical / alphanumeric / percentage indexes, storage and indexing of research in databases, reading / reference counters, and so on. Free access applications, developed with the democratization of the Internet at the end of the 20th century, and promoted at the beginning of the 21st century, with Web 2.0. However, it is software (intelligent or not) that is transmitting inaccurate or false data and information. Many of those applications' databases are not interlinked in a confederated fashion, for example. Some of these applications work under acronyms, websites, etc., such as: ORCID ID, Scopus ID, ResearcherID / Publons, Semantic Scholar ID, LinkedIn ID, ResearchGate, Google Scholar, DBLP (Digital Bibliography & Library Project), and so forth. Nor have state efforts curbed such interference, such as authorizations to conduct or direct investigations such as the French *"Habilitation pour Directer Recherches"* (HDR); qualifications for teachers, through the various regional and/or state entities in Spain (ANECA), state entities in Italy (i.e., universities, and/or ministries), and so on.

In order to counteract these negative human/social factors, sometimes the solution is to organize and coordinate discussion groups around these problems, such as international conferences. Events in which severe controls can be included, based on previous experiences and tending to permanently eradicate the constitution of negative factors ("G", fleeting comets, rockets, dynamic persuaders, etc.) that interfere with the positive evolution of science and education. Axiomatically, this generates an exclusion of some of the applications totally disconnected from each other (seen in the preceding paragraph with a confederation of data equal to zero) to hypothetically measure the scientific level of the works, because we are dealing with a qualitative principle of all the science: Truth.

A truth that through the new media is easily deformed and manipulated to promote negative values in digital culture, such as lies and deception. Veracity that both in the image and in the texts has disappeared with the (r)evo1ution of software and hardware. So much so, that in the '90s and before the use of desktop publishing programs for 2D digital images (Photoshop, Paint Shop, and so on), Regis Debray, argued "the death of the image" (Debray, 1995). In the new millennium, something similar is happening with the written word. Artificial intelligence algorithms can write texts from scratch, for example, the GPT 3 —Generative Pre-trained Transformer 3 (Zhu & Luo, 2022).

Definitely, this is a new model of artificial intelligence, and the position of Plato, who "did not believe in the written word" is, affirmed (Delcomminette, d'Hoine & Gavray, 2020). With the rise of social networks, many innovative ideas, born from the democratization of the Internet and multimedia communication, can already be considered ancient history. One of them is the generation of didactic content. The educational value of photography and educational video at the end of the 20th century has been diminished or trivialized through Facebook, YouTube, Instagram, TikTok, etc. Hence the importance of always considering a kind of diachronic and synchronic bridge between the origins of technological innovations (software and hardware) and the current use made of them. The purpose is to quickly detect

misuse or gaps among the population, since it is detrimental to the harmonious process of modernizing science and education.

RHETORIC QUESTIONS FOR ALL

The modernization of the sciences and education is and will be one of the cornerstones for all the inhabitants of our planet. Those who from the 1980 have been behind this issue have been direct and indirect witnesses of great breakthroughs and some recoils. These ups and downs are due to exogenous or endogenous factors, to the daily reality of the formal, natural and factual sciences. Many of those factors are beyond the control of all those scientists and professors, who, in a modest and honest way, collaborate in the development of the quality of life of all humankind. An evolution or revolution which dilutes narrows the digital divide (i.e. between users with a paid access to non-original multimedia content through a set of ultra-modern mobile devices; and users with a free access to creative multimedia content through a set of the classical non-mobile devices) among the human beings whose theoretical and practical research focuses on the cornerstones of the current population pyramid, as well as for the future generations oriented at the use of the latest interactive technologies in the communicability and quantic-nanotechnological-self-sufficient era. This is an era in which the universities, for example, have focused on accelerating the statistic numbers of degrees issued in relation to the registered students or the spot they take in the listing of the best colleges within and without their borders.

In this regard there have been a myriad measurement tables with different qualitative parameters sometimes contradictory with each other if one considers the whole global village described by McLuhan. This phenomenon is an exported fashion to the most remote corners of the planet, where the educational and scientific priorities, obviously, are totally different from the wild quantification of knowledge. If this tendency of scientific and educational knowledge is established, it is important to ask some rhetoric questions such as:

- Why in many industrialized countries are there so many university professionals in view of the high unemployment rates in situ?
- What is the financial cost for the original communities of turning their nuclear specialists, engineers, industrialists, mathematicians, etc., in teacher for interface design, human-computer interaction, cognitive science, tourism, journalism, business administration; or their graduates in audiovisual, architecture, computer programmer, physics, mathematics, to mention a few examples, in experts of invalidity or autism; or the graduates in fine arts, literature, and so forth, in pedagogues for robotics, electronics, medicine and marketing, among others?
- How can it be achieved that the previous asymmetries and theoretical and practical detractions, whether it is in the training or workplace stage, not only do not have room, but are boosted in the new millennium, under the alleged supervision of the educational and scientific authorities?
- Who really controls the trends in the market of supply and demand in the local and global education university?
- Are there mechanisms to detect the creation of educational and scientific models alien to the reality in which the different nations are immersed?

This tiny set of questions, whether it is in a latent or manifest way, shows us the behavior of millions of people daily. Questions that should be enlarged as we talk about the modernization of the sciences and education, as a kind of infinite semiosis, not only to grasp the current state, but also with a sight intent on the short, middle and long term for the scientific education of the future generations. Once again the rhetoric, whose geographical origin is located in the current island of Sicily (460 BC), allows us to open new horizons in the evolution of science, computing and all its derivations, the modernization of education and the role of the scientist, committed to the local context, to which he belongs.

The main and secondary issues that are related to this field of human knowledge are multiple. In this work we have tried to make a first quadrangular interrelation, whose elements can be included in three large sets. Each of them has its corresponding contents (in parentheses and in alphabetical order). The three sets are:

1) "Modernization of the Sciences and Education" (Educational Research; Engineering Education; Epistemology; Fields of Science Education; Formal and Factual Sciences; Human and Social Factors; Informal Science Education; New Challenges in Formal Education; Scientific Method; and Scientific Modelling);
2) "Science of Information and Computer Information Systems" (e-Science; Human-Computer Interaction: Past, Present and Future; Information and Communication Technology; Interactive Systems: Design, Communicability and Evaluation; Knowledge Visualization; Smart Environments; and Social Computing);
3) "People, Science and New Technology" (Cultural Systems, Employment and Human Integration; Diffusion of Innovation; History of Science; Knowledge Transfer; Open Science; Research and Technological Development; Science #.0 (the symbol # refers to the increase of the version / numbering over time), and Scientific Publications.

These sets and their respective elements may be expanded and/or modified in the future, as the sciences evolve and so does the way of providing education to current and future generations.

CONCLUSION

While the new information and communication technologies (NICTs) try to be invisible to the eyes of human beings, "the modernization of science and education", in global emergencies, has been verified as practically non-existent. However, these two areas are strongly interrelated with each other. For centuries, great debates have been generated in societies around them, beginning with universal access to a secular and free education. Something, that still persists in some places on our planet. Therefore, these two areas are usually a timeless source of financial resources that governments spend. Financial funds raised through direct and indirect taxes. However, it has been proven that in times of pandemic, the results obtained from the university and pedagogical sector in general, and despite technological advances, education provided at a distance, blended or face-to-face, does not reach the level of sufficiency.

There is a boomerang effect of wanting to hide or cover up that reality with deceitful practices. For example, the prizes arranged in advance for teachers, researchers, directors of educational and/or scientific institutions, etc., creative advertising campaigns, the avalanche of statistical data, and so on. All this reinforces the decadent educational and scientific model, specifically, in the space of teaching science

and new technologies, in the university perimeter. A university portal that makes use and abuse of these misleading resources denotes an institution where the principles of science do not exist.

Currently, there is a general idea that the teaching of science arises with the first universities: Bologna (1158), Oxford and Paris (1167), Cambridge (1209), Padua (1222), Salamanca (1227), and so forth. However, it is not. These universities have their origins in the dissemination of knowledge based on the written word. Specifically, its main tasks were the translation of the writings of the ancient world. These first European universities enjoyed a certain ecclesiastical freedom. Nowadays, they can be considered as "workers' associations" (teachers and students). Once again, the text is the source of great progress in the history of human communication, as hypertexts have been at the end of the 20th century, although they have generated a mosaic culture or fragmented knowledge. That broken digital culture alienates the ability of human beings to think. It is a culture that generates societies with individuals who are counted as physical labour force, but lack the capacity for intellectual work. Hence, we can observe and check the importance of books and reading them because knowledge is accumulated in them.

The efforts made over the centuries by scientists have been concentrated on scientific methods that originated and evidenced a new way of thinking, although it put into discussion indisputable concepts in ancient institutions. For example, Galileo Galilei with his position in favour of the heliocentric system. Theses already presented by Niccolò Copernicus (16th century) and which were summarized in his posthumous work on the revolution of the heavenly bodies *(De revolutionibus orbium coelestium,* 1543). The dissemination of this work marked the beginning of the scientific revolution in Europe. The origins of the universities as some of their teachers and students, who have studied / worked in them, today Google designates them as "celebrity students." In other words, a kind of award for those study powerhouses that are currently supposedly neutral and transparent. The truth is that with the passing of time, the religious, political, financial powers, etc., would enter those powerhouses of higher learning, pioneers in Europe, thus reducing their symbolic and historical value. In consequence, to think that the precepts and principles of Galileo Galilei, for example, survive at the University of Pisa, is a *"grasso errore"* (a huge mistake). Quite the contrary, as has been seen in the computer field of storytelling. This is a demonstrable reality that expands in other former students of that university (like many others), who carry out activities contrary to the normal development of science and science education in Austria, Belarus, Brazil, Chile, Colombia, Finland, France, Greece, Italy, Mexico, Portugal, Romania, Spain, Switzerland, and so forth.

Knowing the evolution of the sciences not only allows us to investigate the genesis of inventions, the production techniques of goods and services, the processes of educational and cultural expansion, etc., but also to establish parallels between the norms and rules that have derived from all that intellectual and social metamorphosis. Some changes are currently diluted by the misuse of advances in new technologies, promoting the general decline in educational levels and the terrible behaviour of those who should guide this process. This is due to a lack of respect for the rules and scientific rigor. The rules are violated on a daily basis by those who are above the democratic legal system and who were excluded from the origins of European universities. That is, the bearers of the exaltation of religious beliefs before the common good. Today, they are the promoters of soft skills (lowering the educational and scientific level) and the destroyers of the problem solving paradigm (acquiring knowledge to solve problems autonomously). The important thing is no longer "knowing how to do", but "knowing how to be."

As a rule, they are the "fleeting comets" formed in modern or old elitist and private educational institutions, where *"laissez faire"* predominates (translated here as freedom of action, without measuring its consequences towards "others"). From there, they move to public institutions, occupying the pinnacle

of power. In their wake are the ruins of educational structures and research systems, which normally take centuries to build. Unfortunately, social networks have enhanced such phenomenons as narcissism. That is why it is necessary to investigate the limits and challenges of science education and new media.

Finally, it has been found that there is an intrinsic and natural tendency of human beings to return to agriculture, when crises tend to repeat themselves and last over time. The pandemic has revealed a centrifugal force to displace the population of the city towards less populated or rural areas. Perhaps, this movement towards the origins of scientific development can serve to encourage a better future in the modernization of science and education. Always, we are thinking and keeping in our mind the fundamental premise that there is no innovation, creativity and technological progress, when biological damage occurs, whether related to humans and/or the environment. For example, electromagnetic noise, generated by wireless telecommunications networks (intelligent or not), whether domestic / urban / rural, and so on, negatively affects all living beings. In short, the common good and quality of life must prevail in the modernization of science and education.

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ANNEX #1: APHORISMS

Here the first 20 aphorisms and a summary of aphorism 128 are listed. It is necessary to clarify that the term "man" refers to all human beings equally, that is, without any type of sexual, racial, economic, educational discrimination, etc. The reader interested in the rest of the aphorisms with their matching comments and clarifications of the notions used by Bacon, can consult the following link: https://oil.libertyfund.org/title/bacon-novum-organum#preview

I. Man, as the minister and interpreter of nature, does and understands as much as his observations on the order of nature, either with regard to things or the mind, permit him, and neither knows nor is capable of more.

II. The unassisted hand and the understanding left to itself possess but little power. Effects are produced by the means of instruments and helps, which the understanding requires no less than the hand; and as instruments either promote or regulate the motion of the hand, so those that are applied to the mind prompt or protect the understanding.

III. Knowledge and human power are synonymous, since the ignorance of the cause frustrates the effect; for nature is only subdued by submission, and that which in contemplative philosophy corresponds with the cause in practical science becomes the rule.

IV. Man, while operating can only apply or withdraw natural bodies; nature internally performs the rest.

V. Those who become practically versed in nature are, the mechanic, the mathematician, the physician, the alchemist, and the magician but all (as matters now stand) with faint efforts and meagre success.

VI. It would be madness and inconsistency to suppose that things which have never yet been performed can be performed without employing some hitherto untried means.

VII. The creations of the mind and hand appear very numerous, if we judge by books and manufactures; but all that variety consists of an excessive refinement, and of deductions from a few well known matters—not of a number of axioms.

VIII. Even the effects already discovered are due to chance and experiment rather than to the sciences; for our present sciences are nothing more than peculiar arrangements of matters already discovered, and not methods for discovery or plans for new operations.

IX. The sole cause and root of almost every defect in the sciences is this, that while we falsely admire and extol the powers of the human mind, we do not search for its real helps.

X. The subtilty of nature is far beyond that of sense or of the understanding: so that the specious meditations, speculations, and theories of mankind are but a kind of insanity, only there is no one to stand by and observe it.

XI. As the present sciences are useless for the discovery of effects, so the present system of logic is useless for the discovery of the sciences.

XII. The present system of logic rather assists in confirming and rendering inveterate the errors founded on vulgar notions than in searching after truth, and is therefore more hurtful than useful.

XIII. The syllogism is not applied to the principles of the sciences, and is of no avail in intermediate axioms, as being very unequal to the subtilty of nature. It forces assent, therefore, and not things.

XIV. The syllogism consists of propositions; propositions of words; words are the signs of notions. If, therefore, the notions (which form the basis of the whole) be confused and carelessly abstracted from things, there is no solidity in the superstructure. Our only hope, then, is in genuine induction.

XV. We have no sound notions either in logic or physics; substance, quality, action, passion, and existence are not clear notions; much less weight, levity, density, tenuity, moisture, dryness, generation, corruption, attraction, repulsion, element, matter, form, and the like. They are all fantastical and ill-defined.

XVI. The notions of less abstract natures, as man, dog, dove, and the immediate perceptions of sense, as heat, cold, white, black, do not deceive us materially, yet even these are sometimes confused by the mutability of matter and the intermixture of things. All the rest which men have hitherto employed are errors, and improperly abstracted and deduced from things.

XVII. There is the same degree of licentiousness and error in forming axioms as in abstracting notions, and that in the first principles, which depend on common induction; still more is this the case in axioms and inferior propositions derived from syllogisms.

XVIII. The present discoveries in science are such as lie immediately beneath the surface of common notions. It is necessary, however, to penetrate the more secret and remote parts of nature, in order to abstract both notions and axioms from things by a more certain and guarded method.

XIX. There are and can exist but two ways of investigating and discovering truth. The one hurries on rapidly from the senses and particulars to the most general axioms, and from them, as principles and their supposed indisputable truth, derives and discovers the intermediate axioms. This is the way now in use. The other constructs its axioms from the senses and particulars, by ascending continually and gradually, till it finally arrives at the most general axioms, which is the true but unattempted way.

XX. The understanding when left to itself proceeds by the same way as that which it would have adopted under the guidance of logic, namely, the first; for the mind is fond of starting off to generalities, that it may avoid labor, and after dwelling a little on a subject is fatigued by experiment. But those evils are augmented by logic, for the sake of the ostentation of dispute.

CXXIX. It remains for us to say a few words on the excellence of our proposed end. If we had done so before, we might have appeared merely to express our wishes, but now that we have excited hope and removed prejudices, it will perhaps have greater weight. Had we performed and completely accomplished the whole, without frequently calling in others to assist in our labors, we should then have refrained from saying any more, lest we should be thought to extol our own deserts. Since, however, the industry of others must be quickened, and their courage roused and inflamed, it is right to recall some points to their memory.

First, then, the introduction of great inventions appears one of the most distinguished of human actions, and the ancients so considered it; for they assigned divine honors to the authors of inventions, but only heroic honors to those who displayed civil merit (such as the founders of cities and empire legislators, the deliverers of their country from lasting misfortunes, the quellers of tyrants, and the like). And if any one rightly compares them, he will find the judgment of antiquity to be correct; for the benefits derived from inventions may extend to mankind in general, but civil benefits to particular spots alone; the latter, moreover, last but for a time, the former forever. Civil reformation seldom is carried on without violence and confusion, while inventions are a blessing and a benefit without injuring or afflicting any (.. .) Again,

let anyone but consider the immense difference between men's lives in the most polished countries of Europe, and in any wild and barbarous region of the new Indies, he will think it so great, that man may be said to be a god unto man, not only on account of mutual aid and benefits, but from their comparative states—the result of the arts, and not of the soil or climate.

Again, we should notice the force, effect, and consequences of inventions, which are nowhere more conspicuous than in those three which were unknown to the ancients; namely, printing, gunpowder, and the compass. For these three have changed the appearance and state of the whole world: first in literature, then in warfare, and lastly in navigation; and innumerable changes have been thence derived, so that no empire, sect, or star, appears to have exercised a greater power and influence on human affairs than these mechanical discoveries.

It will, perhaps, be as well to distinguish three species and degrees of ambition. First, that of men who are anxious to enlarge their own power in their country, which is a vulgar and degenerate kind; next, that of men who strive to enlarge the power and empire of their country over mankind, which is more dignified but not less covetous; but if one were to endeavor to renew and enlarge the power and empire of mankind in general over the universe, such ambition (if it may be so termed) is both more sound and more noble than the other two. Now the empire of man over things is founded on the arts and sciences alone, for nature is only to be commanded by obeying her.

Besides this, if the benefit of any particular invention has had such an effect as to induce men to consider him greater than a man, who has thus obliged the whole race, how much more exalted will that discovery be, which leads to the easy discovery of everything else! Yet (to speak the truth) in the same manner as we are very thankful for light which enables us to enter on our way, to practice arts, to read, to distinguish each other, and yet sight is more excellent and beautiful than the various uses of light; so is the contemplation of things as they are, free from superstition or imposture, error or confusion, much more dignified in itself than all the advantage to be derived from discoveries.

Lastly, let none be alarmed at the objection of the arts and sciences becoming depraved to malevolent or luxurious purposes and the like, for the same can be said of every worldly good; talent, courage, strength, beauty, riches, light itself, and the rest. Only let mankind regain their rights over nature, assigned to them by the gift of God, and obtain that power, whose exercise will be governed by right reason and true religion.

ANNEX #2

Storytelling: Sparklines Technique For Analysis Of Educational Anti-Models

In this case, a brief true story is told, using the "sparklines technique", between what should be or the desire to follow the epistemological statements of the sciences, and the reality of events. It includes main and secondary themes, characters, opponents, actions, strategies, methods, historical, temporal, geographical contexts, etc.

The main theme is to demonstrate how the ultra-nationalism of the '90s, driven by retrograde and nostalgic sectors of the European dictatorial past, before the first half of the 20th century and that in the 21st century, through pseudo-feminism, facilitate the heirs and supporters of these ideas its validity and geographical expansion. Interestingly, the characters that support these ideas are characterized by short

stature. Precisely, this is one of the physical problems that has attracted the most attention throughout the history of the military, it is the height of those characters who are defined as disastrous for humanity, particularly those born in Austria, Spain and Italy, in the nineteenth and twentieth centuries. If we add Napoleon Bonaparte to them, we have the physiological framework of the problems entailed in the schizophrenic personality with delusions of grandeur, regardless of the sex of these individuals. Social networks play an important role in the dissemination and promotion of these characters and their actions. For example, an easy way to detect such recalcitrant ultra-nationalism is biographies in dialects, excluding the official language.

Figure 9. Contempt for the language of the place of birth (Cantabria, Spain —in this geographic region the people speak only Spanish and no Basque), resorting to the narcissism strategy that is promoted through social networks such as Wikipedia but in Basque language (Wikipedia, Entziklopedia askea). The main objective is the linguistics discrimination. The second objectives are the diffusion of neo-slavery in the Americas, intolerance social camouflaged, exportation of educational anti-models, promotion of toxic digital ecosystems, and the new autocratic educational management.

One of the hobbies of die-hard ultranationalists is self-promotion on Wikipedia of a regional language or dialect that does not belong to them by birthplace. However, it is the method used by the promoters of academic racism to stand out from the rest of their colleagues at work and internationally. This is one of the most common problems detected in unworthy behaviours within the context of HCI in Spain, in the last two decades, for example.

This is one of the strategies to hide the nostalgic ultras of past times (i.e., Francoists, fascists and Nazis). Wild nationalism exercised during the ‘80s and strengthened in the ‘90s, easily demonstrable with the names and surnames of the people that these groups of teachers promoted in the category of university professors, doctors, and so on. Since the second decade of the new millennium, this masculine and xenophobic nationalism has been under the notion of pseudo- feminism. For this purpose, women of

short stature and with few intellectual lights but faithful to their bosses are chosen in university departments. In short, fake feminism is the new strategy used to cover up mistakes and criminal actions of all kinds in the academic field, in recent times, particularly in small European cities.

However, another of the problems detected is the expansion from these small cities to other geographical points on the planet. For example, in the case of expansion towards the Americas, Portugal uses the Azores Islands (i.e., Madeira) and Spain, the Canary Islands (i.e., Tenerife). This geographical proximity with the former colonies has allowed maintaining, over time, linguistic characteristics that tend to be a bridge for the new generations from overseas. Precisely, those are the bridges that exporters of top-down educational systems to the new world are currently seeking, resorting to false feminism.

Meanwhile, in Spanish island universities, many students are forced to resort to the services of lawyers, to assert their rights, not only as students, but as citizens who have been scammed by their universities. All this to be able to finish their master's and/or doctorate studies, when they have previously paid (i.e., educational expenses) to take the subjects of such studies. Although they are paradisiacal places, touristically speaking, however, there is absolute debauchery from the legal point of view, since public officials of local education, not only do not respect the rights and human dignity of their students, but neither the basic principles of scientific knowledge. Interestingly, this happens because those who manage and will manage the interweaving of university institutional relations have directly and indirectly been contaminated by models of state terrorism. And in many places, in the new millennium, state terrorism remains immune in an educational context. That reality can be synthesized with an old popular Spanish saying that says: "In the country of the blind, the one-eyed man is the king." So much so, that some dwarves trained in overseas dictatorial educational systems, when crossing the bridge between the new and the old world, become the queens of the insular mambo.

Going unnoticed due to their height, intellectual abilities, etc., they come into contact with the university environment and learn about the weak points of their elderly bosses (belonging to the network constituted in dictatorial times and who must select their heirs), and particularly, those local professionals who may be their competitors. These competitors are first considered colleagues but after and automatically opponents. Subsequently, those direct and indirect opponents become their enemies. Therefore, these enemies must be eliminated quickly, since they compete to reach lifetime jobs, having the same generational age and work area. Once the chief, trained in the times of Franco, Mussolini, Hitler, etc., has identified the dwarf heiresses, they will be presented to the rest of the local and national caste so that the network of influences provides them with all the necessary elements for their fleeting progress, starting with the highest level in the lifetime position of a university professor.

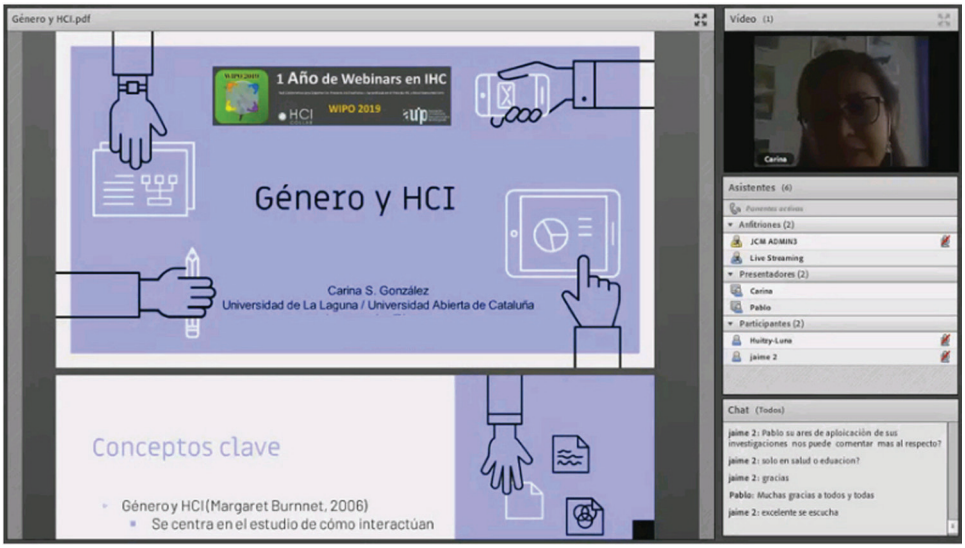
Mechanically, she/he, with her/his family and friends (basically unemployed, with computer skills), will dismantle each of the eventual opponents, inside and outside the university. Fundamentally, they will do it by resorting to anonymous attacks on the Internet, associating themselves with extremist criminal organizations but perfectly camouflaged, inside and outside the academic unit, to which the heads or former heads of it belong or belonged. The goal is to rapidly fill management positions within the department, faculty, university, etc.

To this end, the method followed is to sign "ghost agreements" of all kinds. Technology transfer, research projects that will never be completed, exchange of students (or rather, neo- slaves) between universities and companies from underdeveloped countries. At the same time, she will begin to offer herself as a speaker at congresses, seminars, and so on, organizer of events in national crime associations, co-director of trivial theses, utopian projects for the local population, etc. In short, she is present-

ing herself to her superiors as a kind of dwarf robot that never stops travelling, signing agreements, presenting statistical data, self-promoting herself as head of interuniversity teams, and so forth. To all this we must add the coursework, carrying out experiments, writing papers, etc., for new studies, which can be a post doctorate or directly, a new doctorate. Easily, for the members of the caste, thanks to the network of sectarian influences to which they already belong as active members and that can be seen in the participation of courts or juries for the defence of doctoral theses, master's degrees, awarding of prizes, financial grants, scholarships, stays abroad, management of European projects, and an extensive etcetera. Obviously, all this is abnormal and illogical, in the rest of the European reality.

In this insular nightmare connected to the Pyrenees, the presence of the collaboration of relatives, friends, and so on, unemployed people and a wide network of collaborators and/or associates in formative delinquency, inside and outside the university, is perceived. In other words, a clear example of the circulation of the Latin American narco-education, between the new and the old world, exalted from the direction of the faculty and the university, through the local media. Media that to cover up corruption, resort not only to radio, television, press, magazines, etc. traditional and local, but also to social networks, especially YouTube channels. Objectively and unquestionably, if you analyze the endless activities carried out by these fals e feminists in island universities, not even the best commercial robot can perform so many tasks simultaneously.

Figure 10. It is an example for the exportation of neo-colonialism in the Americas, education only for elites, destruction of independent initiatives, non-governmental, and democratic from a Gardunian virtual organization, in Iberian Peninsula (HCI Collab —WIPO).



We are facing a structural and immutable methodology, based on corruption and coming from the dictatorial era of the 20th century. An academic island reality that remains unchanged, thanks to the interconnections with the capital of the country —Madrid— (i.e., Charles III University of Madrid, University Carlos III, King Juan Carlos University Autonomous University of Madrid, and Polytechnic

University of Madrid) and the Pyrenean regions (i.e., University of the Basque Country, International University of La Rioja, University of Zaragoza, University of Lleida, University of Girona, Polytechnic University of Catalonia, University Pompeu Fabra, University Ramon Llull, Open University of Catalonia), fundamentally. Moreover, this corruption is cyclically rewarded by the national and international network of criminals, through diplomas, technological gifts, automatic appearances in international articles without any type of contribution, scholarships, national and international trips and stays, etc. Therefore, belonging to this criminal network means granting degrees, scholarships, training, financial and technological resources, lifetime jobs, etc., among friends. Public contests for job vacancies, ministerial requirements related to the annual production of the scientific body, etc. they are a utopia because they have already been granted in advance.

Here are several strategies used by professors who direct projects in the field of ICTs, education, robotics, etc. The publications are coordinated and carried out by contracted young collaborators, who keep in contact with identical groups of young people, nationals and foreigners. In other words, monographic works by the professor will never be seen, for example.

The programming of the systems is carried out by small external companies from universities or foreigners where the cyclical crises of the new world force young computer professionals to emigrate: Venezuela, Colombia, Brazil, Mexico, etc. This instability of computer human capital means that many projects may remain unfinished.

In these two examples it has been seen how the norms and rules are not respected by lifelong officials. Generally, this is the common denominator in the departments, faculties, laboratories, and so forth, of computer architecture technology, computer engineering and systems, informatics, audiovisual, automation, mathematics, telecommunications, ICTs, and so on. Departments and characters that instead of carrying out tasks related to these scientific areas, are dedicated to scamming the ministerial authorities with false publications (inclusion of names in books, papers, posters, demos, etc., in exchange for other favours within the network of international crime, for example, an award, a scholarship, a trip, and a long etcetera).

All this silence that reigns in the face of such a scientific and educational calamity also has a prize for the elderly "Gardunians" who have set up branches throughout the state geography. They will be affiliated with the university, until the end of their days, since their disciples and heiresses from the university offer them high sums of money, in advisory tasks and continuous training, even though they are already retired.

As an exercise, if you look at the places where they have studied, specialized, and so on, the elder Gardunians (camouflaged "little-big dictators" from the Francoist-Mussolinian-Hitlerian era) are identical in time, to the network of criminal collaborations of the current false feminists. Some false feminists have a special license to commit crimes in the educational and scientific context. Happily and immune they do it through the walls of the institutes that supposedly protect the rights of women, promote the learning of robotics in the child population, sponsor the inclusion of women in engineering, and a long list of lies.

All this happens in places where school dropout due to parents' lack of stable employment is statistically one of the highest in Europe. This is one more consequence of the activity of those who have fun destroying the democratic system starting with the education of children at an early age because on the island of the blind, the one-eyed dwarves of narco-education are the queens of the mambo of Spanish corruption. Sociologically, the norm is confirmed that those who promote racial discrimination, linguistic intolerance, unworthy behaviours in the workplace, among many other components, have problems with

the notion ofJoris *solis,* since they do not belong to it since their birth. This is a reality that you cannot change. Therefore, they are aggressive bipolar, deceive and lie to the rest of the adoption community, and tend to destroy the rest of the members / opponents who do have the right from the *Joris solis.* Finally, following the precepts of Umberto Eco, to summarize a story, you can make a list of keywords. In this case, the main and secondary keywords, implicit and explicit, are the following: Feminism, autocracy, enemy, collaboration, ultra-nationalism, neo-colonialism, human dignity, freedom, narco-education, education for elite, cyber terrorism, criminal organization, statistical data, innovation, creativity, HCI, UX, UE, computer science, robotics, ICT, AI, AR, VR, and new generation. **With these words and the actions of the network of all these characters, it can be affirmed that in some areas of the southern Europe there is a 25-year delay in R&D and scientific education.** The reason is that first you have to select the people who will maintain the sectarian network and then you have to instil in them knowledge and training in the field of ICTs. This is the main covert about the enormous dependence on foreign countries, in the field of innovation and technological creativity, in some European regions. Human capital and indigenous educational models have inclusion in criminal networks as a priority and not in the authentic training that weighs the variables of the context of belonging.

Chapter 10
Powering the Use of Comics in Educational Emergency Situations

ABSTRACT

In this chapter, the author present the first set of strategies called "CFC" (comics for crises) to encourage the use of comics in emergency situations (health, extreme weather events, seismic events, wars, among others) that prevent face-to-face classes. The purpose is to maintain the group contact of the students and as a means of information, training, entertainment, creativity, and furthermore, an instrument of catharsis of lived experiences. The research promotes the critical-constructive analysis of the evolution of the comic through time to investigate the evolution of design and content in the various media of social communication from the 20th century. Finally, an experimental methodology and results obtained in the tasks that go from the systematic analysis of the main components of the comic to the creation of a comic strip through the use of analogical and/or computerized supports are disclosed.

INTRODUCTION

In situations of calamities, whether natural or not, which extend over time, the comic can be considered a valid instrument to promote interest and motivation to continue the educational process of children and adolescents, at a distance. In this sense, the theoretical context that the comic contains together with the use of free graphic applications and apps, some of which are already included in the operating systems of personal computers, tablets PCs, smartphones, etc. (i.e., Paint, Clip Studio Paint, and MediBang Paint) can be the fundamental element to narrate your own experiences in comic format (McCloud, 1994; Weaver, 2013; Syma & Weiner, 2013; Sabon, 2022). Narration is a key component for the catharsis process in dramatic situations such as epidemics, pandemics, revolutions, wars, and so on.

In this context of individual and distance education, it is necessary to resort to the use of available didactic resources or common cultural knowledge, which can serve as inspiration to narrate the experiences that the students are going through together with the rest of their study colleagues, family, friends,

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and so on (Janak, 2018; Syma & Weiner, 2013). Although, there is a growing tendency to use transmedia in classes for the purpose of interrelation between students, teachers, etc. (Twitter, Facebook, Instagram, and so forth), it is necessary to remember that in these calamity situations, online communication services can be collapsed due to the high traffic of multimedia data to manage (Pervez, 2018). Consequently, local authorities may advise against the unlimited use of smartphones for the transmission of videos, photographs, etc. In other words, telephone communication can be reduced to only very brief text communications (Cipolla-Ficarra, 2011b).

In normal situations of distance education, the comic has been a valid instrument to quickly and efficiently train users who had never had contact with computers (Cipolla-Ficarra, 1996). Evidently, techniques and methods that are not developed internally in the new virtual campus, due to the lack of knowledge of the staff that is beginning to be trained in e-learning processes, distance content design, resolution of student problems with technological devices, and so forth. Besides, this efficiency is due to the comic following the attributes of quality in communication for interactive design (Cipolla-Ficarra, 2008; Cipolla-Ficarra, 2003; Cipolla-Ficarra, 2001). That is why it is necessary that comic studies are not only related to the historical aspect but also take into account the technological reality at the time of design. That is, the resources available to designers who have been pioneers in issues related to distance education, through the use of new technologies. Hence, the need to consider diachronically and synchronously everything that is intended to be examined or evaluated within the comic, in the various analog and digital media.

Comic strips are not born as a definitive genre. Rather, it has been an accumulation of components that have been enriching the graphic and literary aspect to tell stories, through vignettes (the smallest unit within a comic strip). In the vignettes, the iconic signs and textual language converge, which varied between different cultures (Moles, 1967; Cohn, 2014). For example, the genesis in North America is located, in the satire and caricature of news, commercial advertising, electoral propaganda, etc., mainly in newspapers, from the seventeenth century (Dauber, 2021; Lent, 2005). Then, between the end of the 19th century and the beginning of the 20th century, certain components of human expression were enhanced, in graphic and printed communication, until certain basic components were established, such as balloons. Works such as "The Yellow Kid" by Richard F. Outcault, "The Katzenjammer Kids" by Rudolph Dirks, "Little Nemo" by Winsor McCay, to mention a few examples, are considered pioneers in that area in the American continent. Other works from that geographical area are in figure 1, in stamp format. In annex 1, there are other contemporary European examples in this regard. Many of all those comic strips have been transformed over time into television series, movies, video games, and so on. That is to say, interactive audiovisual productions or not, which have attracted the attention of millions of inhabitants, throughout our planet, over the years.

Also, during the transfer of the 19th century and the 20th century, the comic appears in Europe. The humorous, satirical, parody, etc. of politics are present, along with other characteristics of fractionalized publications (Stein, 2013). They are called pamphlets. They are related to fictional, fantastic, romantic, adventurous content, and so on. They were publications divided into deliveries and were aimed at the general public. The massive public had a lower educational and/or cultural level than the elite. **Many illiterate people began to read and write,** these **publications being a regular communication channel to motivate them in this educational process.** In those moments, the European comic, the text and the graphics complement each other in the narration but they are not integrated in the space of the vignette. Its extensive texts were placed at the bottom of the vignette.

Figure 1. Comic strip classics stamps, 1995 (USA)

Unlike the American comic, the text is smaller but included in the space of the vignette. Therefore, it is feasible to establish a first differentiation between the American public and the European from the point of view of enjoyment. In the first are the lower layers of the population pyramid. While in Europe, they were rather aimed at the middle or bourgeois sector of society. However, one of its fundamental characteristics or functions at that time was to use it as an instrument for literacy. Functions that has lasted to this day.

THE VIGNETTE OF THE COMIC AS A NARRATION RESOURCE AMONG CHILDREN, YOUNG PEOPLE AND ADULTS

From the linguistic point of view, the comic in Europe is associated with several terms, such as: *bande dessinée* in French; *Comicbìicher* in German; *comic / tebeo l historieta / tira cómica* in Spanish, *história de quadrinhos* / *gibis / tira,* in Portuguese; *fumetto* / *fumetti* in Italian, etc. (Mascotta, 1970; Gubern,

1972; Rodriguez-Diéguez, 1988). All these denominations show the popular acceptance of the comic and its terminological evolution, over time, inside and outside the European borders.

Apart from this small Tower of Babel from the 20th century, it is possible to detect their common denominators, such as: The narration; the function of distracting or pastime; socialization; literacy; the mission of reaching the largest possible number of consumers or readers, starting from the base of the population pyramid to the top; the integration of textual and iconic elements and the use of specific codes, among others that are continually being incorporated, as new media and social communication technologies advance (Rodriguez- Diéguez, 1988; Eisner, 1996; Frey & Fisher, 2008; Avraamidou & Osborne, 2009).

The narration in the comic is interrelated with the structure of the vignette and its temporal sequence. It is important to highlight the notions of synchronism and diachronism in the temporary variable (Cipolla-Ficarra & Cipolla-Ficarra, 2008; Cipolla-Ficarra, 2005). Furthermore, there is an influence of cinema on comics, in the last century and computer animation from the '90s. This type of animation requires a storyboard that structurally and graphically has several elements in common with the comic, such as the time division, the scene plans, and so forth. Therefore, the new generations that have experience in making computer animations, whether in 2D / 3D, usually regard a vignette as a frame of an animation.

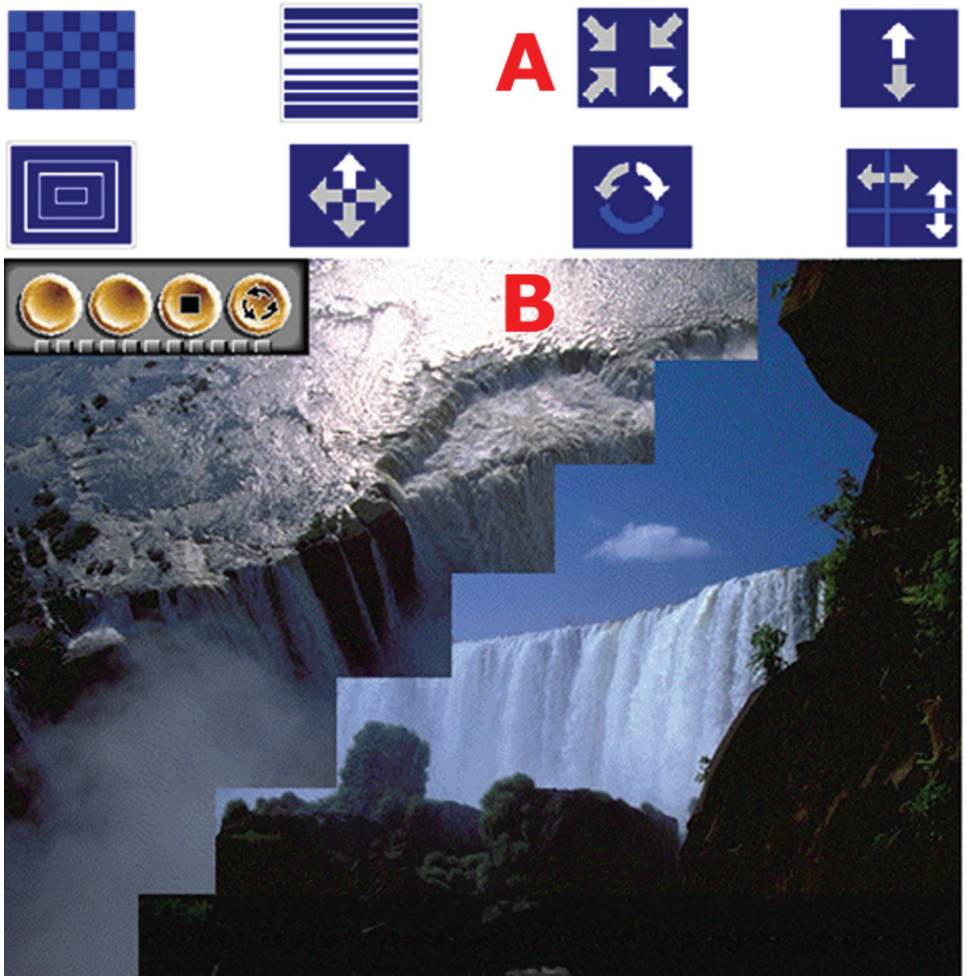
For example, the generation Z by resorting to digital photography to generate a collection of images. In this sequence of photos, the temporal variable (just like comic strips, computer animation, cinema, etc.) of the images that make up the content can refer to a before, now and after (Cipolla-Ficarra & Ficarra, 2011). That is, it admits all the variables of the story. From a certain moment of the narration, the future can be advanced (flash-forward) or the past (flash- back) previously passed through a transition.

This transition in the comic is synchronous but it prepares the reader for a jump to the future or the past, through the effects of transitions, as occurs in the guided links of interactive systems, when photographs, slides, etc. are presented. Effects that can refer to cinema such as crossfade, wipe, flou, and so on. Figure 2 shows some transition effects in interactive systems, with excellent results for viewing tourist content, starting in the 1990s. The users of these systems usually consider very positively the passage from one image to another, through the blurring to pixels or pixelation of the image. The interested reader can expand these notions in the following references (Cipolla Ficarra, 2010; Cipolla-Ficarra & Cipolla-Ficarra, 2009).

Other aspect to consider in the structuring of the comic narrative is the layout of the vignettes for reading, depending on the different cultures and the way of reading the texts (Moles, 1967; Fernandes, 1995; Bach, et al. 2016). That is, from the upper left margin to the right, generally in Western culture, while in the opposite direction in Eastern culture, there are exceptions to such rules. For example, in Japanese you can write in two directions: Horizontal and vertical. On the one hand, it is similar to how it is done in English, Spanish, French, Italian, Portuguese, German, and so forth, that is, from left to right, horizontally. On the other hand, you can write from right to left, vertically.

This influences the way of organizing the vignettes to narrate the story, as well as, in the versions of the comics for other languages, other than the original (Varnum & Gibbons, 2007). An exception to such a rule is the vignette macro, where there is a synchronicity of all events. In this sense, it is worth highlighting some covers of one of the magazines with the greatest humorous tradition, since the return of democracy in Spain, such as "El Jueves" (www.eljueves.es). In figures 3 and 4 you can see some examples of macro vignette on the cover.

Figure 2. Some transition models used in the interactive systems of the 1990s for the promotion of tourism and that later, some of them have been incorporated into applications for oral presentations, through the use of slides (PowerPoint). The model A is into photos B —transition from bottom right corner to upper left corner.



These typologies of covers somehow have historical links with artistic works from painting. For example, the work called "The Garden of Earthly Delights" by the Dutch painter, Hieronymus Bosch (Belting, 2016). This work contains multiple narrations of the characters that are represented in the central part of the triptych. Although generation Z, with social networks, is focused on the use of digital photographs, video, chats, etc., (Cipolla-Ficarra, 2011a) with comics it is necessary to highlight the influence of cultural heritage in shaping it, which implies expanding the horizons of knowledge to understand 100% of the content of a comic strip. Hence, the comic is a means of communication that allows convergence between the different cultural and generational strata that make up the population pyramid.

The macro vignettes can be considered as a kind of synthesis to avoid iconic redundancy (Gubern, 1972). That summary function can potentially turn them into a kind of role model within the metaverse. In addition, they allow analyzing the process of how people read the content, depending on the culture to

Figure 3. The rent issue, solved (Lo del alquiler, solucionado). El Jueves, Oct. 13, 2021 (2316)

which they belong. That is, in Western culture, from the top left corner of the first page down, following a zig-zag path. In some Eastern cultures, from the last page, follow a vertical reading from bottom to top.

Historically, the first macro vignette was published in the New York Word (1896), with the character The Yellow Kid, in the series At the Circus in Hogan's Alley. These macro vignettes are considered by several authors (1896) as the origin of the comic in the written press (Gubern, 1972; Mascotta, 1970;

Figure 4. Back to work (La vuelta al curro). El Jueves, Sep. 1st, 2021 (2310)

Witek, 1990). Other examples of these historical macro vignettes are at the following link: www.cartoons.osu.edu/digitalalbums/yellowkid/1896/1896.htm

This confirmation of the birth of the comic in the written press is given by the use of an iconographic resource such as the balloon or speech bubble that appears in figure 6, next to the parrot's cage; with the text "Sic em towser" (it is a reference to a silent film of the year 1918). It is the text of the dialog. In

Figure 5. Triptych oil painting on oak panel painted by Bosch, between 1490 and 1510. It has been housed in the Museo del Prado, in Madrid (Spain).

this confluence of iconic and verbal elements of the comic, the texts can be inside the globe or in boxes for additional explanations regarding the passage of time, geographical location, social status, and so on (McCloud, 1994; Witek, 1990). In some cases, the texts serve to adapt or modify the pre-existing rhythm of the passage of time (relay function). For example, speeding up time (after several days, months, years, and so forth) or marking coexistence (simultaneously, contemporaneously, synchronously, etc.). In other cases, the texts fulfil the anchoring function of language when the image is vague or has more than one possible relationship between meaning and signifier. That is, they open a process of infinite semiosis (Barthes, 1978; Palfram, 2021). Also here there are references to the works of painting where they used to include bands, ribbons, boxes, etc., to explain partially or totally, the meaning of a work. In this sense, the work of some Asian authors stands out.

One of them is the Japanese, Utagawa Hiroshige (1797-1858), where in the examples of figures 8 and 9 the inclusion of the text is observed, in rectangular boxes, both vertical and horizontal (Hiroshige,

Figure 6. The Yellow Kid (February 16, 1896). The Great Dog Show in M'Googan Avenue. New York World

Figure 7. The Yellow Kid (August 9, 1896). Hogan's Alley Folk Have a Trolley Party in Brooklyn. New York World

Figure 8. Old Sotry of the Otama Pond in Kanda (1840)

Figure 9. Commodore Perry's Gift of a Railway to the Japanese (1853)

2019). Hiroshige's distribution of elements in space has influenced the works of Degas, Toulouse-Lautrec, Van Gogh, and so forth. Several of his polychrome woodcuts are characterized by parody and humour on historical events and / or classical narratives, from Japanese culture.

In contrast to these last four figures (6, 7, 8 and 9), where the text appears, it is necessary to highlight that there are comics without text or so-called silent comics. This type of comic is the most complex to carry out since one of its main objectives is achieve universality. **Universality together with humour, simplicity and originality are the four fundamental characteristics when conceiving and producing international computer animation works,** for example (Cipolla-Ficarra, Alma & Cipolla-Ficarra, 2011; Cipolla-Ficarra, et al., 2014; Cipolla-Ficarra & Cipolla-Ficarra, 2014). Narrating comic stories through vignettes, without resorting to the text and with the aim of achieving universality, is not an easy task nowadays. Basically, the problem of universality is that the cultural background of young comic readers, since the level of general culture, continues to decline, as time goes by and the use of apps and other applications related to comics progresses.

However, excellent examples still exist in computer animation, such as the French television series Minuscule (www.futurikon.com). This is an audiovisual production that combines video and computer animation. The content is related to insects. In the new millennium, the good results obtained with local and international audiences have allowed the generation of two film productions such as: "Valley of the Lost Ants" (2013) and "Mandibles from Far Away" (2019). All these works can serve as a source of inspiration for new generations and their future productions in the comic.

Therefore, through the examples presented, it is feasible to establish a first set of those elements that make up the code and/or common denominator of the comic, among the different cultures (Sones, 1944; McCloud, 1994; Groensteen, 2007; Cohn, 2014): First, there is the setting of the action within a box or panel. Second, the use of balloons, speech bubbles, boxes to include the text. This is a text that can refer to the dialogue between characters, contextualization of the action, allusions to artistic works, onomatopoeic sounds, and so forth. Third, the representation of the action, it is the movement implicit in the temporary variable. That is to say, the different ways of representing the kinetic code of the characters, objects that change with the greater or lesser natural lighting of the day, landscapes that represent the different seasons of the year, and so on. Fourth, it is the range of expressiveness of the characters in the heterogeneous situations of the narrative. This resource allows practices to be carried out with students and that serve as a catharsis in emergency situations, as will be analyzed later.

Fifth, it is the degree of realism of the characters. This parameter of realism is within iconicity. Here it is necessary to consider the evolution of traditional 2D graphic resources (analogical), up to the latest technological advances in computer graphics, particularly in the three- dimensional emulation of reality, in the field of creation and movement of virtual characters. Those who move away from reality fall into the category of caricature. Some examples of caricatures are in figures 11 and 12. This degree of high abstraction of real characters in humorous publications in comic format can be a source of continuous censorship, even in countries that make up the current EU. The magazine "El Jueves" —specializing in cartoons and graphic humour—, has been withdrawn from circulation on several occasions and its publications that were already being sold in newsstands have been destroyed. These events denote not only the massive nature of the publication, but also the existence and persistence of censorship, in the young democratic systems, in some southern European Mediterranean nations. The wide diffusion of the comic, among the different population strata, is the sixth characteristic.

Figure 10. Vignette without text or silent, where the author Guillermo Mordillo (www.mordil1o.com) manages to issue a universal message, thus overcoming a large number of cultural barriers.

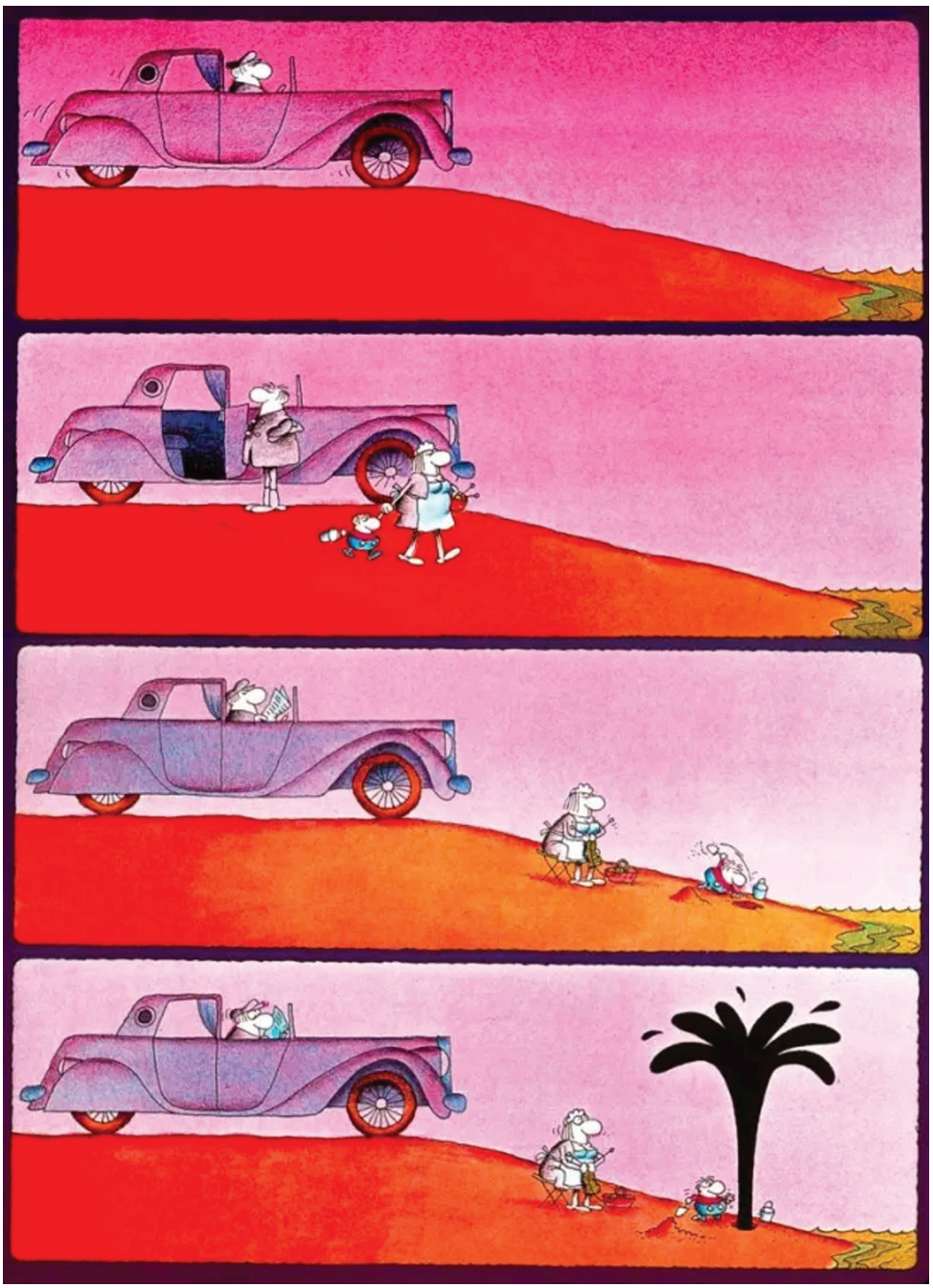


Figure 11. The cover (Oct. 1st, 2014) is a political satire of the current ruler of Catalonia (simulating Superman), as opposed to his corrupt predecessor, in green (kryptonite), who is raised in hands, by the Spanish Prime Minister.

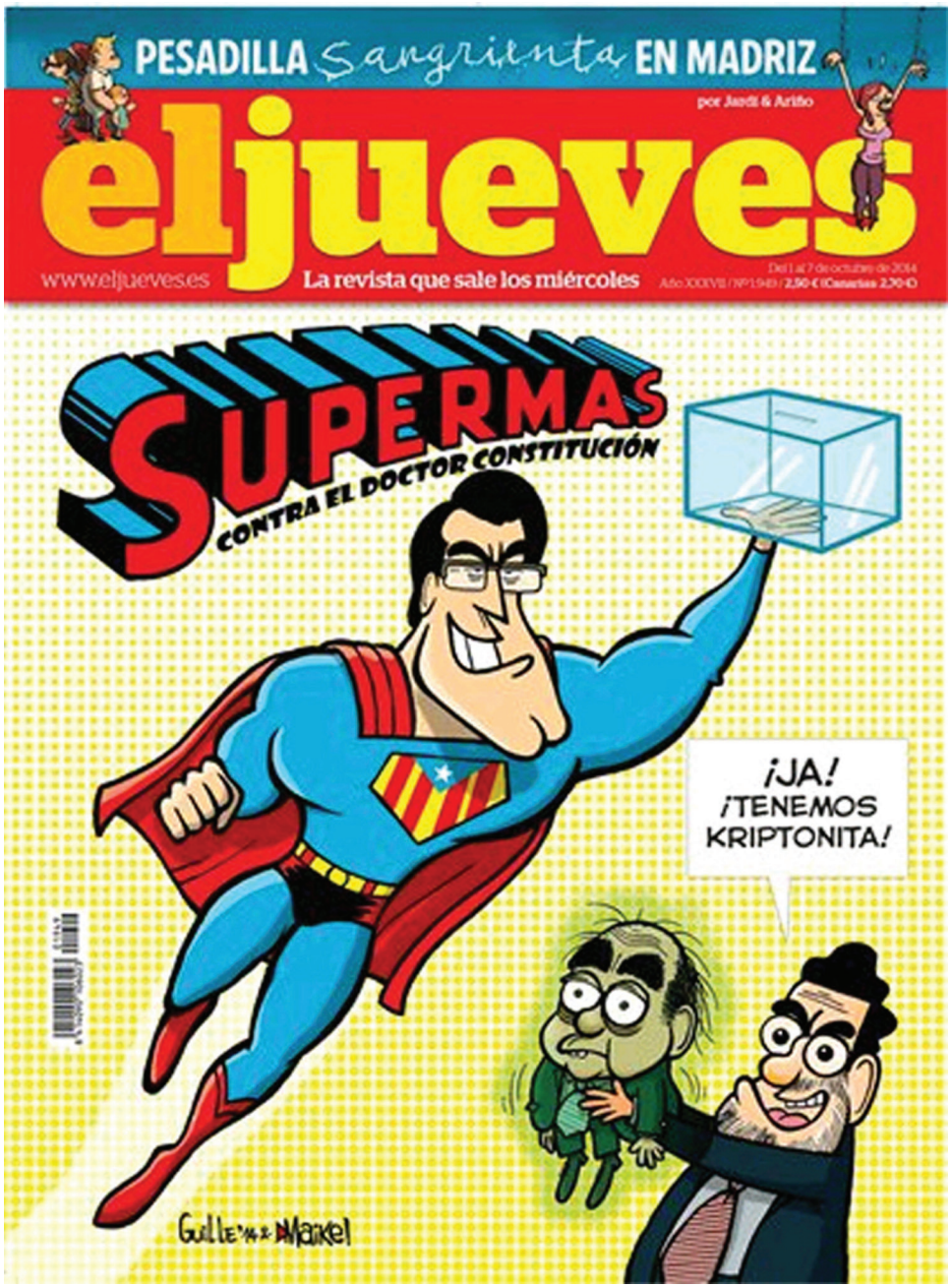


Figure 12. On the cover there is a reference to the events in the US Congress (Jan. 6, 2021), through one of the characters symbolizing that attack but in a Spanish version. The balloon reads: "This is the future of Spain."

The reading of comics in Europe and on paper has many followers belonging to the Silent generations (1925-1944), Baby Boomers (1945-1964) and Generation X (1965-1980). The appearance of interactive video games on personal computers in the 1990s and later on video game consoles made their interest gradually decrease. In this sense, Generation Y or Millennials (1981-2000) is a kind of bridge that closed an entire cycle. The new generations Z or Gen Z (2001-2012) and Alpha (2013-present) are more focused on social networks (Stillman & Stillman, 2017; Cipolla-Ficarra, 2022). This does not mean that it can be revalued in the educational process since one of the functions of the comic is entertainment. Therefore, it favours learning in an entertaining way. Such is the case that it may be the ideal strategy, before diverse users and with different cultural levels, in learning the use of computer systems at a distance, within virtual universities (Starskey, 2012; Cipolla-Ficarra, 1996). This function is the seventh feature.

The eighth and last is the ability to tell a story where there are no digital or analog records, through the lenses of cameras, video cameras, etc. For example: In trials where the recording of images with electronic devices is prohibited, or in catastrophic situations, when there are no survivors such as a plane crash, the sinking of a ship, and so on. In the latter cases, a good cartoonist can relate what happened by using a strip of vignettes.

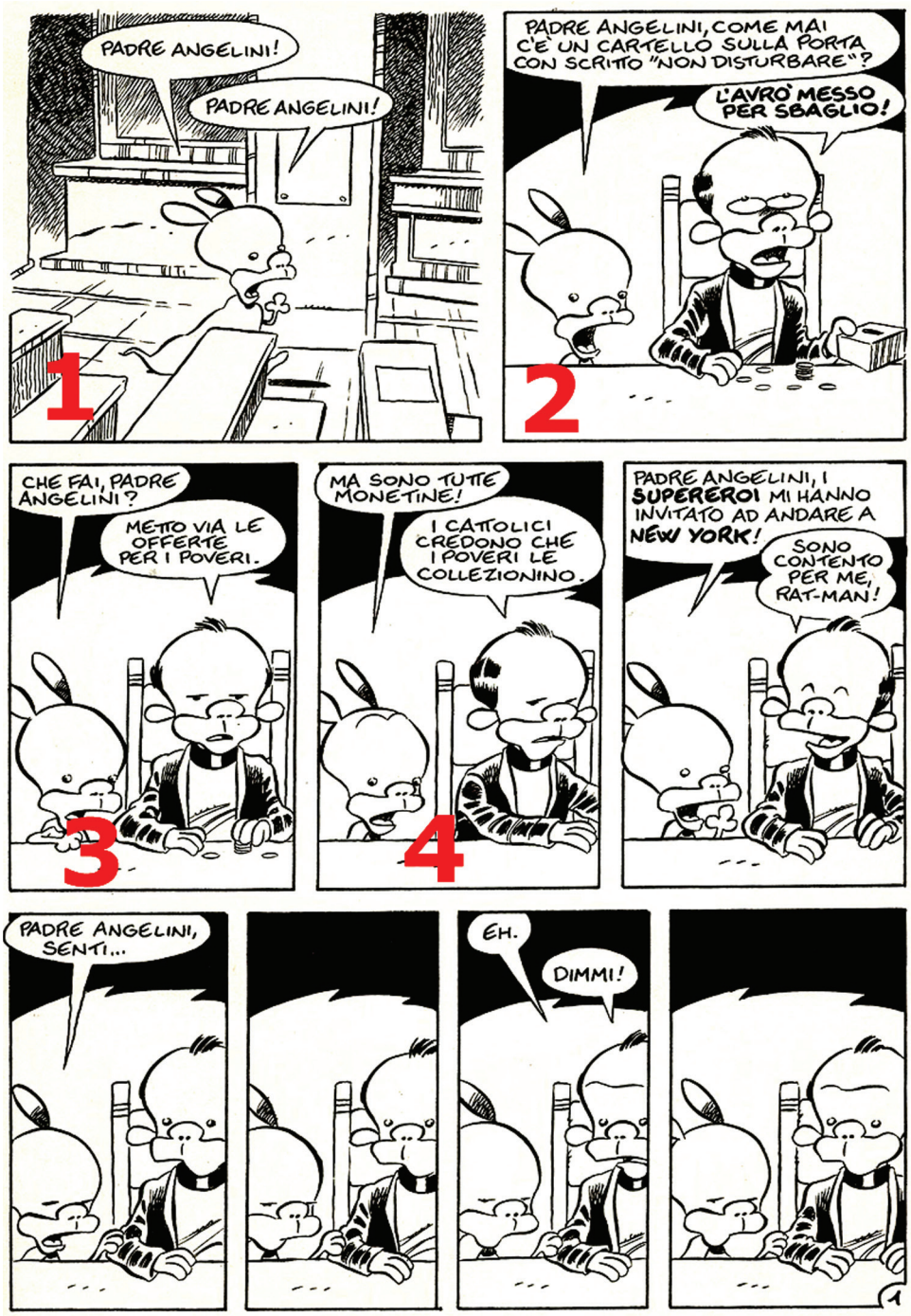
GLOBAL CRISES AND COMICS REVALUATION IN EDUCATION, SCIENCE FICTION AND NEW TECHNOLOGIES

Humour, adventure, imagination, science fiction, etc., they are elements that, through comics, can be combined in the right way to increase the cultural level of students and socialization (Frey & Fisher, 2008; Starskey, 2012; Weaver, 2013; Cipolla-Ficarra & Cipolla-Ficarra, 2014; Cipolla-Ficarra, F. et a1., 2014). **In emergency situations where face-to-face communication is supplanted by communication through plasma screens, comics can play a very important role.** Hence, the need to return to each of these common denominators, characteristics, isotopic lines, etc., and those that may be generated as the latest novelties and/or experiences from cinema, theatre, literature, journalism, 3D, ICTs, etc., are incorporated within the comic. The main objective of all this confluence of concepts and practices is to transform them into motivating activities for learning, when in the development of the lessons in the real classrooms; it is not allowed by the contextual circumstances. In short, the reasons for calamities (natural or not) are beyond the management and / or control of teachers and the rest of the educational authorities.

Science fiction is an interesting literary resource to attract the attention of young people to the study of formal and natural sciences, as well as everything related to new technologies. These technologies have nowadays range from applications to the space industry / artificial intelligence, passing through smart cities, for example. Through the comic it is possible to investigate the impact of these technologies on the human being and the natural context in which she / he is immersed.

In the literary works of science fiction, the time reference is always the future. For example, in the works of the science writer and populariser, Isaac Asimov, robotics has been its central axis, without neglecting other aspects related to humour and the new generations (Asimov, 2005). In the time variable of science fiction, the short, medium and long-term future is the common denominator that can be seen in the works of Arthur Charles Clarke, George Orwell, Herbert George Wells, Ray Bradbury, Jules Verne, among others (Simpson, 2001). However, there are several representations of that time related to the future: Apocalyptic integrated (these two notions refer to the work of Umberto Eco); utopian — cacotopian, unreal — real or feasible (Eco, 2000; Noth, 1995). In some of them there is the vision of the

Figure 13. An example that refers to two realities. The first, utopian— real as it is to have the doors of the church closed. The second, unreal — real derived from an economic activity such as the counting of coins and the inclusion of electronic payment systems in churches, through the use of bank cards. Rat-Man Gigante #64, April 2019, p. 1 (www.rat-man.org)



human being towards new technologies as something that can and should be integrated into daily life. In other cases, as something that should be avoided and widely rejected, due to the possible damage that it can cause to the daily coexistence of people. Also, there is a desire to achieve certain objectives, which today may be impossible or unrealistic due to the current state of technology, and other people see ways to follow to obtain improvements for all, that is, the common good.

Currently, there is a tendency to consider science fiction as alternatives to the social conditions of the current human being. For example, in the first four vignettes of figure 13, from the Italian fumetti magazine *"Rat-Man Gigante"* (Giant Rat-Man, www.rat-man.org), the super hero (Rat-Man who simulates Superman), enters the church to establish a dialogue with the priest (Mr. Angelini). In just three vignettes, the author of *Rat-Man Gigante* Leo Ortalini introduces two real criticisms. The first of them is in the second panel, since the church has a closed door, with a do not disturb sign (non *disturbare)* since the priest is counting the coins received from the parishioners. The second takes place in the dialogue between Rat-man and Angelini (fourth panel), when the superhero exclaims to the priest that they are all coins, who replies that "Catholics believe that the poor collect them." This parody responds to the fact that in many churches in northern and central Italy, computer systems were installed to receive offerings through credit cards. In other words, sometimes reality is stranger than science fiction. The comic continues to be an effective instrument for synthesizing reality within one or more vignettes.

Regardless of the game of this bipolarity in the representation of time with the future, science fiction poses an ideal future as opposed to the present. Or in its alternative, an imperfect model that is a consequence of the present. In both cases, a background of rejection of what is the current society is observed. This rejection crosses all areas of daily life ranging from education, health, work, etc., to sports, the environment, the economy, politics, and so forth. Like the dichotomy between the apocalyptic and the integrated defined by Umberto Eco (Eco, 1990; Noth, 2000), we find ourselves with a technophobic vision (technology as the genesis of current evils in developed and/or emerging societies) and another technophilic / technophile perspective (technology as a useful instrument for personal development and social well-being). An analysis of science fiction works can be done following several of these perspectives.

One would be from the temporal and technophobic point of view, for example, where the rupture of the pre-established order is considered a necessity in view of the continuity or survival of society. Second may be the exploitation of the environment through the use of technology, to transform inhospitable spaces for human beings into habitable spaces. For example, the tropical forests, the sandy deserts, the glacial lands of Antarctica, etc. Third: Adaptation and evolution of the human being in these imaginary environments. An adaptation, that may or may not be feasible, through biological mutations or technological inventions. In the negative or non-feasibility case, it would mean the end of the human species. Thus, the technology in various works of science fiction literature is ambiguous. In this sense, it is worth mentioning the works of some writers, who since the 19th century opened new horizons to imaginary universes. Their works entered the collective imagination of readers, attracted by the extraordinary, fascinating and unusual narratives.

In our days, writers such as Edgar Allan Poe, Edgar Rice Burroughs, Gaston Leroux, Herbert George Wells, Howard Phillips Lovecraft, Jack London, Jules Verne, Mary Shelley, among others, continue to attract the attention of readers, due to their imaginative capacity of going ahead in time, to describe dystopias and incredible worlds, in works such as: Time Machine; The Machine to Kill; The Invisible Man; Frankenstein; The Gods of Mars; A Princess of Mars; From the Earth to the Moon: A Direct Route in 97 Hours, 20 Minutes; The First Men in the Moon, and so on.

Cacotopias and imaginary scenarios have been the result of the rhetorical questions made by these visionary writers. The answers denote profound changes (positive and negative) due to the advancement of science and technology. However, the catastrophic or apocalyptic vision of technological progress is generally preceded by a positive vision. The continuous progress of science and new technologies opens new lines of research, theoretical goals, practical challenges, etc., in the societies. All this, to be developed and achieved, in the short, medium and long term. Therefore, this contrast is a kind of justification for the present, since scientific and technological progress, beyond the implicit danger, is what ensures the continuity of the human being.

In many of the science fiction treatises, an attentive gaze is directed towards space. For this reason, the conquest of space is a recurring theme in literature and in the collective imagination. In this sense, the works of the Belgian, Georges Prosper Remi, known worldwide as Hergé (Goddin, 2015). Through his comic character "Tintin" it is possible to examine a considerable number of variables that intervene in the elaboration of a comic strip, comic book, comic album, etc. Through his albums related to the conquest of space such as "Destination Moon" (1953) and "Explorers on the Moon" (1954) it is possible to carry out practical exercises with students, in periods of crisis or emergency situations.

The first album compiles the weekly strips in Belgium's Tintin magazine from March to September 1950. The second album contains the strips of the same magazine, which go from October 1952 to December 1953. In the first place, these works of Tintin can be contextualized with the news of the time in the newspapers, for example. In this sense, it is worth mentioning news such as: The war problems between North and South Korea; The war in Indochina; Storms and floods in the North Sea; Creation of the European Coal and Steel Community (ECSC) between Belgium, France, the Netherlands, Luxembourg and West Germany, that is, the genesis of the current EU; The Cinemascope is imposed in movie theatres to counteract the advance of television, among many, other events at the time of making the strips.

At the same time, in the scientific field there are multiple variables to consider before making the strips, following the detailed style of authors such as Hergé, who previously documented all the technological advances of the time. In the case of the trip to the Moon, these two albums are prior to the Apollo 11 mission, taking the human being on lunar soil for the first time (July 20, 1969). The covers of the original albums are in figures 14 and 15. Consequently, many illustrations are successful from a technological point of view, while others have not been or have served as lines of future research. In the vignettes it is important to consider aspects such as: the observation of the Moon through telescopes, the mapping of the lunar surface through photographs, the selection of the best place for the moon landing, the lunar scenarios where the special vehicles for exploration move around, and so forth.

Another aspect is the study of rockets, propulsion engines, fuel for those engines, towers for rocket launch, etc. For example, after World War 1, Europeans and Americans began to study rocket propulsion and the type of fuel. However, as early as 1896 there are Russian studies on liquid fuels. The first experimental rockets were sent with probes for analysis of the atmosphere. Simultaneously, and the same as literature, the audiovisual would motivate a new generation of scientists in astronautics, with the German film by Fritz Lang (1929), Woman on the Moon *(Frau im Mond).*

In the energy field, it is worth mentioning the research of Enrico Fermi on quantum mechanics and nuclear physics, the studies of the atomic cell or reactor, the diagrams of the atomic engine, etc. Also noteworthy is the use of IBM computers in the race to the Moon; the various means of communication between the Earth, the Moon and the astronauts: Radios and radars; the equipment and suits of the astronauts such as the use of the plexiglass helmet; the use of autopilot; the absence of gravity in space; the presence of meteorites; the architectural and/or industrial design of the lunar base, the ship's com-

mand room, the interior furnishings, the terrestrial and lunar means of transport, and so on. Finally, the transcultural aspects can be analyzed, through the clothing, objects, environments, etc., of the characters that intervene in the narration.

Figure 14. Cover of the album "Destination Moon" (1953).

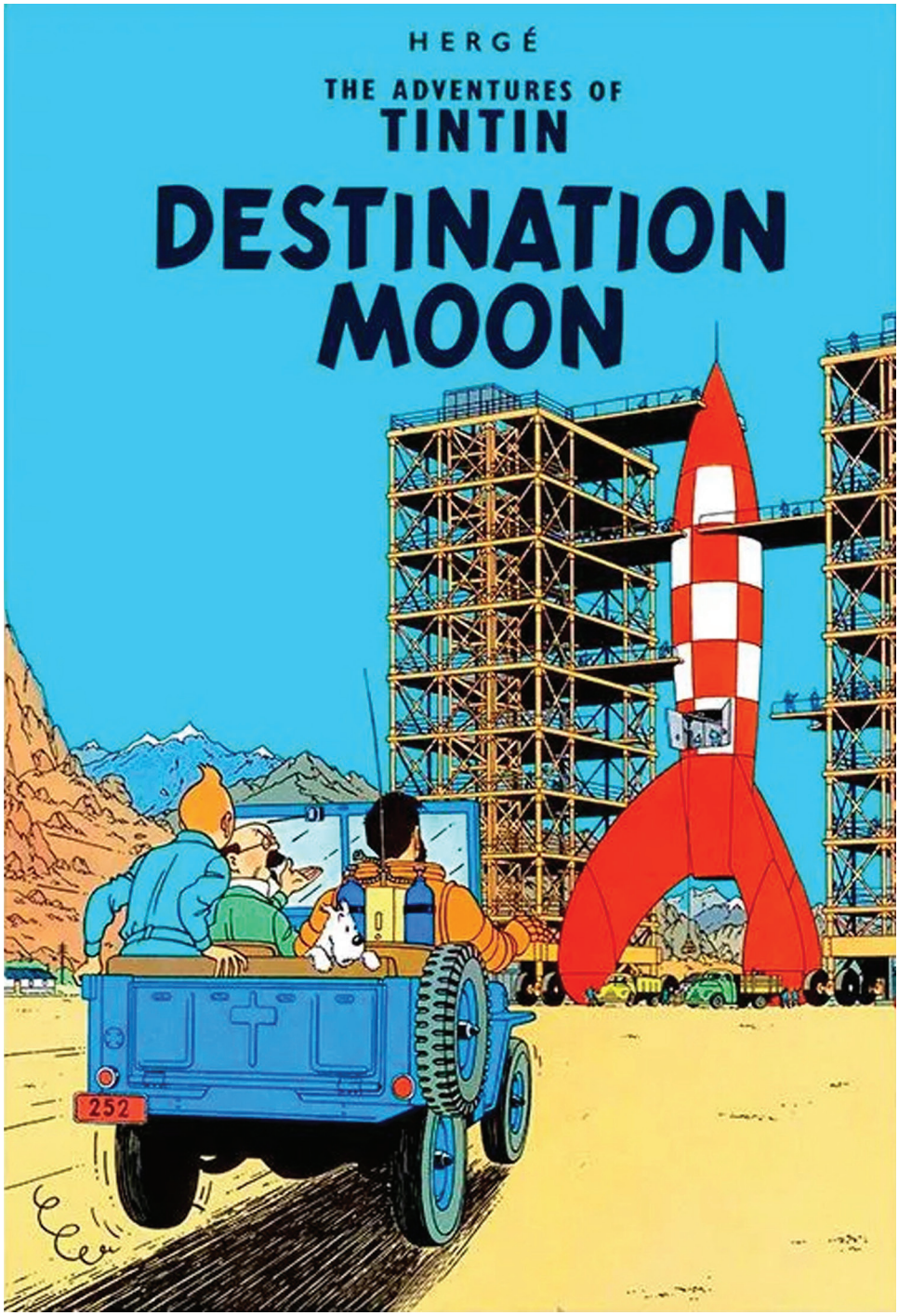


Figure 15. Cover of the album "Explorers on the Moon" (1954).

Each of these iconographic and textual communication aspects of these two albums can be study topics to generate debates or individual and/or group research tasks among students. One of them may be: How to correctly read the online information of university professors (for example, the curriculum vitae) before registering for engineering, bachelor's, master's, doctorate, specialization courses, continuing education courses, etc., in private, public and hybrid study centres. That is, avoid being scammed or deceived by the administrative and / or academic staff. Or, have future problems to finish the studies

and achieve their certification. In figure 16, we have a perfect example of Lombard dystopias, through its public educational missile system (training + academic positions).

Within a decade, a Lombard "nuclear engineer" becomes a "finance professor" (figure 16). That is to say, at the same time, back then, a foreign citizen was needed in some Spanish public universities to obtain a doctorate (Andalusian or Madrilenian natives obtained it in just three years —see example, chapter: "Reviewing the Components of Evaluation Methods"). From there, the missile's Garduña and Lombard fuel will take it with supersonic speed towards an aeronautical and airport career, flag carriers, rectory, honorary doctorates, maximum state honours, and a long etcetera.

In annex #1, section B (chapter: "Transforming Digital Challenges into Digital Opportunities: Truths and Lies") you can see part of the rest of the curriculum, from that missile metamorphosis, which goes from nuclear energy to finance, in a first phase. Meanwhile, the flagship companies are dismantled, the university he directs is one of the worst ranked for managerial transparency, the Italian honorary degree *"Doctor Honoris Causa"* comes from a region with the highest rate of national, European and international crime. This is a classic example of the inversion of the triangle elaborated by Shannon and Weber (Shannon & Weber, 1963), through the inclusion of politics and religion, in mathematics. In short, a reality that surpasses all the adventures of hidden mysteries, treated in the works of Hergé and the rest of the masters of fictional literature. The reader interested in these issues of the mysteries of the null educational, administrative, legislative transparency, ICT evolution, and so forth, can read the following reference (Cipolla-Ficarra, 2021).

Contrary to this reality of the so-called "Lombard educational missile system", the works of Georges Prosper Remi have been gaining realism, with the continuous progress of audiovisual technologies, from the new millennium (Goddin, 2015). Particularly, it has been so with computer animation cinema. So much so

Figure 16. The Lombard missiles in education and the inversion of the Shannon-Weber triangle, in the spread of technophobia.

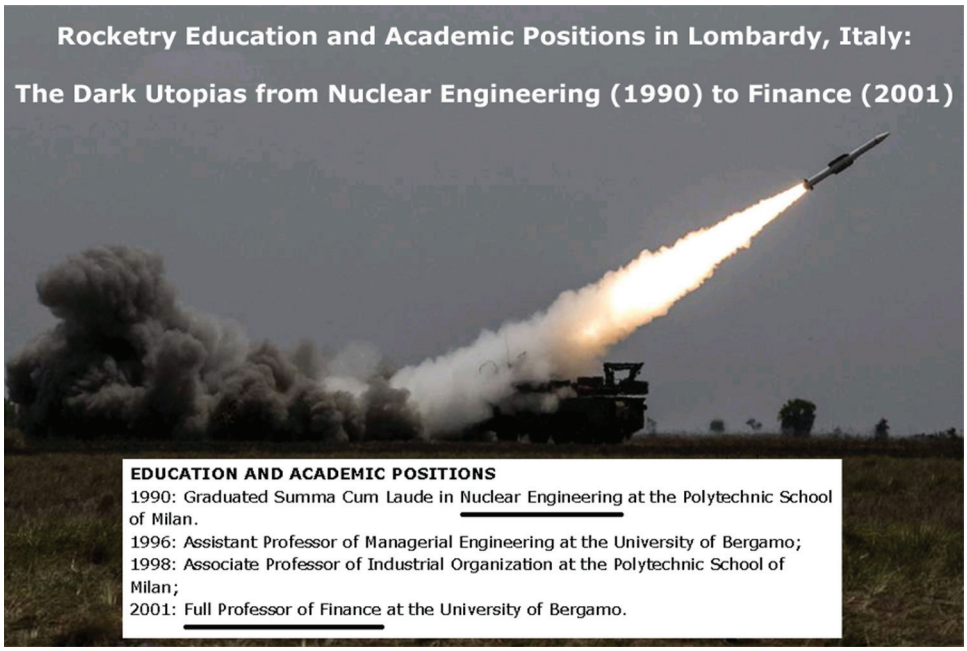


Figure 17. High realism achieved with the techniques and algorithms used in the rendering of computer-animated images in the film "The Adventures of Tintin" (2011).

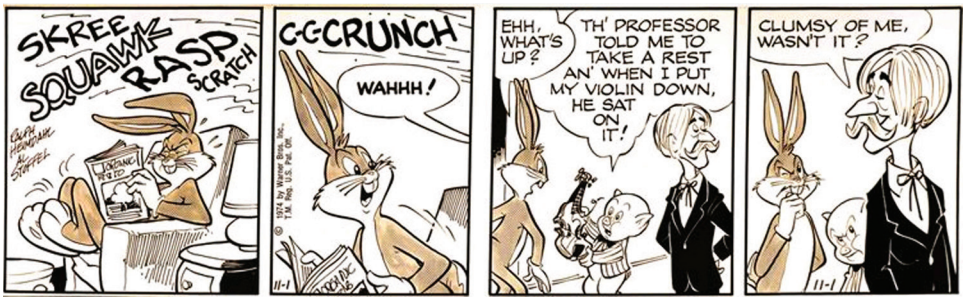
that in the first scenes or others throughout the film "The Adventures of Tintin" (2011), the viewer has the illusion of being in front of images captured with film cameras, when in reality they are scenes, characters, objects, and so on, reconstructed through three-dimensional computer graphics (El-Hakim, 2004; Voulodimos & Doulamis, 2020). In Figure 17 we have two examples of this. The comic can see the influence of cinema. For example, through the different shots used in the vignettes, such as: General, full, American, close-up, detail shot, among others. In the angle of the camera: horizontal, high angle, low angle, vertical prone, vertical supine, and so forth. Finally, the horizon that can be normal, inclined, etc.

Now, due to the screens of cinema, television, personal computers, tablet PCs, etc., the horizontal dimension is greater than the vertical dimension. However, these proportions can be modified in the comic, as can be seen in the distribution of the vignettes, within the pages of magazines, newspapers, and so on. Other constitutive elements of the comic that are splendidly present are the kinetic codes that express movement (trajectory and other effects), such as the simple linear trajectory (lines that mark the

Figure 18. Captain America and Agent Axis: "Tales of Suspense 82." Author: Jack Kirby (1966).

space covered by the characters, objects, etc.), the colour linear trajectory (spots of colour or by a trail of colour emptiness, in the colour publications), the oscillation (dotted halos or blurred elements that represent a vibration, for example), the impact (halo of lines or colour that represent an instant prior to the coalition), the clouds (which are accompanied by lines of trajectory), the kinetic deformation (distortion of flexible objects), the visual decomposition of the movement (blurring of the contours as it happened in some photographs of the 20th century, when the roll of the film was not completely rotated, before taking the photo), etc. Some examples of the kinetic codes are in figures 18 and 19. Other examples can be consulted at the following link, which refers to an online database of Walt Disney comic strips: I.N.D.U.C.K.S. (International Network of Disney-Universe Comic mowers and Sources — www.inducks.org).

Figure 19. Bugs Bunny & Porky Pig. Daily strip for Warner Bros, published on the 11/01/1974.



Hergé's works were characterized by a social, cultural, technological, informative, formative richness, etc., in each one of his adventures. Within those albums, the set of vignettes denote not only the cartoonist's interest in the technological reality he was immersed in, but also the possibility of anticipating the future. This temporary advance implies a constant study and analysis of the latest technological advances. Undoubtedly, in some cases there were successes and in others mistakes. Hence, the need to be evaluated based on the temporal context and the information available to Hergé, at the time of making his strips.

GESTURE AND COMMUNICABILITY

One of the keys to the success of a comic strip is the technical and innovative capacity of the cartoonist in detecting all those elements that are in the aesthetic expressiveness of the main and secondary characters. Simultaneously, this ability is accompanied by the observation of events, the commitment to the context of belonging and the power of synthesis, as has been seen in the first macro-vignettes or in figure 13. More precisely, in that figure it is in the fourth vignette, with a strong criticism of the church towards the alms received from the parishioners, in the Milanese homilies. That attentive look at the characters has other components that are related to morphopsychology and close-ups of the cinema, for example.

Besides, it is necessary to consider whether the reader already knows the character or characters in advance, in the case of political parody. It can also happen that the characters have been readapted to the new media, as is the case of the comic strips in the newspapers, then they go to the magazines, and from the magazines to the albums. From analog support to digital support in 2D, whether in television series up to 3D cinema and / or three-dimensional video games. An example from the middle of the last century to the present day is the Peanuts by Charles M. Schulz (figure 20). Currently, that chronological order can be reversed, that is, go from a video game to a comic strip, prior to a film, as is the case with Tomb Raider (Lara Croft, a British archaeologist), figures 21, 22 and 23.

Diachronically, in the examples of Lara Croft, there is no more than a three-dimensional version of the character, with little realism in the image, since at that time the hardware available for video games (personal computers and consoles) was limited for audiovisual synchronism and high resolution of the final images (1996), generated by computer. In other words, the speed of navigation took priority over the quality of 3D images. Later, with the film version (2001), in which the role of Lara Croft is played by the American actress Angelina Jolie, the realistic dimension opens up, in the process of communication

Figure 20. The Peanuts 3D Film —www.peanuts.com (2015).

Figure 21. Video game cover, marketed since 1996.

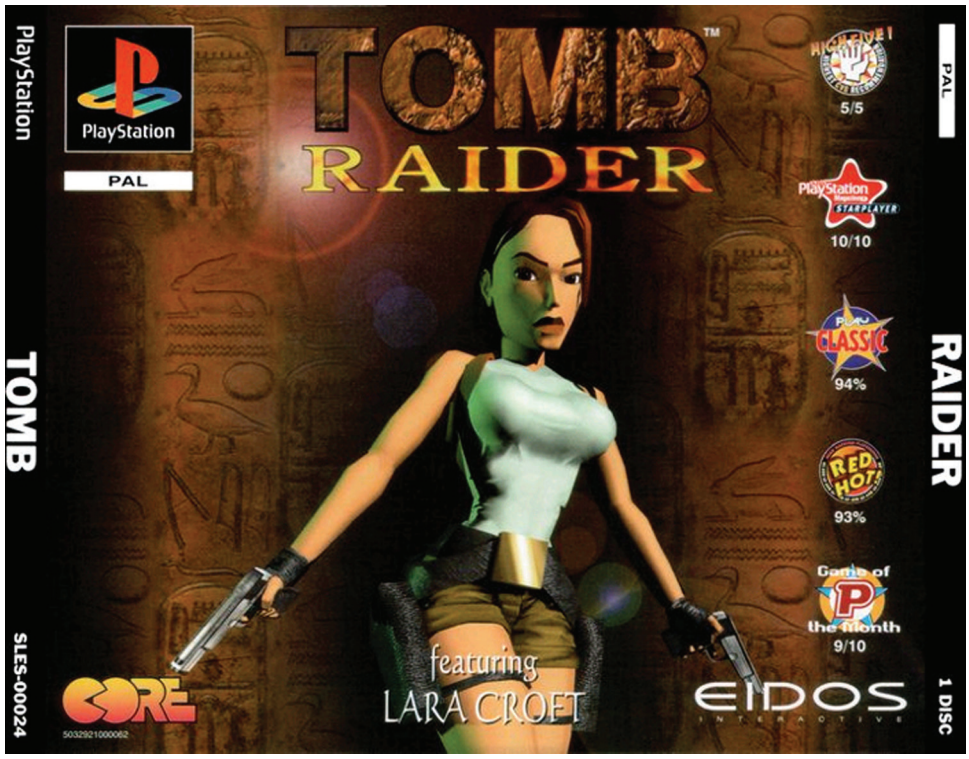


Figure 22. Lara Croft: Tomb Raider. A film made in 2001.

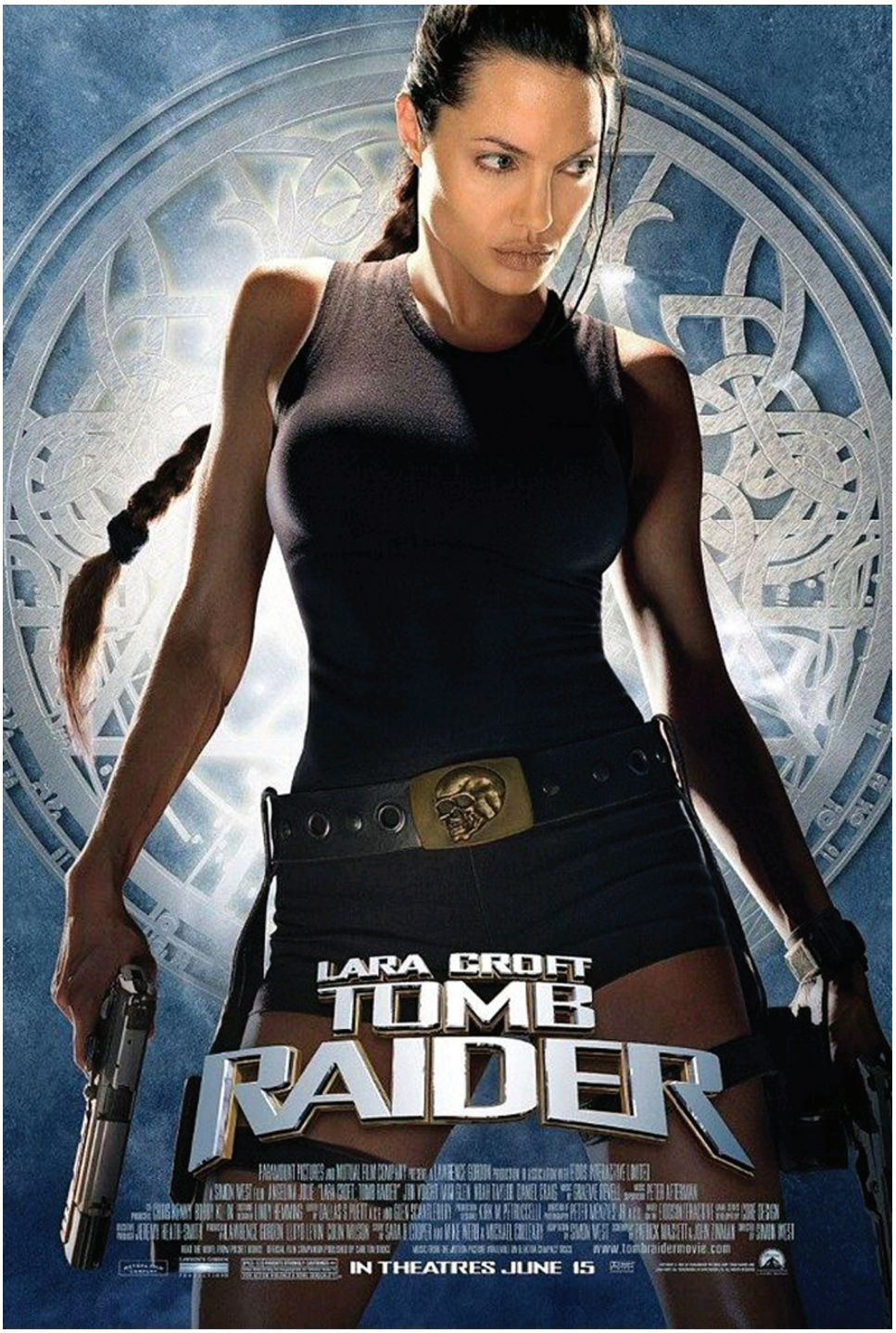


Figure 23. The eighth cover of Tomb Raider magazine, edited by Dark Horse Comics (2014).

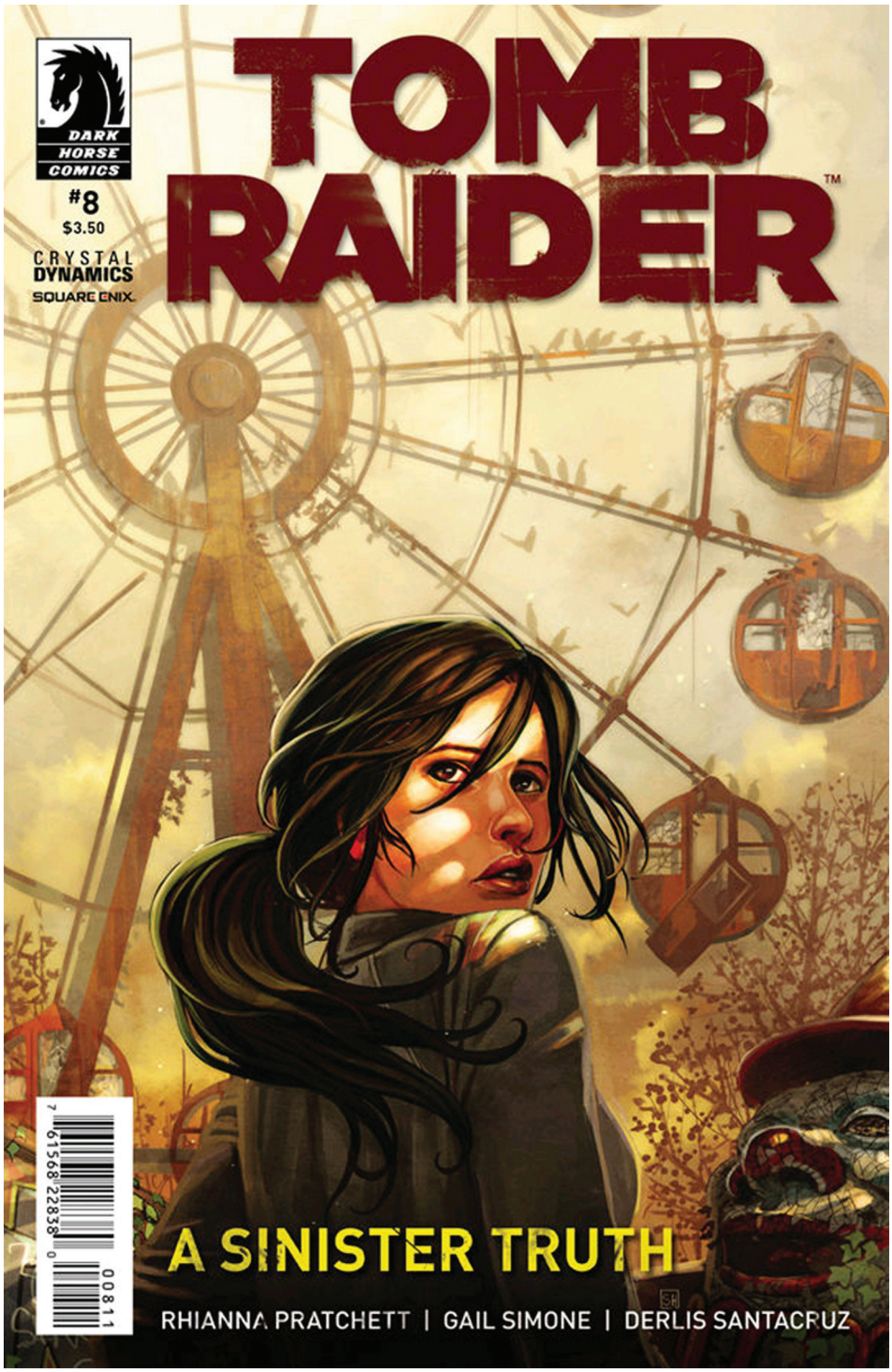
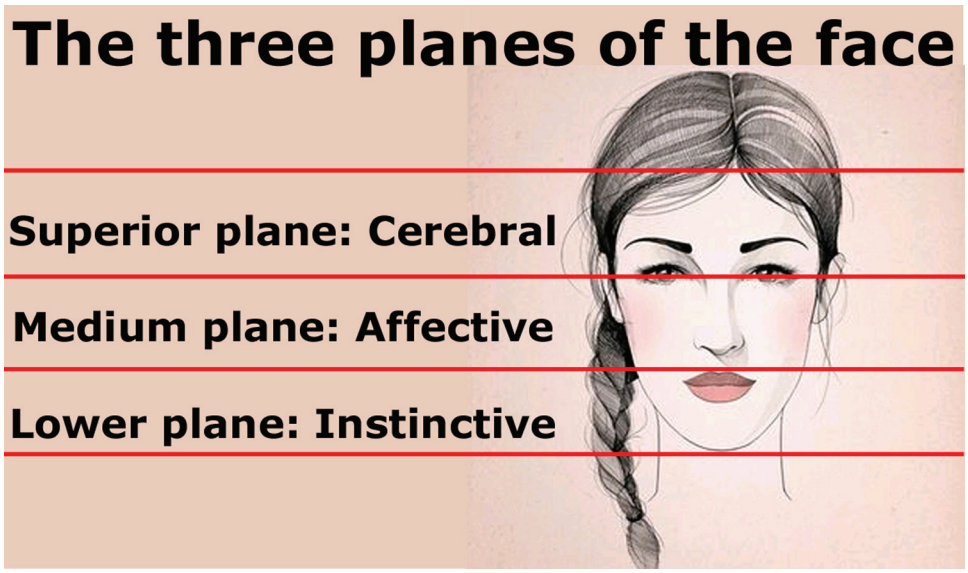


Figure 24. Three levels of the face.



with the users of the video game and later with the comic. The latter would adapt to an iconographic style, more similar to the graphic photo novels of the mid-20th century, than to the classic strips of the same period.

Besides, having a human reference allows more detailed studies from the morphopsychological point of view (Corban, 2018; Spinetta, 1987). These types of studies are interrelated with the notion of emotionality of interactive systems, currently considered as the central axis of software engineering, IoT, HCI, UX, etc. (Schachter, 1964; Bartneck & Lyons, 2007; Wadley, et al., 2022). However, the central core or kernel of software, with or without artificial intelligence, remains communicability. **Empathy, emotion, playability, ecosystems, etc., are terms currently used for mercantile purposes, inside and outside the educational field.**

Much of the acceptance of characters in comic strips for albums, books, fanzines, magazines, newspapers, etc., in our days is concentrated in the convergence of close-ups, facial gestures and morphopsychology. Among the expressive resources are those that seek to externally describe the characteristics of the character, and others that pursue the attraction of the reader, so that he identifies with them and participates in their actions. In both cases, there is an implication and complicity of the cartoonist with the reader, through the gestures of the characters.

From a morphopsychological point of view it is possible to establish three levels of the face (Corban, 2018; Spinetta, 1987): Cerebral, affective and instinctive-affective (figure 24). Structurally, it refers to the eyes, nose and mouth, and that each of them can be called "receptors" towards the recipient, where the eyes always have the greatest impact on the reader. From these three levels derive the thought, feeling and action of the human being. These three functions are not developed in a similar way among all human beings. Furthermore, there is generally a predominance of one of them, over the rest. For example, the instinctive level or plane is related to the unconscious functions of the human being, in feeding or reproduction.

The affective plane occupies the central part of the face: Nose, cheekbones and cheeks. Here you can manifest a continuous source of conflicts between the proposed objectives and those really achievable in each of the people. This derives from affective life and is intertwined with social life, both inside and outside the group to which they belong: family, friends, fellow students, co-workers, etc. Finally, there is the brain plane that encompasses the forehead, temples, eyebrows, eyes, and eyelids. It is the plane of thought and within morphopsychology it denotes the degree of receptive and emitting intelligence. In addition, the structure of the forehead implies other considerations such as the slope, the solar form (longened towards the height, that is, an inverted isosceles trapezoid), the lunar shape (lengthened towards the sides, that is, vertical oval), the curvature of the eyebrows and eyes, etc. The ears are located between the superior cerebral plane and the middle affective plane.

From these first morphopsychological notions and taking into account the expressions/gestures of the characters observed in European and American comic strips, it is possible to establish lists or classifications of them, which may vary in different cultures. For example: eyes wide open (astonishment), eyes closed (sleep), eyes wide open (anger), eyes to the side (distrust), high eyebrows (astonishment), eyebrows bent in a "/" or "V" shape (irritation), horizontal eyebrows (neutrality), shadowed nose (coldness or drunkenness), open mouth (surprise), smiling mouth (approval or happiness), smiling mouth showing teeth (hypocrisy), raised hair (irritation or despair), and so on.

The combination of the expressions of the eyes, mouth, nose, hair, ears, and so forth, generate several meanings: Serenity when there is a predominance of horizontal lines between the eyebrows and the mouth. Total happiness is achieved with the eyebrows curved downwards and the line of the mouth arched upwards. Anger when the eyebrows have a "/" or "V" shape facing the centre of the face and the line of the mouth curves down. We can see the perversity at the moment of combining angry eyebrows with the mouth of joy. And so on with the rest of the possible combinations. These combinations can also vary over time and depending on the factors of endoculturation and transculturation of the new generations. Now, all these expressions are related to what is currently known as emotion. An emotionality that can make the characters more or less empathic, friendly, sociable, etc. since they are related to the expressions that derive from elementary feelings (joy, melancholy, sadness, anger, and so on), behaviours (provocation, mockery, deception, aggression, and so forth), and daily actions (work, study, walking, eating, etc.) to cite three groups.

AN EXPERIMENTAL TEACHING METHODOLOGY

One of the ways to entertain and educate young people in health emergency situations (local, regional, national, and international) can be to carry out research tasks that can later be viewed, in the format of a cartoon for the rest of their classmates, for example. In our case, we have worked with 28 students from an artistic high school, whose ages range between 15-16 years. These tasks can be carried out individually or in groups, where the student describes and recounts her own experience, through the use of vignettes, using the largest possible number of communication resources available in the comic. Comics can be made through the use of technological devices (PCs, tablets PC, etc.), or in analog format (paper).

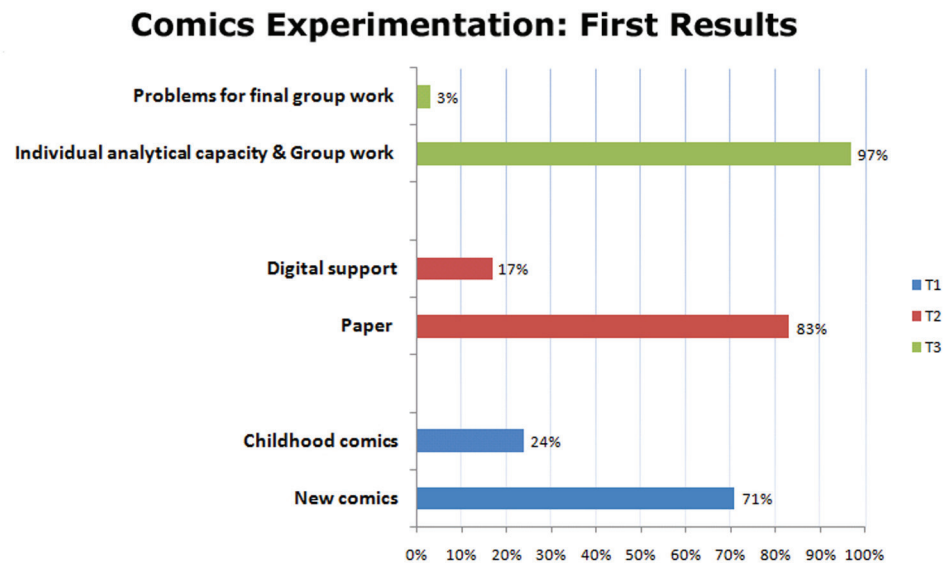
In the first place, those areas on which the comic is going to work are defined and which will serve as a model to follow in the production phase. That is, the structures (shapes, dimensions, lines) and their contents, whether from the iconic point of view, as verbal or textual. Subsequently, it is decided what types of comics are going to be examined from the historical perspective, for example, those of the 20th

century or the new millennium. From this division begins the analysis of the design of the characters, objects, scenarios, and so on; cinematographic aspects (planes, angulations, horizon, and so forth); movement or action of the characters (gesture, expressiveness, etc.); psychological profile of the characters (heroicity, humanity, prejudices, among other positive and negative values), the purpose of the content (educational, informative, humorous, etc.). In this process, teamwork and individual work are combined.

Reviewing the content, those vignettes that have the greatest number of sociological, historical, science fiction, new technologies, and so on, references will be sought. In these vignettes, structural and content resources will be studied. For example, locate interjections to convey sensations (joy, surprise, greetings, calls for attention, etc.) and onomatopoeia to indicate sounds or noises of nature (thunder, rain, wind, and so forth), musical instruments, electronic objects or work tools, people (sneezing, walking with boots, etc.). The objective is to establish a categorization among those most used. The style used in the communication of the characters can also be categorized, when they resort to close-ups to convey their emotions. The latter can be considered a starting point for the second set of activities. Activities that consist of the generation of various gestures, starting from geometric figures such as the inverted isosceles trapezoid and the application of the notions of morphopsychology and the expressions observed in comic strips.

Finally, there is the task of creating a comic on a page, in which purely creative activities are developed. In other words, the combination of group, individual, critical-constructive work techniques and the ability to communicate personal experiences through comics are summarized. Figure 25 shows the means of the results obtained from those activities that the students have evaluated anonymously. In the first task (T1), more than 75% of the students have begun by analyzing the comics of the new millennium, mainly from Marvel (www.marvel.com). Others have chosen to analyze the characters of childhood whether they are of American, European or Japanese production. In both cases, the influence of the audiovisual (television and cinema) and interactive videogames persists. However, then the students have continued with the interest of knowing the origin of the comic, analyzing the comic strips of their

Figure 25. Results of the three tasks assigned to the group of students



favourite characters or those that have a certain similarity with the current characters, for example, Superman, Batman and Rat-man. In the second task (T2), more than 83% chose to carry out the gestural practices on paper. The last task (T3) is the most significant since the entire group (28 students) have been able to express their personal experiences, in comic format, where 31% have resorted to the use of the macro vignette. The acquisition of intellectual work techniques aimed at individual analytical capacity, such as group work, has been achieved by 97%. In final phase, only 3% of the students had personal or technical problems for group work.

The results obtained show the high interest in comics by young people, in each of the three tasks that were assigned to them. These tasks can be complemented and updated with other activities when face-to-face lessons return to normal. For example, transforming those comics on paper into digital media, making 2D animations, establishing a debate about why comics are liked or criticized negatively, creating dialogues between characters, generating storyboards for computer animations based on comics, etc. Finally, and **from the point of view of the socialization of the members of a class, the comic can be regarded as a valid instrument for an effective integration of new students, coming from catastrophe areas.**

LESSONS LEARNED

One of the most common criticisms in our days, in school failure, is the dependence on social networking and the lack of interest in reading. In the systematic analysis of a comic, the ability to constructively assess the components of the comic has been verified with students belonging to generation Z, taking into accounts the temporal, social context, etc., at the time of completion. Interest in its historical and artistic aspects has also been increased, such as understanding the technological evolution of the graphic arts, especially in the transfer from paper to digital support, or the interrelationships with the works of classical painters, to mention two examples.

Another important aspect is the strength of cohesion within a group, since all the students have narrated their personal experience, in the first lockdown period, due to the Covid-19 pandemic, through a short comic strip. A rudimentary cartoon that has served as a catharsis mechanism to free themselves and share with their colleagues a situation of concern towards the present and the future. The search for technological elements has led them to increase their interest in science fiction literature. In short, they have verified the power of synthesis that comics have, and the possibility of comparing the past and the present, with a more attentive and constructive look towards the future. We can observe the democratic value that a vignette can have when a publication (i.e., magazine, newspapers, and so on) is constantly withdrawn from newsstands for showing the reality. This reality contradicts the cacotopian or anti-utopian system that prevails in certain autocratic geographical areas under the hypocritical mask of democracy. Hence, satire, parody, humour, and so forth, concentrated in specialized publications in comic strip format, are cathartic channels for the population that suffers from the lack of authentic freedom.

CONCLUSION

The comic remains a valid instrument to connect millions of human beings, regardless of the place that the person occupies in the social pyramid, to which she belongs. Some of the resources of cinematographic language, specifically close-ups and the application of morpho- psychological knowledge of the face and personality, for example, have a high communicative power in the recipients of the cartoon. Besides, the creative ability to transmit universal messages through silent comics is something that still cannot be overcome by artificial intelligence.

Although this international communicative process takes time to achieve by the authors, we believe that with the present set of strategies the first bases for future research have been established. Research in which graphic, literary, humorous, psychological, sociological, informative, educational, technological, and so on, components continue to accumulate. The short-term goal is to reassess the use of comics in teaching, inside and outside the classroom, in the face of the advance of the "tile culture" through transmedia. The language of the comic allows events —serious or not— to be expressed in an entertaining way, which does not mean suppressing the realism of the facts of what is being narrated. It can also become an alternative means to the need to always be connected to the network, for the learning process. The three tasks carried out by students in times of pandemic demonstrate the great interest of young people in being connected to each other, sharing experiences, learning from the past, carrying out experimental practices and projecting themselves into the future together.

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ANNEX #1: COMICS AND STAMPS

Stamps, coins, souvenirs, etc., in many African countries (Burundi, Kenya, Liberia, etc.) or small European states (for example, the Republic of San Marino, Malta, Luxembourg, etc.), these are regarded as a source of income for numerous inhabitants. Furthermore, there is generally a fusion with the theme of the comics. In the attached examples you can see an American audiovisual industry (DC Comics www.dccomics.com and Marvel www.marvel.com) that has been characterized for decades in generating fictional characters and taking them to all social and interactive communication media, since the 20th century. Currently, they continue with this process of adapting to new media and including all technological advances, real and fictional, in their creations. Therefore, the audiovisual industry in that country is a great planetary industry, thanks to the imagination of the creators of these characters, represented in figures 26 and 27, to mention a couple of examples.

Figure 26. Detective Comics Inc. —DC Comics, www.dccomics.com

Figure 27. Marvel —www.marvel.com

Chapter 11
Reviewing the Components of Evaluation Methods

ABSTRACT

The present research work consists of a revision of the main components of the evaluation methods, from the educational, technological, and scientific perspectives. It highlights the interrelation of mathematics, the media, and the social sciences in the generation of new educational paradigms. The advantage of diachronic and synchronic storytelling is also disclosed to confront historical and current realities in secular European institutions, which have an international projection and are aimed at education. Finally, the contributions of the formal, natural, and social sciences are investigated in the generation of evaluation methods, techniques, and instruments that range from usability engineering through user experience to the expansion of communicability.

INTRODUCTION

The scientific method has allowed great advances over the centuries ranging from the formal sciences to the social sciences. Robotics, the metaverse, distance education, the design of interactive systems, 3D digital special effects for the cinema, the security of communications in mobile telephony, and so on (Spool, 1999; Goulekas, 2001; Levi, 2004; Genkin, 2016; Yadav, Stephenson & Hong, 2017; Wilkins, 2019; Kress-Gazit, et al., 2021; Bonawitz, et a1., 2022), implicitly entail mathematics, either in the elaboration of algorithms in the programming of interactive systems as well as in the use of commercial applications, to mention two examples. Some branches of the formal sciences are devoted to the study of numbers and their properties (arithmetic), the solution of unknowns (algebra), the laws of reasoning (logic), the systems that evolve (analysis), the property of figures (geometry), prediction of the future (statistics and projections), etc. (Suzuki, 2001; Boyer, 1991; Chaber, 1999; Edwards, 1994; Boyer, 2004). Each of these branches over time and applying the scientific method have received important contributions for their development and growth, becoming fundamental areas for the current expansion of the communicability and quantum-nanotechnological-self-sufficient era (Cipolla- Ficarra, 2018).

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Temporarily with geometry we can go back to 2000 years before Christ, since the figures have preceded the numbers to solve practical questions such as length and areas. Some examples of fundamental contributions come from Pythagoras with his theorem; Euclid with his axioms of plane geometry; Cartesian with coordinate systems; Riemann with curved spaces; Poincaré with topology, and so on (Suzuki, 2001). All of them make up fundamental aspects of geometry, in current programs designed to generate 3D images by computer, whether static or animated. Continuing with this analysis we can mention the works of Fermat (pioneer in the theory of numbers) or the modern number theory of Gauss. Both researchers are fundamental to arithmetic, which is the purest branch of mathematics (Boyer, 1991; Chabert, 1999; Suzuki, 2001; Edwards, 1994).

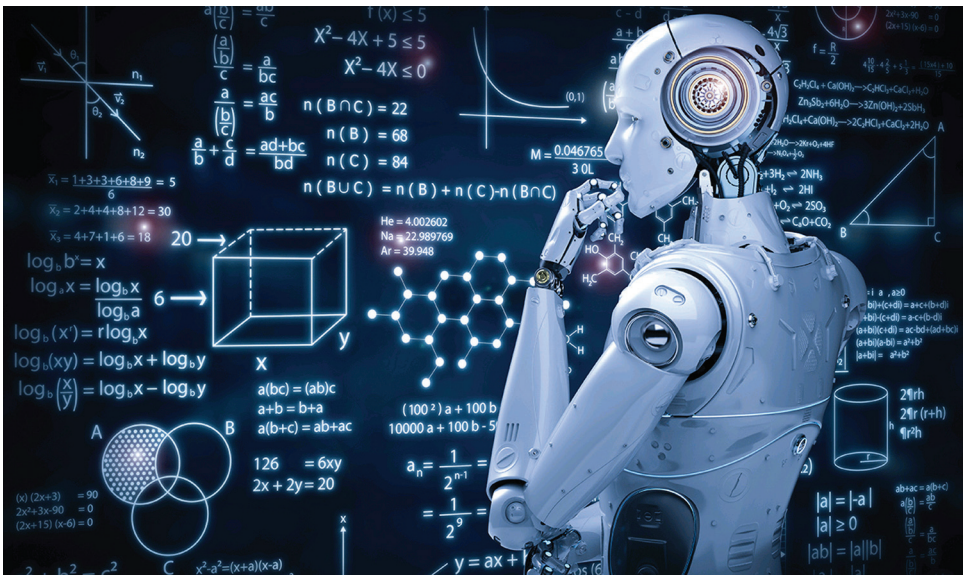
In the field of abstract algebra are the works of Galois, although the solution of the unknowns (modern algebra) has its origin in the Far East. The term "algorithm" derives from the works of the Persian Abü Ja'far Muhammad ibn Mfisä al-Khwärizmi —mathematician, astronomer and geographer (Chabert, 1999). Currently, this term is acquiring a negative value in the social sciences due to the infodemic chaos of the network. This chaos we can see in the algorithms used in communication as the cause of the end of the meaning of words, becoming a set of meaningless commands. So much so that the rise of big data has generated the term "algocracy" (the autocratic power of algorithms).

Evidently, this involution is not related to systems that change in nature, analysis being the branch of mathematics for its study. Included in this scope are the works of Newton with his foundations for calculus and mechanics; Leibniz and the infinitesimal calculus; Weierstrass with his continuous functions, etc. The laws of reasoning that arise from a bet in the seventeenth century, between an aristocratic de Méré (Antoine Gomabud) and two mathematicians: Blaise Pascal and Pierre de Fermat. In later centuries it is worth noting the following contributions by Cantor and the various types of infinity; Hilbert and the axiomatization of mathematics; Turing and the basics of computing. With the information technology of the 20th century, the ability to predict the future through statistics and projections is enhanced, although the relationship between logic and mathematics dates back to Greek antiquity. Noteworthy are the contributions of set theory, Jakob Bernoulli's laws of large numbers; Ronald Fisher's statistical inference; and John von Neumann's game theory.

The works of Neumann, Turing, Pascal, and so on, have laid the foundations for the development of the first computers and programming languages in the 20th century. Until then, mathematicians and computer scientists had defined their fields of action within the sciences (Finn, 2018). However, with the rise of the first interactive systems, such as hypertexts and the spread of personal computers in homes, there is a commercial need to teach their use in order to increase sales. In this sense, mathematicians began to move towards the field of social sciences, especially in the field of psychology, even if they had no prior knowledge or experience.

The term usability was used as a strategic expansion force, that is, a kind of Trojan horse. Later, the word engineering would be attached to include it aesthetically, commercially, educationally and scientifically in the context of formal and natural sciences. Over time, it has been seen as those forces that go beyond the epistemological principles of science by generating illogical engineering such as design engineering, semiotic engineering, urban mobility engineering, business management engineering, and so forth (Cipolla-Ficarra, 2010). Epistemology reflects on scientific knowledge, covering issues related to scientific activities and the investigative process of applying the scientific method. Therefore, epistemology is an intellectual activity of the human being that reflects on the nature of science, on the character of its assumptions. In brief, it analyzes studies and examines cognitive problems of a scientific nature.

Figure 1. Quantum-nanotechnological-self-sufficient era: The (r)evo1ution of the algorithms (www.science.org)



A scientific method difficult to apply when there is an expansion towards infinity of the formal / natural sciences towards the factual sciences is generated. In other words, making the disciplines of the social sciences "the engineering" implies including mathematics but in a superficial or "soft" way. A quick and easy way to do this is through statistics. Some statistics that in many of these engineering curricula, consist only of the use of commercial Microsoft applications such as Excel or Access (Cipolla-Ficarra, 2012). Analyzing the language of these professionals, it is possible to verify that they always speak of percentages as the topics covered belong to the field of commercial advertising or political propaganda.

THE NEED FOR USABILITY IN THE '90S

The first commercial systems of the '90s of the hypertext, multimedia and hypermedia (figures 2 and 3) required that users not only know how to use the computer but also the various peripherals connected to it (speakers, microphones, printers, video cameras, etc.) for the best possible use of multimedia content. These commercial products required optimum quality at the time of interaction. This fundamental requirement of quality is due not only to motivate the navigation of end users but also for economic reasons. Such systems were at considerable cost to end users. They acquired the original systems and their updates, over time (for example, the encyclopaedias, dictionaries, video games, and so on).

Until then, in software engineering and the development of graphical interfaces, the need to include some specialists from the social sciences was enunciated to improve the quality of the software, in the conception, development and testing stage, before the definitive version of the software. In this sense, in the book "Usability Inspection Methods" Jakob Nielsen and Robert L. Mack (Nielsen & Mack, 1994), with their experience in the mathematical and computer fields, include several techniques from the social sciences (interviews, direct observation, questionnaires, etc.), belonging to disciplines such as journalism,

Figure 2. The ancient civilizations of Egypt, Greece and Rome in this multimedia system "Ancient Lands" (Microsoft, 1994).

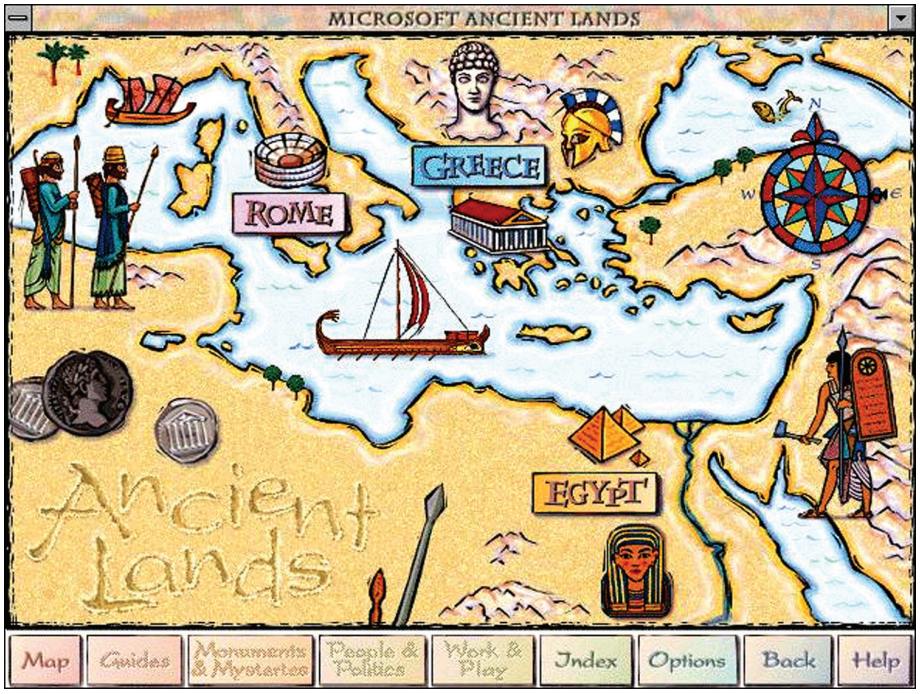
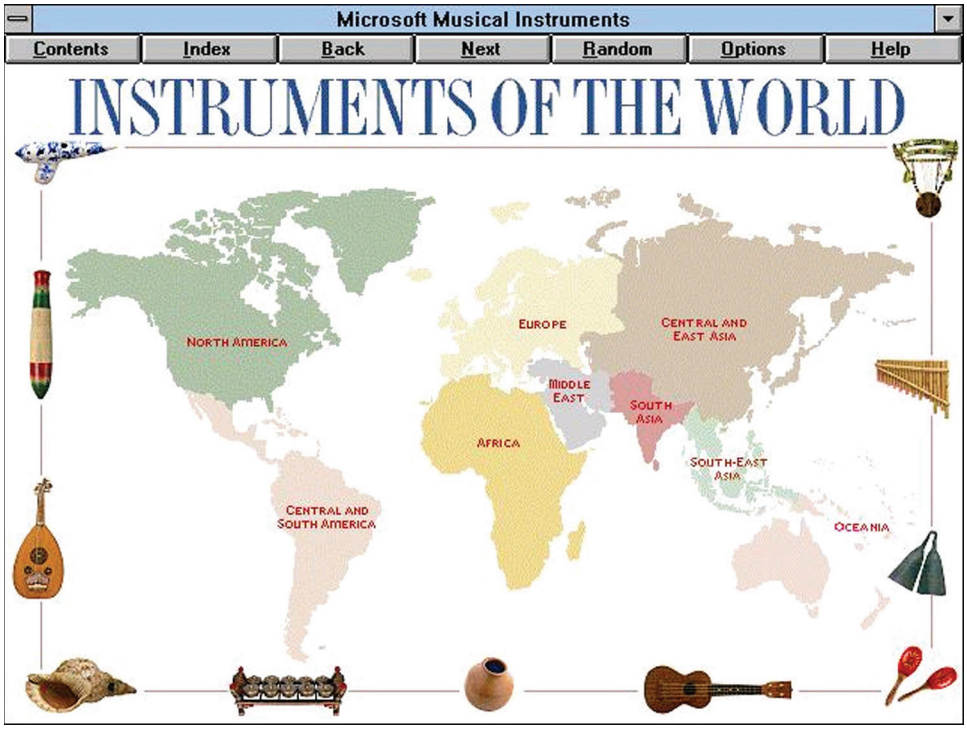


Figure 3. Microsoft Musical Instruments (1992). It is an interactive system with features historical origins of more than 200 instruments.



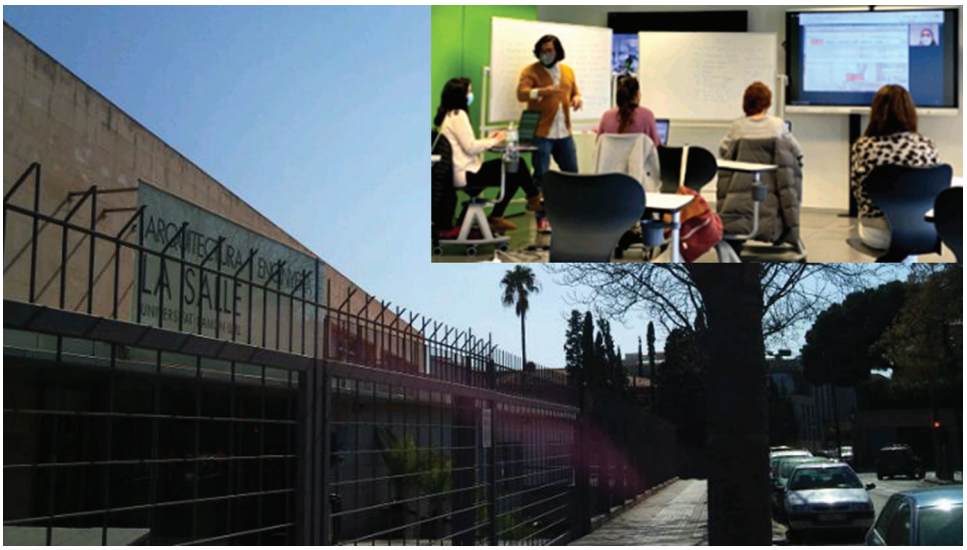
sociology, psychology, etc., in the incipient engineering of usability. Through usability engineering one of the greatest expansions of the natural and formal sciences over the factual sciences would be verified, starting in the new millennium. Simultaneously, the end of the limits between the different disciplines, specifically, in the context of their domains, fields and specialties (Cipolla-Ficarra, 2019).

In the summary of those techniques enunciated by Nielsen and Mack (Annex #1), some observations are attached that have not been considered and that make many evaluations of usability, user experience, human-computer interaction, human-computer interface, and so on, under the current fashion of cross-sectional, multidisciplinary, interdisciplinary, transdisciplinary studies, etc., and using the latest multimedia communication technologies (smartphones, tablet PCs, etc.) lack 100% scientific value. Finally, it must be remembered that these techniques were announced and implemented in the 1990s, in the expansion of interactive multimedia systems (off-line and online), in the homes of millions of users.

As Nielsen and Mack maintain, their usability techniques have their origin in the social sciences, but have been adapted to the needs of software. It is not our intention here to make an exhaustive analysis of them. However, since the beginning of its use there have been several inconsistencies of varying intensity in some evaluation techniques from the empirical point of view, which may question the validity of some of the results obtained in the usability literature, therefore it is necessary to adopt certain control measures or recommendations before enunciating principles or laws of usability, UX, HCI, and so on.

Many experiments that made it possible to verify its greater or lesser usability effectiveness in the 1990s are based on office automation applications, that is, spreadsheets, databases, word processors, and so forth. The basic inconvenience of the application of some usability evaluation techniques was related to economic factors, since they needed quite a few means: a laboratory, equipment for operation, a number of users to carry out experiments, the presence of other professionals, etc. In cities like Barcelona, private education (La Salle — URL, figure 4) was used as an element of advertising promotion to attract new students, the total tons of cement used to carry out a usability laboratory (2005).

Figure 4. Private (religious) institution in Barcelona (Spain) and the constant changes the internal reality, for example, the names of the laboratories, courses, masters, etc.; workers role; commercial and political techniques (propaganda) for potential new students or "clients" (generally, in newspapers and specialized magazines), and a long etcetera.



In their book, Nielsen and Mack distinguish four main categories in usability evaluation methods (Nielsen & Mack, 1994): Formal, automatic, empirical, and inspection (also called informal method) which are defined as follows.

- The formal method uses formulas and formal models to calculate usability measures (Card et al., 1993).
- The automatic method derives from some usability measures to describe the functioning of a system through the evaluation of the software (Byrne, et al., 1994).
- The empirical method uses the test with users to examine the properties of usability, that is, it observes how a representative sample of real users uses the system (Butler, 1996).
- The inspection method is based on heuristics and operating rules, and includes a single evaluator that performs the inspection of the application (Nielsen & Mack, 1994).

Some of the main disadvantages of the methods listed above according to Nielsen and Virzi (Nielsen & Mack, 1994; Virzi, et al., 1993) are:

- The **formal methods** developed present several difficulties when applying them, especially when the system is complex.
- **Automatic methods** examine a limited number of usability measures.
- **Empirical methods** apparently provide the "most reliable" evaluations since they incorporate a sample of real users. However, the inconvenience of choosing a representative sample of these users persists. An incorrect selection can lead to errors in the results, since the evaluators must be trained in a short time to master the most sophisticated aspects of the system. Hence, if the members of the sample do not turn out to be very well trained, the conclusions may be valid only in the superficial aspects of the system. It is difficult in a short amount of time to reproduce the situations of use (Lim, et al., 1996), that is, to simulate within an environment all those motivations and objectives that users can carry out in real life. Such failures may lead to artificial rather than real conclusions. Furthermore, the time and cost to carry out an empirical evaluation are considerable.
- **Inspection methods** have the advantage over empirical evaluation of inserting few personnel to carry out the evaluation process. Essentially in the '90s they were experts in usability and human factors. Working with experts allows us to detect failures and problems within complex systems in a short time. However, the possibility remains that the tester may miss some of the real user problems or think that a problem is not significant to the end user.

In Annex #1 there is a brief description of other inspection methods and techniques defined in the 1990s to perform an evaluation of the usability of an interactive system. In some cases, the pros and cons of these methodologies and techniques are included.

The method used by Nielsen (Nielsen, 1997) in usability engineering, at the end of the 20th century, basically consisted of:

- Heuristic evaluation.
- User and task observation.
- Scenarios.
- Simplified thinking aloud.

The reliability and validity of the results of usability inspections are confirmed by the conclusions of research during the 1990s, where various methods were compared in different projects related to interface design, for example (Henderson, R., et al., 1995; Nielsen & Mack, 1994). In this period, studies were increased to demonstrate the validity of the heuristic method in the evaluation of usability in various experiments (Henderson, et al., 1995; Bailey, et al., 1992; Virzi, et al., 1993). Studies that were carried out in laboratories, with a group of people (experienced or not) and with different types of computer systems and in all of them the high rate of reliability of the heuristic evaluation is demonstrated. For example, Virzi, R. et a1. (1993) compares three usability methods in a research on prototypes: heuristics, verbalized thinking (think-aloud) and representation measures (performance). In that comparison, it can be seen how the heuristic evaluation detects more than 50% of the errors or failures in comparison with the methods of verbalized thought and representation measures. At the same time, Nielsen and Landauer, carry out an experiment in which two evaluation methods are used (Nielsen & Landauer, 1993): Heuristics and the user test to detect errors in the graphic design of user interfaces (GUI).

As can be seen below, the heuristic method was more efficient when it came to finding errors in the interface. In a few words, the superiority of the heuristic evaluation over the user test for GUI's was confirmed. In turn, Rosenberg and Friedland used the formal method and the heuristic method to detect errors in applications of the commercial firm Bortland (Wiklund, 1994). The results obtained show the superiority of heuristic evaluation (67%) over formal evaluation (33%) for computer applications. At the same time, another of the techniques on which the method used by Nielsen is based is the questionnaire. In an experiment performed by Henderson and your colleagues, for computer applications: An electronic sheet, a database, a word processor, obtained the following results: Databases (interview: 97%, questionnaire: 70%), Word processor (interview: 42%, questionnaire: 71%) and Spreadsheet (interview: 42%, questionnaire: 68%), where the superiority of the questionnaire technique over the interview is observed (Henderson, et al., 1995).

The use of the techniques listed at the beginning and in Annex #1 may require a single person, such as the usability inspector, or a group of people (experts or not in the field of usability). In the case of the evaluation carried out by usability experts, such as Desurvire and Thomas, the heuristic method was superior in relation to the method called "cognitive tests" for the detection of errors in a prototype of phone interfaces (Desurvire & Thomas, 1993): 44% heuristic evaluation and 28% cognitive tests. Contrary to what "a priori" may be evident in that a group of researchers obtain better results, within usability inspection methods, reliable and verifiable results can also be achieved with the individual work of researchers (Corgan & Walters, 1994; Kelley & Allender, 1995). The work methodology of the heuristic evaluation also allows the advancement of investigations independently.

The results can be verified by other researchers in a later stage called verification. In the same decade, Nielsen carried out an experiment in interface design for phones where he classified usability problems into the most and least frequent, also establishing three groups of heuristic evaluators (Nielsen, 1992a). The first: Newbies (no usability experience). The second, called specialists or regulars. They are those who do have experience but only in usability evaluation. And finally there are the "double specialists", that is, those who, besides to being experts in evaluating the usability of a system, also participate in the design of telephony interfaces. The average of the results achieved by the different types of evaluators and depending on the frequency of the two groups of problems indicated that there is no great difference between those problems that are "more or less" frequent in usability. For example, novices (least frequent problems: 22% and most frequent problems: 29%), specialists (least frequent problems: 41% and most frequent problems: 46%), and double specialists (less frequent problems: 60% and more

frequent problems: 61%). These are three types of evaluators based on their previous experience with the usability of the system to be evaluated.

In the classical literature on usability techniques, nowhere is the degree of professionalism of the evaluators determined. It is not the same as interface evaluation is done by end users like a professional. This is where the first division in research occurs and works arise that support the possibility of carrying out analysis without experience and/or prior knowledge on the part of the users (Nielsen), but with little success in finding errors without a guide. For his part, Virzi and your teammates, sustains the need to carry out the heuristic evaluation conducted by usability specialists (Virzi, et al., 1993). The reason for the divergence is that the knowledge and/or experience requirements of the specialist in heuristic evaluation are not defined (Cipolla-Ficarra, 1997).

SYSTEMATIC REVIEW IN THE LITERATURE OF USABILITY, MATHEMATICS AND SOCIAL SCIENCES

In our days, the literary review of the works carried out in certain fields of usability engineering, human-computer interaction, user experience, etc., serve to increase the indexes in Google Scholar, Academia, etc., but also the beginning of Spanish doctoral theses, presented as a chapter. That is to say, in certain universities the bibliographic search in scientific databases is quantified as "original", a "routine task" to carry out the "state of the art", of a doctoral or master's thesis, a final project of an engineering degree, and so on. Officially, in the Latin world and today, this task is called "Systematic Review or Search." It consists of resorting to the Web of Science (WoS) database and using the software: Science Mapping Analysis.

For example, in Spain and in the educational field, the first chapter of a doctoral thesis is no longer writing a complete state of the art, resorting to reading books, encyclopaedias, dictionaries, magazines, conference proceedings, and so forth. Rather now it consists of using the "Web of Science (WoS)" database to locate relevant articles (less than 300) and analyze them using the scientific software tool "Science Mapping Analysis." The time range can be 50 years. For example, the period between 1968 and 2018. Subsequently, another 20-30 relevant documents (book chapters, journal articles, conference papers, etc.) from the last five years can be included in the review study. If the case of Iberian early childhood education and new technologies is taken, in each article, the purpose of the study, the type of technology used, the applied research method, the characteristics of the sample and the main results obtained will be analyzed. A systematic review that can reach suggestions that the main technology used in Spanish and Portuguese early childhood education is the digital tablet and literacy is the most studied area, and with positive results.

A systematic review that not only generates a partial vision within the state of the art since it excludes the real context of children from a social, economic, geographical point of view, etc., but also promotes a lack of reading among doctoral students and the habit of distorting the central axes of the scientific method. In other words, what was usually done at the end of the 20th century and the beginning of the 21st century, in university libraries, research centres, etc., such as consulting books, magazine articles, databases such as the INSPEC (scientific and technical literature, published by the Institution of Engineering and Technology), request for articles or bibliographic material in other libraries (paid by the same university students for these inter-library services), consultation of scientific material not connected to the network (CD-Roms, DVDs, etc.), to cite some examples, today, belongs to the prehistory of sci-

ence. This denotes a priori the decline in the professional quality of those who guide these works and encourage the picaresque of future professionals, under the theory of least intellectual effort. Besides, the literary revision can connote some serious failures, in the beginning of new divisions in the informatics disciplines for education such as UX.

Now, from the perspective of social sciences and mathematics, prior to the initial methods and techniques proposed by Nielsen, it is feasible to locate some shortcomings in the application of scientific methods and techniques (Annex #1) and that have survived to this day, through the heritage of usability engineering within the notions of user experience and human-computer interaction, to mention two examples (Benjafield, 1993; Gorard, 2004; Frankfort-Nachmias & Nachimias, 2007). Through the use of rhetorical questions and brief descriptions, some of those shortcomings and/or flaws detected in the methods and techniques such as observation, surveys, interviews, questionnaires, surveys, mathematical techniques, graphics / infographics with results will be listed, and so forth.

In direct observation, you can resort to the use of questionnaires, interviews, surveys, etc. However, no one defines the professional profile of the people who make the list of questions, the correctness of the results obtained, the most suitable types of graphs to represent the information obtained, etc. There is also usually no reference to the type of observation. That is, if it refers to an extensive observation (large samples of case studies) or intensive (reduction of case studies until reaching the study of a single person or user of an interactive system). In both types of observation, resorting to certain techniques may be similar to each other, for example, questionnaire and interviews. In extensive direct observation, poll surveys are frequently used, working on a representation of the universe of study.

Basically, this type of observation is made up of three steps to follow: First, determine the universe of study or sample; second, carry out the survey, and finally, interpret the results obtained. Some basic aspects of the samples within the literature of usability, UX, HCI, etc., that are related to education and new technologies are totally ignored. That is to say, they do not mention how the sample is achieved through a probabilistic survey (random) or the method of quotas (number of people who participate in a survey, for example, previously prepared the interview plan to be carried out by the interviewer). Other problems that generally do not have information are the representativeness of the sample, depending on the people / end users of interactive systems that participate in the experiment (Warren, 2012; Kelly & Green, 2018).

Here we must consider variables such as the margin of error and probability, the means used to measure the representativeness, the rectification of the sample, the rectification of the results obtained, and so forth.

Furthermore, in the use of questionnaires, the types of questions (open or closed), multiple choice questions, estimation questions (quantification of opinions) are not always specified; whether they are direct response questionnaires (a single user is the one who answers), group questionnaires (one or more people carry out the task of answering), indirect response questionnaires (the examiner writes the answers), and so on. In the case of indirect response questionnaires, it also implies considering some additional variables such as the loss of privacy or mistrust of the evaluator, to mention a couple of examples. At the same time, information is sometimes lacking regarding the classification according to the nature of the responses, intentions or opinions, test questions, etc. Lastly, there is the organization and presentation of the questions, that is, the use of the funnel technique, the question of the privacy of the information obtained, the number of questions, etc. The wording of the questions also entails other variables that are not generally considered in studies with end users: The attraction towards the affirmative answer, the fear of using certain words, the importance of resorting to certain verb tenses, and so on.

Interviews are another of the heuristic techniques used in usability from the social sciences, particularly journalism. The interviews have different objectives, technical modalities, relevance of the interviewee, temporary duration, level of emotionality or personality of the interviewee, etc. That is, they can be with or without a questionnaire, contain open or closed questions, ask leaders or experts on certain topics, be unique or repetitive (describe whether there are changes in various time intervals), focused (help clarify aspects of a factor or stimulus such as interacting for the first time with a certain interface, viewing computer animations, etc.), multiplied (repeating an interview several times to deepen the opinions and attitudes of the interviewees), and so on. It is also possible to indirectly investigate the personality of a user through tests. From a practical point of view, the tests can help the professional orientation of future students, before starting a university career. The qualities of a good test coincide almost 100% with the qualities of a good questionnaire. That is, validity and fidelity. In this sense, aptitude, knowledge, intelligence and personality tests can be mentioned.

From a mathematical perspective, and more specifically, mathematical techniques can be defined as perfected forms of comparative analysis. Mathematical analysis implies that the phenomena under study are represented by figures, since the common denominators serve as the basis for comparisons. In the social sciences since the 20th century there is a tendency to introduce quantification, which today has reached its peak in education and health, through economic and/or financial aspects, for example. Although social studies include numbers, formulas, graphs, etc., in order to compare the intrinsic characteristics, with the highest degree of precision possible to increase the value of the analysis carried out, there are still sectors within these sciences that resist quantification and mathematical analysis. The perfection is to find the right balance between qualitative information and quantitative data, always differentiating data and information.

The information is the result of a process where the initial data is. This information is usually represented by graphics. Evaluative graphs are instruments that, in the case of the comparative method, allow synthesizing and deducing conclusions, based on similarities and differences. Finally, in this differentiation between data and information, we do not consider the current exploitation of data or dataism, since what is produced is a "crisis of truth" (Han, 2022b). Dataism undermines the distinction between truths and lies. Moreover, access to information is already being used for political-social surveillance and the forecast of individual behaviour, through the new technologies wired to the internet (Han, 2022a).

Mathematical analysis can be applied to phenomena that can be measured, that is, translated into figures or quantified. The figures must represent the maximum precision, since it influences the veracity of the results of experiments, observations, etc. One of the main problems related to social aspects is that the application of mathematical methods is not always 100% accepted by professionals in the formal and natural sciences. Somehow the notion of "humanistic mathematics" is something that is not yet accepted. Therefore, the scope of the quantification can be said to be binary.

On the one hand, it is possible to achieve rigorous quantification, as has been a pioneering methodology for qualitative evaluation of interactive systems in the 1990s, using various disciplines of the formal, natural, and social sciences. However, measuring the quality of interactive systems, through quality attributes, metrics, specialized instruments and new professional profiles, such as MEHEM (Methodology for Heuristic Evaluation in Multimedia), MECEM (Metrics for the Communications Evaluation in Multimedia), HECHE (Heuristic Evaluation of Colours in HomepagE), HEDCDEH (Heuristic Evaluation Disk for Communication and Design in Hypermedia), etc. (Cipolla-Ficarra, 1997; Cipolla-Ficarra, 2005; Cipolla-Ficarra, 2008), has not been an easy task for acceptance in the field of formal and natural sciences, for example, since some members make up the group or sphere of resistance to change.

On the other hand, there are phenomena that reach approximate values, where subjectivity predominates, such as opinion polls or the attitudes of a user towards a new interactive communication device, for example. A trivial way to contradict methodological advances through direct observation is to resort to the "non-objectivity" of the results obtained due to the presence of subjectivity (Cipolla-Ficarra, 1996). Commonly, this triviality and great error in the computer field comes from the inclusion of professionals from the social sciences. That is, people who are totally unaware of the software development process, such as psychologists, anthropologists, pedagogues, fine arts, and so on. This dichotomy or bifurcation generates a special perspective within mathematics that is usually called "qualitative mathematics", composed in turn of a double vision or representation:

- First we can observe the evolution of mathematical theories and the social sciences particularly in the field of discontinuous values that allow comparisons to be made Such is the case of set theory or group theory to mention two examples which seek relationships between classes of members which are separated or divide'd from each other by discontinuous values. This is one of the reasons why this type of theory is excluded in educational systems under autocratic or tyrannical regimes. Discontinuity is a fundamental characteristic that differentiates them from each other in qualitative sets.
- Second the structure of computers prior to quantum computing which is basically based on the binary system. A system that, from the point of view of structural and logical programming, questions at the forks (yes = 1 and no = 0) allow problems to be broken down and logically resolved by programming systems in different languages. Unquestionably, quantum computers open a new universe in qualitative mathematics, such as the study of small numbers and the large changes caused by the passage from one to another (Badcock, 2015).

The figures that come from the social sciences are usually presented mostly in statistical series. These series look for the common denominators or characteristics of the universe or study sample, which are usually called elements. These elements support comparison with each other either through indices or percentages. The main tools of statistics are the arithmetic mean, the geometric mean, and the median. However, in the current literature related to education and new technologies, the dispersion characteristics, the mean deviation, the analysis of associations and correlations, factor analysis, among others, are not considered (Cousin, 2008; Heincecke & Blasi, 2000). Only the percentage is used. From a linguistic point of view, the abuse of percentages carries the notion of propaganda. Therefore, the scientific value of what is presented declines, since we are dealing with a persuasive and manipulative enunciator who tries to avoid the phenomenon of resistance to change.

RESISTANCE TO CHANGE IN HUMANOID MATHEMATICS: THE CASE OF QUALITATIVE EVALUATION OF INTERACTIVE SYSTEMS

Humanoid mathematics is those that do not obey human logic and scientific knowledge. This type of mathematics is opposed to a new notion called "humanistic mathematics" that is intended to be built, following the model of humanistic computing. This opposition is due to the fact that it does not contain elements that converge towards the reason and logic of the human being. The objective of this math-

ematics is to feign historical, cultural and social traits, when in reality the primary and mechanical goal pursued is to obtain the greatest benefit, in the shortest possible time.

Some of these benefits and paradigms can be detected in humanistic computing and endless false engineering that has been formed with the democratization of the Internet and through some disciplines of the social sciences. Some of those chimerical engineering techniques already exist and they are: Semiotic Engineering; Design Engineering; Management Engineering, and so forth. Others that will surely be created in the short term are the Engineering of the Metaverse; Engineering of Cryptocurrencies, Engineering of the Green Economy, etc. The use of the term engineering indicates the hegemony of the formal / natural sciences over the social sciences. Furthermore, in some communities, the engineering degree has a higher social status value in relation to the bachelor's degree.

The notion of benefit must be understood in a broad sense, that is, it ranges from economics to job advancement, in the extracts of the pyramid of society, to which one belongs: Scientific, educational, health, etc. This is the main reason why the history of the new disciplines is important, where there are intersections between the formal, natural and social sciences. For example, in the measurement of the quality of the first interactive off-line multimedia systems, from usability engineering, it was argued that it was impossible, despite the fact that many of the evaluation techniques and instruments of this engineering are based on the social sciences. This denotes the presence of a resistance to change, stemming from humanoid mathematics and other human factors.

Eason in 1984 carried out a study on usability in which he proposed three basic constituents to carry out the evaluation of a system that were the user, system and tasks (Eason, 1997). However, in his research he did not establish a differentiation between usability and usefulness of a system. In the early 1990s, Nielsen determined the differentiation between utility and usability, that is, the elements for the operation of the system "utility" and the use of the system "usability" (Nielsen, 1992b).

This distinction made it possible to eradicate conceptual ambiguities, since there were several works related to the evaluation of multimedia systems, but they were fundamentally oriented towards the usefulness of the system, but not towards usability, such as the minimum hardware configuration that a multimedia system needs for its operation, the type of operating system, and so on. Nielsen, when presenting the concept of usability, allows to distinguish the essential aspects or attributes for the user interface: Efficient use, easy to learn, easy to remember, subjectively pleasant and few errors. These five attributes are orthogonal, that is, each of the properties is independent of the others. However, there was a lack of methodologies for evaluating the quality of a system, from the point of view of usability.

Most of the concepts about methods and techniques that are currently applied in the evaluation of systems come mainly from the human computer interface, software engineering and usability. In MEHEM (Methodology for Heuristic Evaluation in Multimedia), the first theoretical framework on the evaluation of usability was created and it would be extended towards communicability. To create the first theoretical framework for the usability of a system, not only concepts from software engineering, the human-computer interface and design models for interactive systems (hypertext / multimedia / hypermedia), but also several of these concepts have been adapted due to the intersection of disciplines of formal, natural and social sciences that existed at the time of the evaluation of an interactive system. Each of the "disciplines" or areas of scientific knowledge involved in the research are detailed below:

- Communicability.
- Computer Science.
- Human-Computer Interaction.

- Human-Computer Interface.
- Models for Interactive Systems.
- Software Engineering.

From software engineering, a series of quality models, evaluation methods and techniques have been defined to establish the quality of a software product. These models, methods and techniques have made it possible to: Identify the entities or objects that will be evaluated; define the basic factors that have a special interest in the selection of objects, and finally, break these factors down into attributes that can later be analyzed and measured directly. The metrics work carried out by Fenton and Lawrence in software engineering allows identifying the entities and attributes of interest for the evaluation. According to Fenton, entities refer to processes, products and resources. Meanwhile, the attributes related to these entities are classified as internal and external.

Internal attributes are those belonging to the production process, the technological aspect, the implementation, documentation, etc. The main objective of software engineering is to study internal aspects. External attributes are those perceived by the end user of a system. External attributes are studied from the human-computer interface, for example. Also, the concepts of evaluation and verification belonging to software engineering remain as basic pillars for evaluation, carried out through the quality models belonging to software engineering, it has been possible to: Establish the study entities; define the attributes of interest of the object or "quality criteria"; break down quality criteria into lower-level factors in measurement and define metrics.

Another area of interest for the first theoretical framework is design models for interactive systems (hypertext / multimedia / hypermedia / RV / AR / MR, and so on). There are various design models that can be classified according to use as follows:

- Hypertext and multimedia document.
- Hypermedia.
- Databases for multimedia systems.

In this way, a higher level of analysis is achieved based on the four main categories of design: Structure, dynamism, presentation and content. These main categories of design are interrelated with each other and have been constantly expanded and updated for communicability (i.e., context), once the stage of learning to use an interactive system has been overcome.

The division of design into categories for evaluation is unprecedented since research work on interactive systems is directed only to some of these categories and in a non-interrelated way. In addition, the first proposed method (MEHEM) belongs to the category of usability evaluation techniques that is simply called "inspection." This inspection is located more precisely in the sub-category: Heuristic inspection. Heuristic inspection does not require end users because it works with expert evaluators. This type of inspection is based on the definition of a set of usability attributes simply called "heuristics." It is through "heuristics" that usability can be broken down for analysis.

With the proposed methodology (MEHEM) the profile of a new professional was also incorporated to carry out the evaluation. This professional is called heuristic evaluator of interactive systems. The term heuristic refers to the method used to evaluate usability, which has been evolving towards the area of communicability. The heuristic method is made up of various techniques and rules, among which is observation. Among the various types of observation, direct and structured observation is the main

technique used. It is a direct observation because between the interface and the heuristic evaluator at the time of the evaluation, no other person or technological resource intervenes for the measurement. It is a structured observation because there is a set of steps to follow within a procedure and that have been previously defined by the evaluator. With this technique, the reliability of the results obtained has been demonstrated and costs have been reduced. The reduction in costs is due to the fact that a laboratory is not required to carry out the evaluation; equipment and maintenance of special devices, a group of evaluators or a set of users who interact with the system at the time of evaluation, prior training of users and eventual evaluators' assistants, and so on.

Now, all this analysis leads us to several rhetorical questions (they can serve as lines of research for future work), associated with the first answers, succinctly:

1. **How is it possible that from usability engineering, at the end of the 20th century, the possibility of evaluating the quality of an interactive system (MEHEM, MECEM, HEDCDEH, etc.) was denied?** Perhaps the reason was in the total ignorance of the evolution of the sciences. Besides, the contribution of the social sciences in usability engineering was enormous. However, the development of this new area within computing came from people with an academic background in mathematics and work experience in large American computer companies. That negation is a classic example of humanoid mathematics.
2. **What are the consequences of that denial over time?** It is to promote a kind of "wild cannibalism" within the sciences and/or disciplines (User Interface Engineering, HCI, SE, CS, UX, etc.). For example, disparage copyright; ignore copyright; eliminate the protection of intellectual property, steal the identity of pioneering scientists, discredit the professionalism of researchers, particularly those who are modest and honest, and so forth. In a few words, the evaluation of the quality of interactive systems has proven to be an unprecedented and revolutionary area in time. However, its pioneers have been destroyed by its innovative intuition and genius in opening new professions, such as the profession of evaluation and qualitative auditing of interactive systems.
3. **What communication channels have been used to promote denial?** Mainly, opinion columns in specialized magazines on computing, software, multimedia, etc., published in the US and/or Europe, with international distribution. In the '90s, the democratization process of the Internet was in its infancy and therefore, social networks did not exist, as they are known today.
4. **Why has it not been possible to establish the figure of the heuristic evaluator of interactive systems in the curricula of computer engineering / software engineering /** systems engineering / web engineering / and so on? Today and mainly, due to the human and financial factors make the educational system a big business, putting it before the right of citizens with reference to a secular and free education for all. This is a right that does not currently exist, and therefore, has been excluded in the history of interactive systems evaluation, HCI, UX, EU, and so on.

NEWS, PEDAGOGY AND DEMOCRACY: A REAL STORYTELLING

The evaluation of education, the design of interactive systems, communicability in the metaverse, the automation of industrial production chains, the effects of quantifying audiovisual information in social networks, among many other activities, is a profitable task and requires experts with extensive theoretical knowledge and multi-year experience, in various subjects of the social, formal, natural sciences,

etc. It is through evaluation that the successes and failures of educational policies, the results obtained from the investment of financing in R&D projects, the increase or decrease in social welfare, etc. can be measured. However, when in daily reality, through the media, such as the press, it is read that private (religious) institutions in the Iberian Peninsula, after three centuries, eliminate the evaluation system in the educational field.

It is a new signal not only in the distortion in traditional communication models between teachers and students, but also the end of the three positive human aspects: Capacity, Knowledge (individual), and Competencies (CKC). In figure 5, there is the news of the pedagogical setback. In Annex #2, the original text (Spanish —section C) and its translation (English —section B). These types of measures make it possible to establish a differentiation between structure, system and personnel. The educational structure may be 300 years old and has been growing throughout the planet, especially in recent years with globalization.

Figure 5. One of the Iberian media that publishes the news about a new educational methodology (the end of separate subjects and exclusively numerical notes), in a private institution, with a secular tradition in formation. Newspaper: "Diario de Sevilla" (www.diariodesevi1la.es) Date: 11.29.2021


Diario de Sevilla

SOCIEDAD

SEVILLA PROVINCIA ANDALUCÍA ESPAÑA ECONOMÍA SOCIEDAD DEPORTES CULTURA COFRADÍAS OPINIÓN TODAS LAS SECCIONES

CAUSA CRIMINAL WAPPÍSSIMA SALUD TECNOLOGÍA MOTOR MASCOTAS

EDUCACIÓN

La Salle acaba con las asignaturas separadas y notas exclusivamente numéricas

• La institución educativa da un vuelco a su manera de educar para los más de 80.000 alumnos repartidos en la Península Ibérica.

Tres niñas se dirigen al colegio

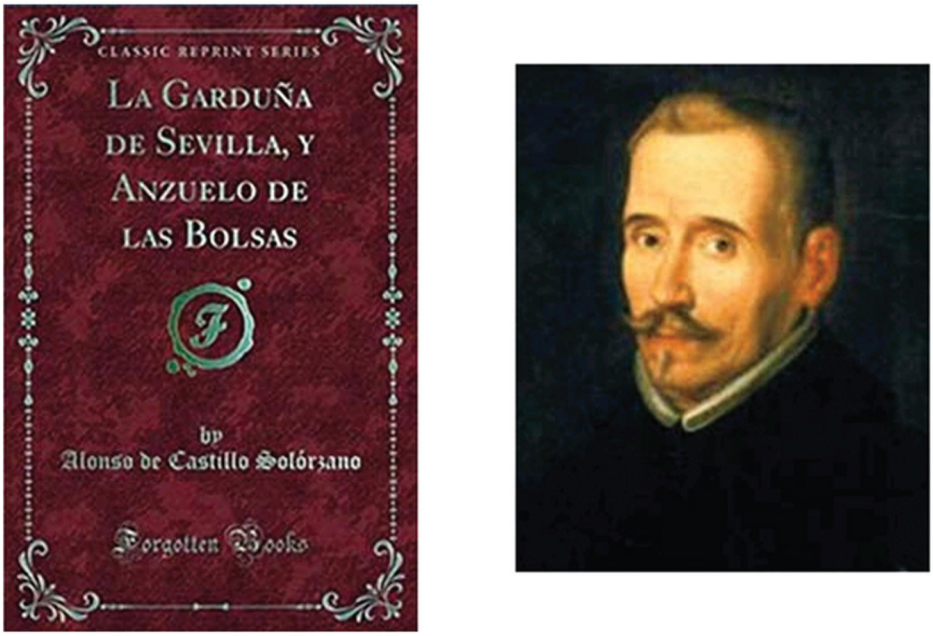
EFE

29 Noviembre, 2021 - 08:39h

This educational structure, which has its French origins, has survived to this day keeping the name of the founder of the institution but not the spirit of equality, fraternity and freedom from the French Revolution. A priori, the title of the Sevillian newspaper news, appears as something revolutionary by uniting

all the subjects and eliminating the qualification of the formative advance of the students. However, it is not for various reasons that are related to the system and its management, that is, the individuals who manage it. Besides, from the sociological, geographical and diachronic point of view there is a link with the literary work: *"La Garduña de Sevilla y Anzuelo de las Bolsas"* (1642), whose author is Alfonso de Castillo Solórzano (figure 6). The notion of fraternity is one of the components that generates these distortions in this educational structure, from the early age of the students who can start their studies to the university level. All this within the same structure. Some of these distortions can be consulted in the following references (Cipolla-Ficarra, 2011; Cipolla-Ficarra, 2017).

Figure 6. Book cover: "La Garduña de Sevilla y Anzuelo de las Bolsas" (1642) and portrait of the author: Alfonso de Castillo Solórzano.



The public educational system differs from the private (or religious, as is the case of the institution referred to in the news) since the first is secular and free (or with very low costs), and the second is not. Furthermore, public education continues to be in many nations, an inalienable right / obligation towards citizens, whose origin is in their respective constitutions. Private or parity education, whose monthly costs for a multimedia engineering student can exceed the monthly salary of a young human-computer interaction (HCI) laboratory assistant in these supposedly revolutionary institutions (i.e., 1997-1999). In other words, the mercantilist factor of education prevails over scientific knowledge. So much so that in countless parity education institutions, a student can recover three or four years of study in a classic public secondary school, in a couple of months and with a couple of exams.

That is, take free exams that in less than a year can obtain the certificate of primary, secondary, master's degrees, etc. Just read certain resumes where master's degrees last less than a year. This is a reality of the new millennium. However, it was a mechanism not implemented in the existing university

systems in Europe. Today, the analyzed news from the Andalusian newspaper opens the possibility to experiment and practice it in those private institutions, with several centuries of existence, such as La Salle. In Barcelona, as in other Iberian cities, professional "comets" (four or more university degrees: Bachelor's and/or engineering, master's, doctorate and post doctorate, in a decade) will become professionals at the "speed of light" (a five-year period). These cosmic phenomena (figure 7) only occur with native personnel or those foreigners who manage to form part of fraternities or brotherhoods (other denominations are brotherhoods, castes, sects, Freemasons, and so on). These groups of individuals often act masked or made up before society and belong to the Omega generation (Cipolla-Ficarra, 2022). Removing these real or virtual masks is not a simple task. In addition, it can even be useless since they enjoy eternal immunity, since the times that the first universities were founded in the old continent. The only way to counter their actions is not to directly and indirectly finance their activities. Education for them is synonymous with power and financial income.

Figure 7. The Catalan educational anti-model from private or religious institutions. The comets or rockets students have in a decade two degrees, two masters and a PhD, simultaneously occupying regular offices in Catalonia firms. These comets or rockets are only for autochthonous citizens. Today, a "mega expert" in technology enhanced learning, augmented reality, graphic expression, mixed methods, architecture visualization, gamification, gaslighting, mobbing, bullying, stalking, and very long etcetera.

Democratizing knowledge is something they do not like because it reduces their income. Hence, they are in opposition to free and digital access to encyclopaedias, dictionaries, manuals, etc., and everything that boosts distance education. They are the ones who promote the theory of minimum effort to obtain certifications and qualifications. However, they are working for the elimination of the "CKC" with reference to Alpha generation. A generation that will end this century, depending on artificial intelligence, in the form of robots or not, to carry out any type of operations that until the end of the 20th century were skills acquired in schools, institutes, universities, and so forth.

The authors, promoters, supporters, etc., of the Iberian journalistic news paradigm hold, in addition to bachelor's degrees, engineering, doctorates, etc., a diverse set of study certifications, regardless of the type of content, duration, quality of the teaching staff, and so on. The important thing for them is that as many as possible of the main international universities or research centres appear. It is particularly necessary that names such as: University of Oxford, University of Cambridge, University of California Berkeley, Stanford University, Massachusetts Institute of Technology, Harvard University, Columbia University New York, etc., appear on these certificates. This is the main way that favours the empowerment of their actions before the community to which they belong. That is, through "soap bubble" resumes. The purpose is to rapidly occupy managerial positions, whether or not they have completed their university studies, in government institutions, aimed at generating more income, through job opportunities in new technologies or the like.

In some Iberian private or joint universities, temporary employment is frequently guaranteed to their students (clients), before finishing their studies, in private universities, through technology parks, business incubators, SMEs, startups, spin-offs, scale-up, and so on. In a nutshell, private universities guarantee the fellowship the best managerial positions in companies, industries, laboratories, universities, schools, etc., in the local or regional community, in order to then start a career as life officials towards national and international institutions. The great problem of this deplorable reality lies in the low or poor level of knowledge of these potential officials, since they are not trained for individual work. Therefore, they will always be the puppets of the power groups, to which they belong and obey. This type of organization not only increases the costs of the goods and services of a community, but also harms the local democratic system, since it is demotivating future generations. Today, this reality it is specifically visible in the percentages of electoral participation, to democratically elect their representatives, for example. In short, **another of the consequences of this news is directly related to the free will of the human being, in exercising the right to vote, guaranteeing the continuity of the democratic system** of the peoples.

Now, these Iberian private universities and other European regions intertwine their contacts with public universities for access to R&D projects, financial funds, student exchange, scholarships, etc. It is a proven phenomenon and can be verified from several aspects:

1) **Job prospects:** Former students from private universities quickly occupy lifelong positions in public and/or private universities, in the same city, province or region.
2) **Unresolved problems in the final stage of studies:** Students who have problems in their advanced studies (preparation and presentation of theses, dissertations, etc.) at a certain university generally request that their academic record be transferred to another academic unit (read university) to obtain the title of engineer, graduate, doctor, and so forth. However, this transfer is sometimes not the solution to the problem since there are cases in which the old problems in the final stage of their studies are repeated at the new university. This denotes the strength of the alliances between teachers' guilds. Usually, these problems are related to the completion of doctoral theses, master's

theses, engineering, and so on. Simultaneously, it connotes that there is a network between private and public schools, giving rise to the hybrid system. That is, public institutions governed under the system of religious or private brotherhoods.

3) **Obtaining scholarships rigged in advance:** It is easy to verify how those students of master's degrees, doctorates, post doctorates, etc., in certain university contexts continually obtain scholarships. This option to continue researching with scholarships is achieved when they repeatedly include names of people in their research works, which only appear in the publications, with their labor or real contribution being equal to zero. Hence the rise in the new millennium of the vital need for group work. These publications are especially enhanced by certain algorithms, in search engines, databases, portals, etc., related to the academic and/or scientific world: Academia, Google Scholar, ResearchGate, Elsevier, and so forth.
4) **Pilgrimage towards the context of health:** Research carried out by mathematicians, physicists, chemists, etc., starting from usability engineering, user experience, human-computer interaction, interfaces, social network analysis up to gamification, wheelchair users, pressure injury, diabetes, mental illness, heart disease, addictions, multiple sclerosis, cancer, mental health, people with neourodevelopmental disorder's / intellectual disability, socially assistive robots in smart homes, and an extensive etcetera. The goal is to destroy the scientific method of health sciences from the natural and formal sciences, through education / research. In the civilization of human knowledge, a mathematician is not a doctor and vice versa, even if he manages to accumulate the highest levels of indexing of his published works, previously approved by the editors of the brotherhood: MDIP — Sensors, Multimedia Tools and Applications, Interactive Multimedia and Artificial Intelligence, IXD&A, etc. In other words, these latest "digital and open" publications, like so many others that exist on the Internet, today represent the barbarity of scientific knowledge, by transforming a computer scientist / mathematician / physicist into a doctor.
5) **Non-existence of evaluation systems:** Although all inventions are designed in the proportions that we call normal, but the world is abnormal and is made up of innumerable variables. One of them is the evaluation of those abnormalities. It is not possible that in the 21st century, under serious international crises (financial, pandemics, wars, etc.) it continues to be verified that corruption in the academic / scientific field is not only admissible, but also rewarded, despite the denunciations that are carried out in the social, digital and analog media (figures 8 and 9). This leads to science and popular knowledge being in two opposing realities and destined to collide violently in the short term.

The rhetorical question of these five points is: **How do the members responsible for this Spanish private / public / hybrid entity act, for example, in the face of technological innovation or new areas of scientific knowledge?** Simply, discouraging creative work, destroying work teams and starting a persecution *ad aeternum.* Continuing with the storytelling technique and adjusting the facts to the institution of the news but placing ourselves in the north of the city of Barcelona, we can list typical actions of scientific terrorism (alphabetical order) that will not change over time and the use of reforming pedagogical methodologies, whether current or future:

Eliminate all academic links in the university portals of former professors.

Exert pressure and persecution on other work activities, leisure activities, etc., carried out by teachers outside the contracted area, so that they desist or abandon them (it is a typical action of destructive sects).

Exploit the contracted personnel in the labour market by translating, teaching material, etc., for specialization courses, master's degrees, and so forth. All that activity outside of academic hours. The generated teaching material is then systematically plagiarized by the substitutes.

Generate clones of the contracted personnel, through xenophobic young people and internal hypocrites to obtain substitutes at a lower cost.

Internally discriminate against and exclude staff based on their place of birth, economic and social status, religion, etc.

Not paying decent wages to laboratory collaborators. Those responsible for these laboratories must personally defray monthly economic aid to maintain said personnel.

Not paying registration fees for congresses, trips, stays, etc. of research carried out with colleagues and/or students.

Not renewing employment contracts without any prior notice.

Require the generation of scientific publications by teachers to obtain institutional financial aid. Generally, these funds allow them to expand building infrastructure to increase the number of students or clients.

Stealing teaching material from teachers' presentations and personal belongings, during breaks in lessons.

Use the personnel hired for the commercial battles (increase in the enrolment of the courses) that they maintain with other similar institutions, since they make up the competition of the educational market.

All these listed actions are a small example of the immunity enjoyed by certain private educational institutions, over time, such as the one referred to in Annex # 2. An immunity that transcends education and affects the political sphere, such as political and financial corruption, through ESADE (business and law school —www.esade.edu, "sold" in the Spanish media, as the best centre in the Iberian Peninsula). Digital newspaper: El Pats (www.elpais.es —02.28.2012). As can be seen, the social media report these events with their respective problems on a daily basis; however, solutions or positive changes do not occur. Currently, the attempt to combat the "infodemic" with the truth is something that is doomed to failure. It is resistant to truth. In addition, in the "infocracy", the disputes of figure 10 no longer degenerate into a television or radio show of the twentieth century, but rather, into an "information war." In it, all those who have greater economic, political and religious power win (figure 11). Hence, the management of the educational and health system, in many places, is today considered as a multinational or joint-stock company.

These events have been presented under the storytelling structure called "converging ideas" (recourse to various small narratives to reach the central core of the topic), together with the diachronic and synchronic vision of these sub-themes, which converge towards the central theme (figure 15). In future works, these narratives with their corresponding main and secondary themes will be examined based on the main techniques of structuring a storytelling, such as the mountain, nested loops, spark lines, in media res, petal structure, among others.

Figure 8. Reissue of the book plagiarized from the MEHEM methodology with the logo of the institution that has eliminated evaluations in the educational system (La Salle — URL, 2003). This denotes the wild mercantilism in education (www.anaya.es).

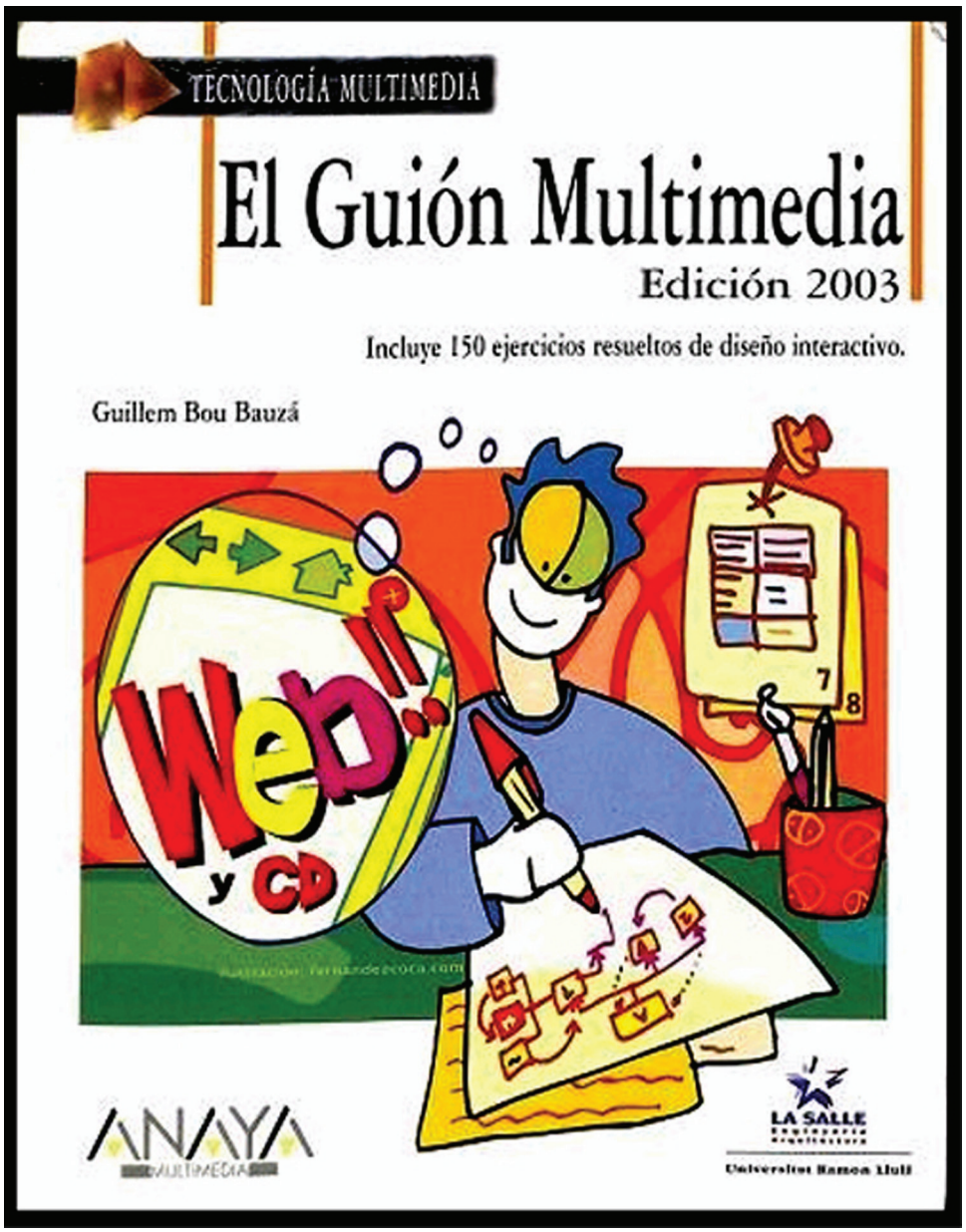


Figure 9. Book based on the plagiarism of the MEHEM methodology (first version — UAB). This denotes the non-existent control in the publisher (www.anaya.es).

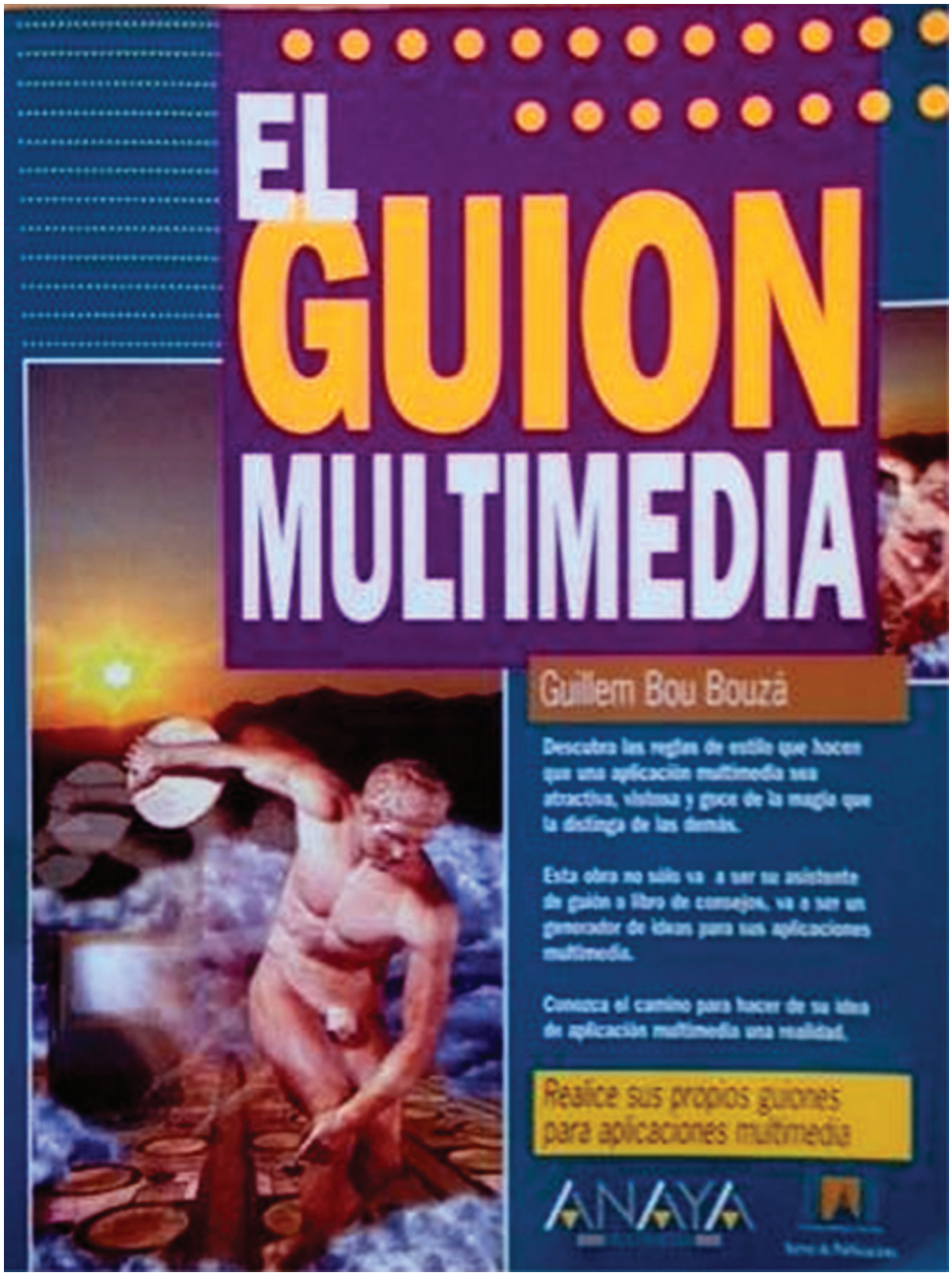


Figure 10. Diagram of an illegal financial scheme that affects the institutional image of a private school (ESADE — URL) and the State.

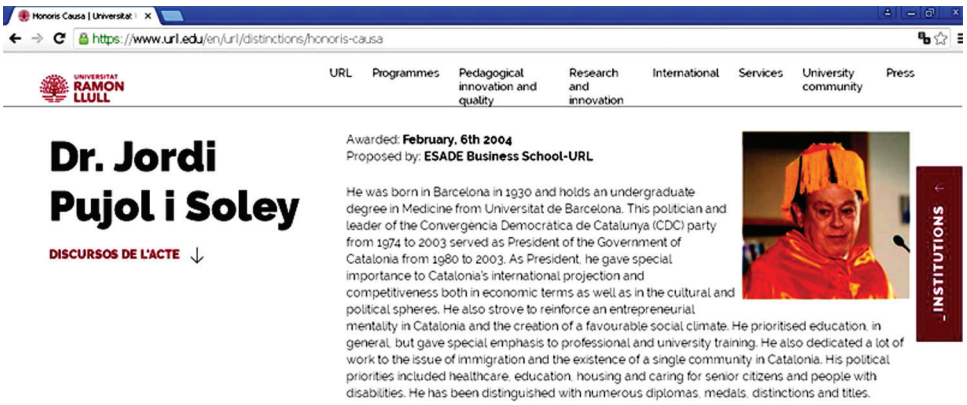


Figure 11. Link between politics education + religious institution in Barcelona, Spain. The honoris causa doctorate received by ex-Governor of Catalonia (2004), in the school ESADE URL.

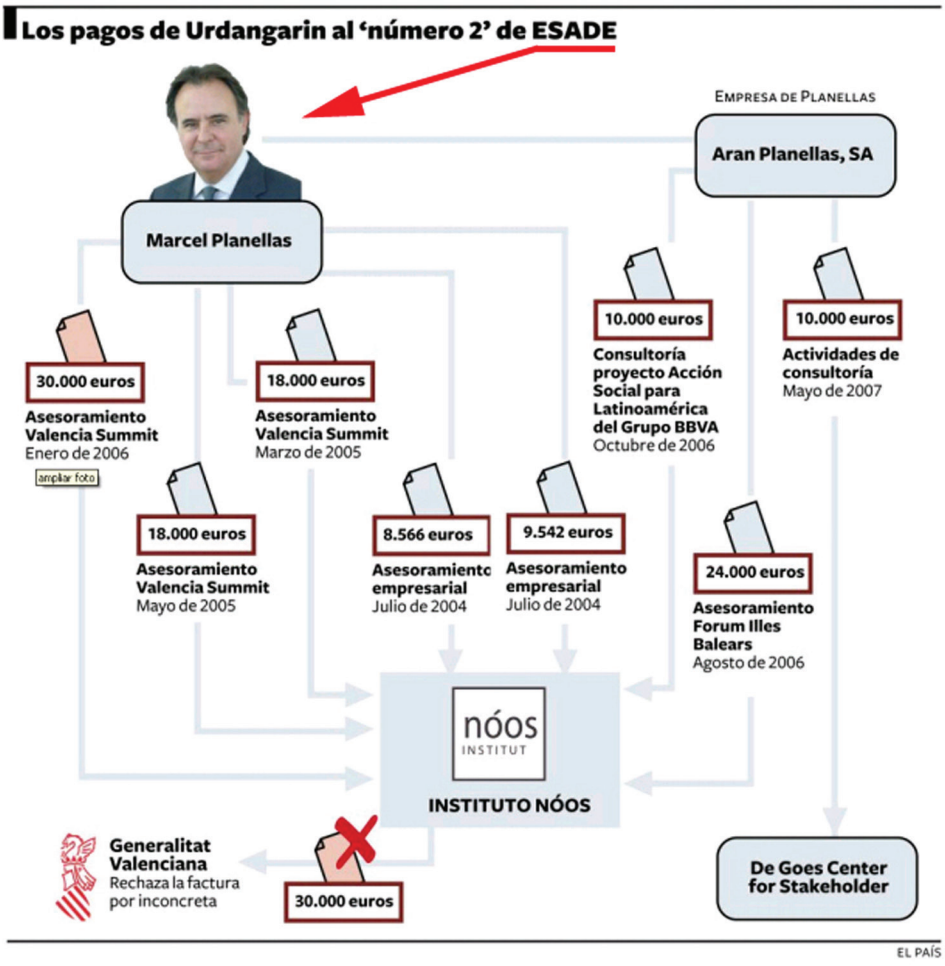


Figure 12. The use of comics as a tragicomic parody of reality that, starting from the educational and financial systems, encompasses political and religious institutions. For example, the ex- Governor of Catalonia and your family: 23 years of interrupted power (1980-2003). El Jueves (www.eljueves.es), 08.06.2014, Vol. 1941.

Figure 13. The rise of precarious work (including bogus self-employment). El Jueves (www.eljueves.es), 07.12.2017, Vol. 2094.

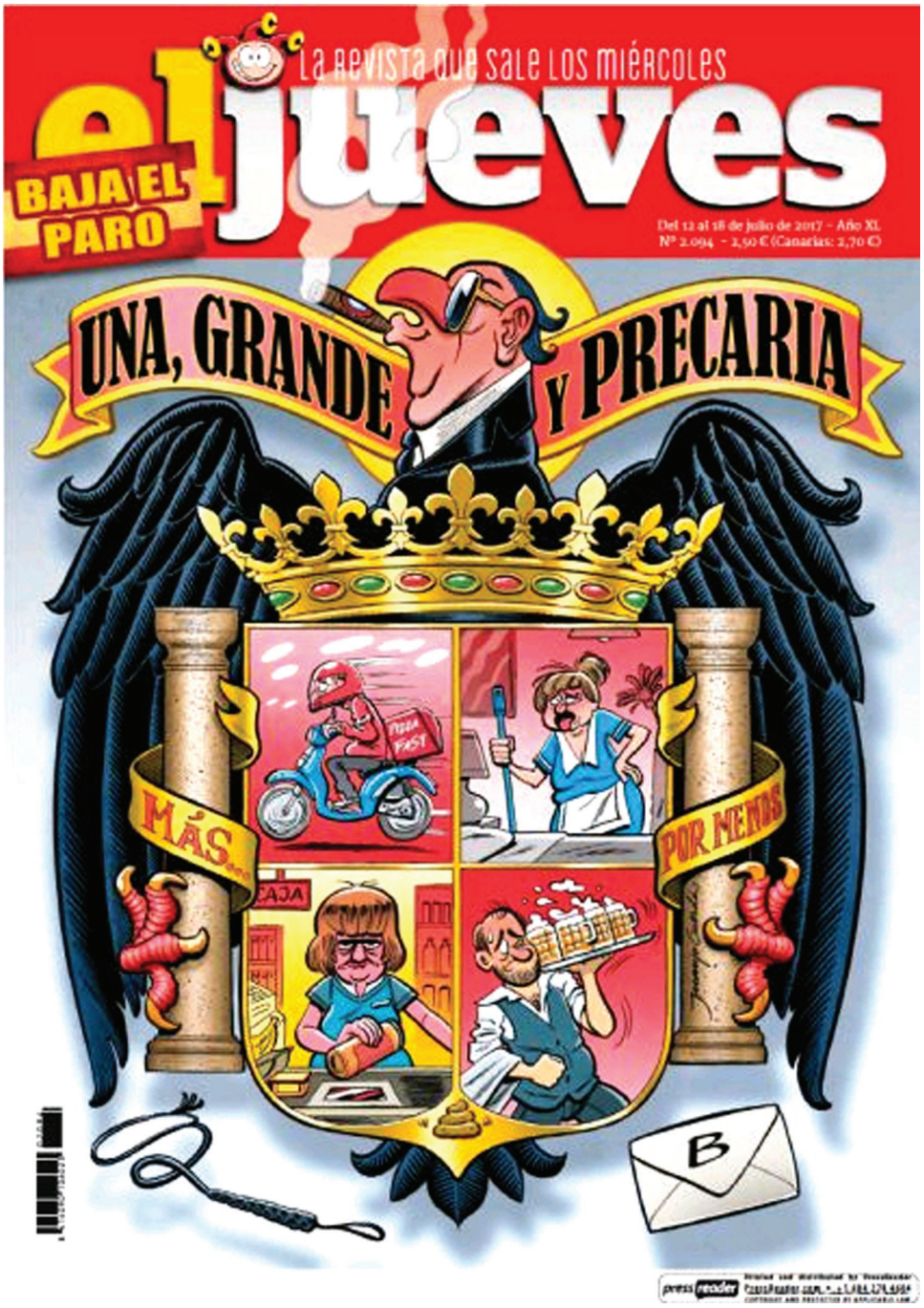
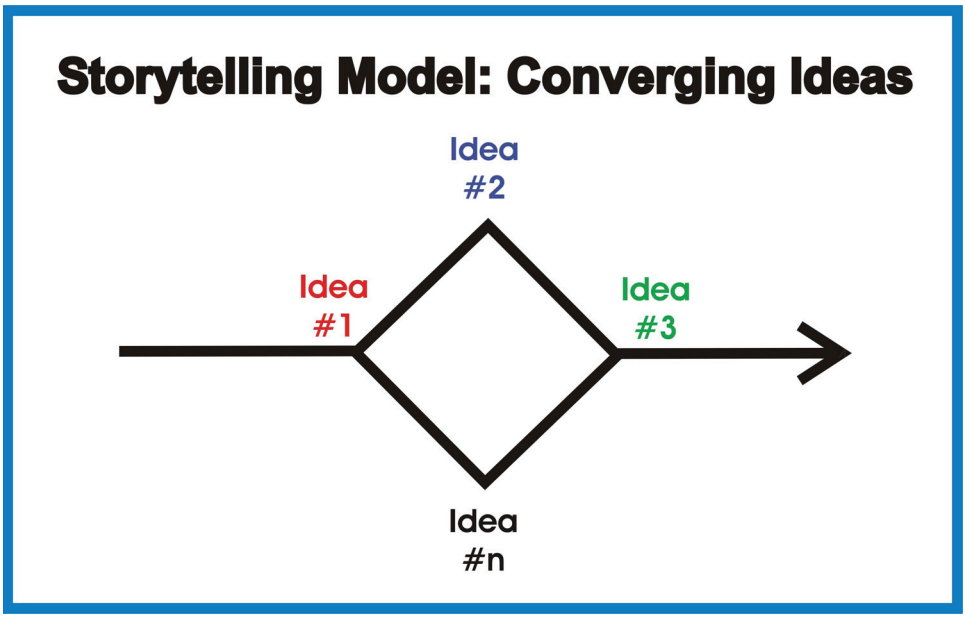


Figure 14. Emigration: Effects of the irregular works —lack of stable jobs. El Jueves: "Bad times to emigrate" (www.eljueves.es), 02.25.2014, Vol. 1918.

Figure 15. The potential of the "converging ideas" model lies in making the most of the various points of view of the various micro-narratives, to reach a central core. It is a technique similar to the "nested loops" model. The purpose is to show how the various ideas (various stories) converge towards a single goal, with a single conclusion.



LESSONS LEARNED

The evaluation methods, techniques and instruments applied to the activities of human beings imply the intervention of the formal, natural and social sciences. In this sense, it has been seen how the spread of personal computers in the homes of millions of inhabitants led to the generation of special software systems and new models of interactive communication, where the aim was to draw the attention of users, through as many of the senses as possible. The transition from hypertexts to hypermedia in homes was faster when compared to virtual reality. This is due to the cost factor of the hardware. In this evolutionary process, it can be seen how the costs in the development of software and hardware have begun to decrease as their acquisition expanded, where quality began to be an essential requirement for end users.

However, assessing quality is a task that requires true professionals who do not belong to all the comet qualifications in the European Mediterranean. Regardless of whether, they come from the formal, natural and social sciences. That is, professionals who have had at least between 10 and 15 years of academic training, added to possible work experiences. The link between the different sciences and technological advances allows the opening of new disciplines, but the epistemological limits of each of them should be respected. Respect for these limits can only be achieved by excluding the savage mercantilist factor of education. That is to say, an educational institution should not be managed as a limited or anonymous company for profit.

Completely removing the evaluation process in the educational field only responds to the mercantilist factor of the private sphere of education. A factor that has been progressively expanding in the context of public education, making the universal right to secular and free education for all disappear. The expansion

of the private sector over the public sector supposedly responds to the better educational quality of the first sector over the second. However, the reality in certain areas shows that this is not the case, starting with the comet degrees or the occupation of lifelong jobs, without prior training or experience, to the functions that they have to develop. In this sense, it should be noted that the shortage of mathematicians, physicists, chemists, etc. in the educational, scientific, etc., field, it is due to the fact that they carry out typical tasks of an administrator or management of bureaucratic activities, instead of using their neurons to the maximum in solving scientific questions related to the formal and natural sciences.

The convergence of ideas or generation of synergies is possible within the various sciences, in order to improve the educational process. In this sense, the location of the human being at the centre of the design process of new interactive systems has been verified over time, particularly at the end of the 20th century. Now, the problem lies in limiting the level of triviality that comes from the contents of the network and the use that is made of it, through transmedia, for example, in everyday education. As well as the loss of human skills and attitudes, added to the impossibility of differentiating between reality and the virtuality of everyday life, as the metaverse progresses, in the Alpha generation.

CONCLUSION

The time variable is important in the reliable and qualitative evaluation, since the less time spent, the lower the cost. This variable also plays an important role in the story of events, to establish a before, a during and an after in the narration. In the case of the storytelling technique used, "converging ideas" has made it possible to address various issues whose isotopic lines converged towards the central theme of this research. This is a very valid technique to confront the pros and cons in the use of new information and communication technologies, particularly in the educational field.

Through usability, it has been verified how to establish qualitative evaluation mechanisms in interactive systems, it is not an easy task, for all those who have been pioneers in such tasks. Correcting errors in the order pre-established by the mathematicians of the omega generation, who follow mercantilist paradigms, from the training and research context, implies a high human and professional cost. Putting new areas within computer science on track correctly in the face of certain epistemological deviations requires a great deal of time, particularly when all the norms of the scientific method and the legal system are respected.

The Omega generation, humanoid mathematics, algocracy, wild mercantilism in education, the uncontrolled transfer of technology between universities and industries (and vice versa), the intrusion and aggression of politics and religion in R&D, are some of the innumerable elements that harm the operation of the rules that have been developing the scientific method, through the centuries (Cipolla-Ficarra, 2022; Cipolla-Ficarra, et a1., 2017; Cipolla-Ficarra, Nicol & Ficarra, 2010). Furthermore, they generate a broad consensus in the formation of new professions. This implies a professional and educational vision of 360 degrees, which is not usually profitable for the promoters of the paradigm of fragmented, superficial and trivial knowledge towards which the new generations are being oriented. One way to overcome this limitation is to review the origins, evolutions and projections of the disciplines, which are created with the advancement of human interaction with new technologies. In this sense, storytelling is very valid to present the reality of the facts, being able to generate a new strategy to communicate knowledge.

Finally, it is necessary to remember that nowadays, developing a web portal implies, directly and indirectly, most of the topics discussed in this work, such as interactive design, UX, interface, naviga-

tion, structure, content, connectivity, media synchronization, dynamic, benchmarking, maintenance, traffic monitoring, search engines, search engine optimization (SEO), promotional campaigns, surveys, among many others. A priori, the evolution of usability would be included in the UX, but the quality of communication (communicability) remains a pending issue in countless cases. The analysis and evaluation of communication (interactive or not) remains the key to easily detecting those areas where future generations of users can invest their energies and easily understand where they are, where they come from and where they can go. These three actions are interrelated and previously require another activity. A personal and individual activity, such as overcoming the fragmentation and superficiality of daily scientific knowledge, is coming from the new educational models. This hybrid models do not adjust to the contextual reality of the students.

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ANNEX #1: METHODS AND TECHNIQUES OF USABILITY EVALUATION IN THE 1990s

There are studies since the end of the 20th century that indicate how inspection methods and empirical methods were complementary to detect usability problems. Contextually, these studies were focused on users who had to learn the use of systems, with or without prior knowledge of computing and/or the use of computers. Nielsen, Mehlenbacher, Wiklund made the following classification of usability evaluation methods and techniques, which complement those presented above (Nielsen, 1992b; Mehlenbacher, 1993; Wiklund, 1994):

1) **Heuristic evaluation.** It is a method based on a set of rules, guided by the experience and knowledge of the usability specialist, whose profile must be an intersection between factual, formal and natural sciences, as in the case of the evaluation of interactive systems (Cipolla- Ficarra, 1997).
2) **Guideline reviews.** It is the check of the interface based on a list or usability guide. It is considered a mixed method since it combines heuristic evaluation with standard inspection.
3) **Pluralistic walkthroughs.** They are meetings to discuss usability aspects based on certain tests or experiments. Users usually participate.
4) **Consistency inspections.** The inspections are performed by interface designers to inspect for consistency. Essentially, the evaluation of consistency takes as a reference previous interactive systems or technological products that are directly related to the one being analyzed. The examination is carried out by a team of inspectors.
5) **Standards inspections.** It is an analysis carried out by a user interface expert who, based on the rules that follow the standards of other products on the market, carries out the investigation.
6) **Cognitive walkthroughs.** It is a procedure where the resolution of the problems of each of the stages in the user-computer interaction is simulated.
7) **Formal usability inspections.** It is similar to code inspection methods used in software. Here a group of people have previously defined their functions within the evaluation process, which consists of several stages: analysis planning, meeting and explanation of the guidelines to be followed in the investigation, individual review of the interfaces by the inspectors, listing and classification of the problems detected, and issuance of the final results.
8) **Feature inspections.** They are focused on the operation of a software system. Said technique may include not only the evaluation of an operation but also its design.

Within the usability literature there are other methods or techniques to carry out the usability evaluation of a system. Many aspects of these methods described below have progressively evolved over time, due to technological progress and the training of experts in communicability (Haramundanis, 1992; Henderson, 1995; Nielsen & Mack, 1994; Virzi, et al., 1993; Wiklund, 1994):

9) **Observation.** The observation is based on the analysis of the real interaction of the user with the computer and can be classified according to (Bunge, 1967):

The means used.
The participation or not of the observer in the data collection process. The total number of observers.

The place where it takes place.
Through the means used, it can be decided whether an observation is structured or not. For example, there is a structured observation when the observer conducts his research with a previously prepared questionnaire, while the observation is unstructured when the observer records everything without following a pre-established order or guide. Technologically, the use of a video camera, audio recorder, etc. is used. In regard to the participation of the observer in the investigation, it is not advisable, since the user of the system would receive a direct influence from the outside that would modify the results. Furthermore, in both types of observation, it must be non-participant.
Depending on the number of observers, it is established whether it is individual or group (more than three people are required). The observation is carried out by a single person in the method of analysis that has been proposed since the end of the 1990s. Depending on the type of systems it is possible to carry out the evaluation in a laboratory or at the workplace. Carrying out research in the laboratory implies the inconvenience of having to generate conditions that emulate the real situation. A plausible solution to this problem is the incorporation of video cameras in the workplace to record the user's interaction with the computer. However, in this case there may also be certain distortions in the results achieved if the user knows that his interaction is being filmed.
In the evaluation of interfaces, it has been verified that observation is a frequently used method. For example, one of the consequences of the use of observation by a specialist in communicability is the possibility of obtaining information about the components of the design of interactive systems, regardless of the desire to provide it by their manufacturers. Generally, the design criteria followed by the manufacturers of these systems is reserved information. However, the results are more reliable or objective when the observation is structured (Corgan & Walters, 1994; Cipolla-Ficarra, 1997). In observation there are several components that are interrelated (Bunge, 1967):
The observer.
The observed object.
The context (spatial and temporal). The circumstances of the observation.
The means of observation (concrete and conceptual).
Regarding the objectivity of observation, Mario Bunge maintains that one of the characteristics of the scientific method is its objectivity insofar as it seeks to reach the factual truth, regardless of the scale of values and the beliefs of the person who investigates (Bunge, 1968). There are those who maintain that it is the judgment of a single person, although observation is a process in which the habits, expectations, practical skills and scientific knowledge available to the observer are of great importance and are always interacting.

9) **Analysis of protocols or talk-aloud protocols.** Identifies the conceptual problems of the interface. Discover inconveniences or failures that the user does not reveal in an interview. It is feasible to evaluate unfinished products or prototypes. Its main disadvantages are:

The need for a laboratory and an observer.
It does not allow to quantify the time spent in carrying out the evaluation.

10) **Interview.** It basically focuses on a certain aspect of the interface. At the time of carrying out the interview, the assumption is made of the existence or prior knowledge of the problems by the user.

This technique is usually carried out on a small group of people (five members). The interviews are divided into:

- **Structured or formal or standardized interviews** are those that are carried out based on a previously prepared and standardized form. One of its main drawbacks is that the forms prepared with a predominance of closed questions do not allow the collection of other types of data in situations or unforeseen responses.
- **Unstructured or informal interviews** are those in which the interviewer does not have a previous form. Greater freedom of initiative is given to the person questioned and the interviewer. The questions are of an open type, the interviewer responds with his own terms, which makes the subsequent task of classifying the results difficult. There are two types of informal interviews:
  a. Centralized interview or focus interview, around a previously raised problem or topic.
  b. Non-directive interview. The interviewer encourages and guides the interviewer to express her views on aspects of user-computer interaction.

Among the main drawbacks of conducting interviews, it is worth noting the time required to obtain the information, since they are carried out individually. Moreover, there is the difficulty in quantifying the data obtained and generalizing them.

11) **User surveys.** The speed and low cost in obtaining results are its main advantages. Besides, it keeps the user anonymous and generates quantitative data. User surveys can be carried out in the laboratory or by mail (the benefit of sending by mail is less than the cost in relation to the interview).
12) **Questionnaires.** They serve to detect the subjective preferences of users. Here the user has more time to respond in relation to the interview (Bodker, et al., 2016). There are two modes:
    a. Direct questionnaires: They are those questionnaires in which the user must answer in the presence of the evaluator.
    b. Indirect questionnaires or remote surveys: These are the questionnaires that the user answers without the presence of the evaluator.

To obtain good results in the use of direct questionnaires, it is necessary to consider:

- The order of formulation of the questions.
- The insertion of control and/or verification questions (an incorrect structure of the questions conditions the answers).
- More than thirty questions increase the number of abstentions and decrease the quality of the answers.

In the case of indirect or remote questionnaires, it should be borne in mind that there is a problem of feedback from the process in the surveys, such as abstentions, late receipt of questionnaires sent by mail, and so forth. A good proportion of responses received are usually one in ten surveys or questionnaires sent. The main disadvantage of the direct questionnaire is to gather a group of no less than thirty people

to obtain good results. While in indirect questionnaires, the difficulty lies in the possibility of previously carrying out a pilot test.

13) **User responses or user feedback.** Design changes are made based on user suggestions and requirements. This technique is used when there is a monitoring of the project. The main difficulties are:

You need a special organization for the answers. Requires the opinions of hundreds of users.

14) **Reference system or system benchmarking.** The addresses issues of system speed more than user satisfaction (negative aspect). It allows unifying the distinctive features of the evaluation of the system and providing quantitative data to the evaluation process.
15) **Wizard of** Oz **technique.** It is the study of the behaviour of the user on a prototype of the system within the laboratory by the same designer. Later, the designer can refer to the same user-generated documentation to make the changes. Hence, the present technique provides work-oriented data.
16) **Guided interaction.** They simulate the user's interaction with the computer, which implies the existence of system experts and complex equipment within the laboratory. The main drawback is the cost factor, although quick feedback is obtained within the interface development cycle.
17) **Video sections or videotaped sessions.** It is the recording of reactions to the system. It facilitates the collection of additional information, for example the user's facial gestures that indicate positive or negative aspects of the interaction with the interface. Besides, it allows different viewing angles in the process of user interaction with the interface. The main difficulties are:

The cost of laboratory equipment (software and hardware).
The evaluation sections are individual. This increases the total time of the experiment.

18) **Tests on prototypes or Beta-testing.** These are tests that are carried out on models before "on-line" production. Little budget is required unless system programmers constantly request feedback on the design. The drawback is that the information collected is difficult to generalize.
19) **Verbalized thinking or think-aloud.** The user uses the system and continually makes "value judgments" about it. It is a way of knowing directly which parts of the user-computer dialogue produce the most problems, since it is presented as the user interprets each component of the interface. It had traditionally been used for the practical evaluation of the human- computer interface. The number of evaluators ranges between three and five to obtain good results. The disadvantage is in the time consumed between verbalizing the answers and answering the questions, which slows down the user's actions. There are two considerations to keep in mind with this technique:

It is unnatural for someone to verbalize all his thoughts.
The results must maintain the confidentiality of the person issuing them.

20) **Measures of representation or performance measures.** They serve to detect individual usability problems. They are carried out at the end of the evaluation and require a group of no less than ten people. Their results are easy to compare.

21) **Control groups or focus groups.** They record the main reactions of the group. They are carried out at the analysis stage. The main difficulties detected are listed below:

The need for six or nine people per group. The low validity.
The difficulty of analysis.

22) **Annotations about the current use or logging actual use.** The analyst detects those options that are more or less used. It is carried out in the final stage of the evaluation or as a follow-up to the project. It is a procedure that can be carried out continuously, but it has some disadvantages, such as:

Access to user privacy.
The analysis requires a large volume of data.

ANNEX #2

Section A: English Version (Translation)

Title: ***La Salle ends with separate subjects and exclusively numerical grades.*** *The educational institution turns its way of educating for more than 80,000 students spread over the Iberian Peninsula.*

Text:

With 80,000 students distributed between Spain and Portugal, the La Salle educational institution has turned its way of understanding teaching upside down and has placed students at the centre of a learning model free of separate subjects, time rigidity and exclusively numerical grades.

This experience —the largest in Spain— follows the pedagogical principles of the Celaâ Law. "It's a happy coincidence, we're glad that areas other than education agree on answers because it means we're getting it right," says the director of the La Salle Educational Works Network, Félix Martinez, whose institution has 300 years of history.

All this is substantiated in aspects such as the greater autonomy of the centre; project work, an evaluation of the student that escapes from the mere numerical qualification and the distribution by traditional subjects gives way to the Learning Areas.

La Salle had been studying the new model since 2014, analyzing what was being done inside and outside the Spanish borders, Four years later, work began on its specific development for each of the stages and now the gradual implementation has begun, explains Martinez in an interview with EFE.

At the moment, he adds, it is in the Infant stage of its 81 schools in Spain, in Primary it is in sixty centres and in 1st and/or 2nd of ESO in 31 centres. "Little by little they will be incorporated into the rest and it is already on our two university campuses. "

Results.' More motivation and better understanding

Among the most relevant changes recorded in such a short space of time, Martinez underlines that the students have noticed that "they go to class happier because the approach makes them truly protagonists of learning, that is, they are constantly managing what they are learning. And those who have more difficulties join and overcome them in a more agile way. "

As for teachers, there is a "significant" increase in teamwork, because "the project itself requires it when working in several areas simultaneously; they have to be connected to each other or else it is not feasible. And they have discovered, although we had already been working on it, how trust in students is possible, that they are more skilled and have more capacity for self-learning than we thought".

How do classes and assessment work?

"Contexts educate and have to do with spaces, times and dynamics. There are spaces to learn knowledge, others that we call teamwork projects and others that are workshops, where we want kids to learn how to do things and that require different timings. The schedule is not 50 minutes but sometimes it is two hours, other 40 minutes, it depends on the reality that they are living in the classroom".

The evaluations carried out by the teaching teams of La Salle, together with the numerical value, are linked to how the child is progressing in mind, body, movement, development of thought or in skills

For example, the Language mark is not only rejected in that subject but also if the boy has worked on a social issue and has had to present it orally or in English. "The different areas are fed with all the work that he is doing and with that crossing " the final evaluation is reached.

On the other hand, the person in charge explains that it is not that less content is taught, but that "repetitions that are not necessary in certain areas" have been avoided.

"The level of depth that students acquire as they are the ones who are excited about what they are learning is much greater, they also increase their motivation and understanding, and from one year to the next they remember it much better when in previous years they had not because they had stayed in rote learning."

Likewise, conventional textbooks have been replaced by their own didactic materials that allow the rapid updating of the content to respond to the present context.

The changes have also reached teacher training, in which an average of 50 hours per educator has been invested, and the progressive interior remodelling of the centres, where work is being done on the so-called educational landscapes, which leads to the redesign of the classrooms.

La Salle is an institution established in eighty countries that is dedicated to an education based on human and Christian values."

Interestingly, the last two words of the article, which hypothetically is the cornerstone of all its actions, is not considered by that institution at the time of making financial contacts, with the Arab world, where there is an abundance of petrodollars: Saudi Arabia, Qatar, Dubai, and so on. Like ultra-nationalism, religion as well as the supposed educational revolution of the present news, are marginalized and excluded, due to monetary issues.

Section B: Original Version In Spanish

Title: ***La Salle acaba con las asignaturas separadas y notas exclusivamente numéricas.*** *La institución educativa da un vuelco a su manera de educar para los más de 80.000 alumnos repartidos en la Península Ibérica.*

Text / News:

Con 80.000 alumnos repartidos entre España y Portugal, la institución educativa La Salle ha dado un vuelco en su forma de entender la enseñanza y ha colocado a los alumnos en el centro de un modelo de aprendizaje libre de asignaturas separadas, rigidez horaria y notas exclusivamente numéricas.

Esta experiencia —la más grande que se realiza en España— sigue los principios pedagógicos de la Ley Celaá. "Es una feliz coincidencia, nos alegra que ámbitos distintos de la educación coincidamos en respuestas pues supone que vamos acertando ", afirma el director de la Red de Obras Educativas La Salle, Félix Martínez, cuya institución tiene 300 años de historia.

Todo esto se sustancia en aspectos como la mayor autonomía del centro; el trabajo por proyectos, una evaluación del alumno que escapa de la mera calificación numérica y la distribución por asignaturas tradicionales deja paso a los Ámbitos de Aprendizaje.

La Salle llevaba estudiando el nuevo modelo desde 2014, analizando lo que se hacía dentro y fuera de las fronteras; cuatro años después comenzó a trabajar en su desarrollo concreto para cada una de las etapas y ahora ha empezado la paulatina implantación, explica Martínez en una entrevista con EFE.

De momento, añade, está en la etapa de Infantil de sus 81 colegios en España, en Primaria está en sesenta centros y en lº y/o 2 de la Eso en 31 centros. "Poco a poco se irán incorporando al resto y ya está también en nuestros dos campus universitarios".

Resultados. Más motivación y mejor comprensión

Entre los cambios más relevantes registrados en tan corto espacio de tiempo, Martínez subraya que en los alumnos se ha notado que "van más contentos a clase porque el planteamiento hace que de verdad sean protagonistas del aprendizaje, es decir, están gestionando constantemente aquello que están aprendiendo. Y aquellos que tienen más dificultades se van uniendo y superándolas de forma más ágil".

En cuanto a los docentes, hay un aumento "significativo" del trabajo en equipo, porque "el propio proyecto lo pide al trabajar en varias áreas de forma simultánea, tienen que estar conectados entre sí o de lo contrario es inviable. Y han descubierto, aunque ya lo veníamos trabajando, como la confianza en los alumnos es posible, que son más hábiles y tienen más capacidad para el auto-aprendizaje de lo que pensábamos ".

¿Cómo funcionan las clases y la evaluación?

"Los contextos educan y tienen que ver con los espacios, los tiempos y las dinámicas. Hay espacios para aprender conocimientos, otros que llamamos proyectos para trabajar en equipo y otros que son los talleres, donde queremos que los chavales aprendan a hacer y eso requiere tiempos distintos. El horario no son 50 minutos sino que a veces son dos horas, otras 40 minutos, depende de la realidad que están viviendo en el aula".

Las evaluaciones que realizan los equipos docentes de La Salle, junto al valor numérico, van aparejadas a cómo es el avance del niño en mente, cuerpo, movimiento, desarrollo del pensamiento o en competencias

Por ejemplo, la nota de Lengua no solo viene refiejada en esa materia sino también si el chico ha trabajado en un tema de sociales y lo ha tenido que exponer oralmente o en inglés. "Las distintas áreas se van alimentando con todos los trabajos que va haciendo y con ese cruce " se llega a la evaluación final.

Por otro lado, el responsable explica que no se dan menos contenidos, pero sí se han evitado "las repeticiones que no son necesarias en determinadas áreas".

"El nivel de profundidad que adquieren los alumnos al ser ellos los que se ilusionan con lo que están aprendiendo es mucho mayor, además aumentan su motivación y comprensión, y de un año a otro lo recuerdan mucho mejor cuando en anteriores años no lo habían hecho porque se habían quedado en el aprendizaje memorístico ".

Asimismo, los libros de texto convencionales se han sustituido por materiales didácticos propios que permiten la rápida actualización del contenido para responder al contexto presente.

Los cambios han alcanzado también a la formación del profesorado, en la que se ha invertido una media de 50 horas por educador, y a la remodelación interior de los centros de forma progresiva, donde se trabaja en los llamados paisajes educativos, que lleva al rediseño de las aulas.

La Salle es una institución implantada en ochenta países que se dedica a la educación basada en los valores humanos y cristianos.

Chapter 12
Educators, Technologies, and Neuroscience:
Advances and Setbacks in Pre-University Education

ABSTRACT

In the chapter, the evolution and involution of some pedagogical, sociological, technological, and neuroscientific aspects related to the role of pre-university teachers, in nursery schools, schools, institutes, and high schools, are investigated. The purpose is to establish the existing limits in school performance and analyze some of the causes of school failure at an early age. Simultaneously, some of the main human factors are presented, which increase the existing divergences between the university and pre-university context, resorting to visual synthesis, with the use of keywords. Several true examples are also analyzed that reflect the lack of merits and human talent to carry out the work of a teacher and that constitute educational anti-models. Finally, it is emphasized that the reality examined, described, and verified in the work is mainly focused on European borders, with extension to some countries of the American continent.

INTRODUCTION

Throughout the history of humanity, it has been verified that in periods of great crises there are large-scale technological advances in the field of inventions and discoveries, for example. During World War II, John von Neumann, in 1945 presented the First Draft of Report on the EDVAC (Electronic Discrete Variable Automatic Computer). The EDVAC was one of the first electronic computers built at the Moore School of Electrical Engineering (Pennsylvania, USA). In that text there was a logical description of the organization of the computer, covering topics such as the binary system, the notion of digital, the emulation of the functioning of the human brain, and so on. Previously, he had collaborated on the ENIAC (Electronic Discrete Variable Automatic Computer) project. After World War II, he directed the project of an experimental computer called JONIAC (Neumann, 1958).

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Neumann was a true specialist and pioneer in the field of computer science, with extensive knowledge in mathematics, physics, chemistry, etc. Furthermore, he was passionate about studying the interconnections between psychiatry and neurology. The purpose was to investigate possible convergences or analogies between the computer and the human brain. It was thus that in 1955 he was working on a series of lectures that he was to present at Yale University, but he would die before finishing them. In the drafts of those lessons he explained how in creating the JONIAC computer, he, together with his group of collaborators, had imitated some of the typical operations of the human brain (Neumann, 1958). **In John von Neumann's work career, the motivation towards constant and scientific learning can be verified. This yearning to study various scientific disciplines, converging and diverging from each other, allowed him to establish innovative and impressive bridges between education, health and computing.** Today, we have some examples about these visionary interrelations (Collings, 2016; Vaandrager, 2017; Denning & Lewis, 2017; Ratner & Re, 2018; Mahajan, Mukund & Saxena, 2019; Wing, 2021).

For centuries there has been a discursive tendency in government authorities to constantly present the importance of education and health as the two pillars or fundamental sectors of developed or developing societies (Kotroumpis, Leiponen & Thomas, 2017; Jirotka, et al, 2017; Knowles, et al., 2018). However, the reality that emerges in both sectors, with the arrival of the new millennium, is the exponential growth of problems. Many of these problems appear without an apparent solution, particularly if we analyze the use of new technologies, in the pre-university educational field, for example (Chambers, 2004; Selwyn, Cranmer & Potter, 2010; Galloway & Norton, 2011). **The inclusion of personal computers in schools, since the 1980s, has gone from being a positive factor in pre-school, primary and secondary education**, to studying foreign languages, attending remedial classes in science, learning languages of programming, etc., to something totally different (Neumann, 1958; Collins, 2016; Cipolla-Ficarra, 2009). **The loss of this positive value is due to the miniaturization and enhancement of the functionality of computing devices and telecommunications, without cable.** In few words, the rise of smartphones, social networks and educational anti-models stemming from the mismanagement of the inverted / flipped classroom, for example (Moyer-Gusé, 2008; Cipolla-Ficarra, 2010; Cipolla-Ficarra, 2013; Cipolla-Ficarra & Ficarra, 2013; Cipolla-Ficarra et al., 2018a; Cipolla-Ficarra, 2020).

Therefore, evaluating students and teachers in the pre-university context is a challenge in the new millennium, starting with the behavioral values of children, adolescents, youth and adults. A detailed explanation would imply years of studies, with the help of psychotherapists, to examine and verify all the techniques and methods, related to education, that are proposed from the scientific / university field, in the extensive university bibliography that exists in this regard.

Simultaneously, **the growth of failures in human communications is supposedly due to the fact that the minds of many young people belonging to the Z or Alpha generation are traveling faster than their hands when writing. Hypothetically, all this is due to the exponential increase in online interactive communication, through computer devices, whether they are intelligent or not.** Hence, many Nobel laureates in medicine, such as Francis Crick, Eric R. Kandel, Erwin Neher, among many others, highlight the importance for humanity of the detailed study of the human mind and its functioning (Sakmann & Neher, 1995; Kandel, 2000; Bankston, 2002). To mention two examples, Erwin Neher maintains that: "Curiosity is something we all have as children, a researcher is someone who manages to keep it as an adult" and Francis Crick affirms that "there is no more important scientific matter for the human being, than the study of your brain.

Figure 1. For decades, the Nobel Prize winners in medicine have highlighted the importance of studying the brain and its functions. In the field of electronics and computer science, since the mid-20th century bridges have been built to those fields of neurology.

Curiosity is the engine of motivation for wisdom, throughout the life of the human being. While the study of the brain should begin with the knowledge of the anatomical map of the same, since for doctors, psychologists, psychotherapists, etc., there are still numerous unknowns to be resolved. Now, the anatomical study of the brain has been carried out for years at two levels. First, the microscope, in order to study the nature of the different brain cells and how they interconnect with each other, in different areas or zones of the brain. Second, the macroscopic, to determine the various zones and investigate how they are structured. In our days, the main characteristics to qualify a human being from the perspective of the use of language, learning capacity, empathy, rationality, ethics, morality, among others, are being included as new areas of study, in the formal and natural sciences, the moment the user interacts with computing devices, for example.

Such is the case that in several examples of the preceding chapters it has been verified how the human-computer interaction (HCI) and/or the user experience (UX) have practically lost the north in the compass of scientific knowledge and from the epistemological point of view. A valid example in this sense is when religion is included as new areas of study in the HCI (figure 2). In the case of figure 2, is a cunning way of diverting attention from daily events of intolerance towards other (non-native) people is verified, in certain geographical areas (figure 3). Nations that in popular wisdom were considered as vanguards in social conquests, as are the cases of the Scandinavian countries and their entire area of influence, in northern Europe.

Historically, considering the key elements that define the essence of the human being was the subject of great debates, between the different schools of philosophical thought and other branches of social sciences, where topics such as the soul, spirit and intellect converged. This triad, which tends to remain constant throughout different cultures and which can vary in their denominations, has been the subject of great discoveries and technological advances thanks to neuroscience (Finger, 1994; Bennett & Hacker, 2012; Smith, 2014). **From countless studies, the functioning of the human mind is being understood**

Figure 2. Call to present works in the field of HCI and religion (i.e., Participatory design in religious and spiritual contexts –NordiCHI conference, October 2022), in geographical areas where the social context denotes the first and serious signs of religious intolerance.

Co-Imagining Participatory Design in Religious and Spiritual Contexts

NordiCHI 2022 Conference: Participative Computing for Sustainable Futures
In-person workshop: Sunday, 9 October 2022
Aarhus, Denmark

Early Registration Deadline: 2 September 2022
Early Consideration Submission Deadline: 24 August 2022

ABOUT THE WORKSHOP

In this workshop, we aim to bring together scholars and practitioners from different backgrounds, such as religious studies, theology, HCI, and participatory design (PD), to start a conversation about what collaborative technological design and research with religious and/or spiritual communities could look like in the future and what needs to be done to get to such futures. The outcomes of this workshop will be the formation of a transdisciplinary research and design community, the establishment of guiding principles and best practices that can inform research and design methodologies, and the dissemination of this knowledge in collaborative post-workshop publications.

Figure 3. The bonfires of religious books, on public roads in some Scandinavian cities (i.e., BBC news, 04.12.2022 –www.bbc.com/news/world-europe-61134734)

//www.bbc.com/news/world-europe-61134734

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World | Africa | Asia | Australia | Europe | Latin America | Middle East | US & Canada | US Elections 2022

Dozens arrested at Sweden riots sparked by planned Quran burnings

18 April

Rioting continued on Sunday in Norrköping

More than 40 people have been arrested after violent clashes in Sweden between police and people angry at plans by a far-right group to burn copies

to answer questions such as: Who are we? How does the brain change over time? How can we enhance the mnemonic functions of the brain? How to slow down degenerative memory diseases? among many other rhetorical questions.

Theoretically, the answers to these questions can be very useful in the pre-university educational field to promote and facilitate the teaching / learning process, inside and outside the classroom. However, the contextual factor puts us before daily realities that have other levels of priority, such as the resolution of physical and intellectual violence, in nursery schools, schools, high schools, institutes, high schools, vocational training centres and universities. A violence that in certain communities has been growing over the decades, until reaching extreme situations, where it is necessary to control the entrance to these educational institutions, with metal detectors.

These violent behaviours would be related in neuroscience under the aspect or theme of evil. The use of techniques such as neurophysiological markers and neuroimaging allow establishing schemes with reference to violence / human evil. Undeniably, that in psychopathic origins, double morality, bipolarism, cynicism, and so on, must be studied considering the aspects of the psychosocial environment of the teacher / students and the biological conditions (Marcia, 1966; Hauskeller, 2012). However, psychotherapists, in the process of evaluating teachers, continue their daily work, without legal mechanisms. Mechanisms that should periodically control these hidden or manifest deviations of teachers, which affect the correct educational and behavioural process, between colleagues and students (Cipolla-Ficarra, 2010). The consequences of these malignant and violent behaviours can leave indelible marks on the psyche of those affected, from the beginning of their formative process in childhood, or on the physical health of adults, due to the medicalization suffered in childhood, before the degradation of behavioural values suffered silently.

THE BEGINNING OF THE END IN THE EDUCATIONAL PROCESS

Trying to cover all the stages of the educational process and the use of new technologies from pre-school age to university, throughout our planet, would imply considering endless variables in the training process, among the various stages of learning and the types of teachers involved in the long training cycle (Negrete & Lartigue, 2004; Selwyn, Cranmer & Potter, 2010; Collins, 2016; Vaandrager, 2017). A training cycle, whose endoculturation process has already been, altered (Herskovits, 1952). For example, from the first months of life of the human being, 100% of daily learning is no longer carried out, in the context of the home, but outside of it: Nurseries and nursery schools. Environments where children receive the behavioural values that will be their master guides throughout life. Obviously, this would imply a serious and exhaustive examination of all teaching staff or not, who directly and indirectly participate in this educational process. This is a process in which the human being forms not only character, but also, from an early age, moulds his/her innate temperament. It is a nutshell, the ABC's of personality.

A personality that begins to form in the preschool stage (Hauskeller, 2012). That is, children whose ages are between 0 - 5 / 6 years. Different countries acquire different names for this type of education: preschool, kindergarten, infant, and so forth. An education that usually takes place in nurseries, kindergartens, private schools, depending on the different countries. In addition, it is a preschool stage that has costs for parents or not, depending on the different social policies related to childhood. In other words, there are nations in which preschool education is carried out in public centres or is subsidized, totally or

partially, in private centres. In these environments, children basically learn how to communicate, interact and play with other children, in an appropriate way.

One of the basic functions of these teachers is to constantly motivate the children to learn the local language. Also, it offers them various materials to manipulate and carry out activities that help them learn the language, numbers, music, art, science, computer science, and so on (Ziman, 2002; Chambers, 2004; Galloway & Norton, 2011). At that age children can reach a high degree of knowledge. A knowledge that should help them in personal development, over the years. Besides, creativity and the desire to learn are two of the most important skills for life. Children have innate abilities and unlimited potential, which must be promoted and developed from preschool education. Therefore, of all the phases of the acquisition of knowledge and/or discovery of innate abilities of the human being, childhood constitutes the most important stage. It is a task that requires a highly qualified teaching staff.

Precisely, **evaluating teaching staff (pre-university / university) to certify their professional suitability and qualify them to practice that profession, is one of the "new businesses" that many educational institutions (public or private, university or not, with or without the support of the respective ministries and governments) have developed in the new millennium. Oddly enough, in this evaluation there are no psychological or psychiatric examinations of those who will practice that profession.** Some psychiatric examinations that should be repeated periodically so as not to lose the authorization that allows them to practice the teaching profession. If to all this we add the components "new information technologies" and "behavioural values", we are facing an alarming situation, whose negative results are already beginning to be glimpsed in the field of mathematics, reading, writing, memorization, face-to-face human communication, and so on (Fraile-Rojas, 2020; Cipolla-Ficarra, 2020).

The wild economic model, implemented since the 1980 in many nations of the world, has involuntarily included almost all of humanity in a new era (Ghosh, 2022). In our days and in economically developed and/or emerging countries, for work reasons of the parents, the process of endocultarization of children has been transferred to nurseries and nursery schools. The savage economic model has not only generated a drop in wages and an increase in the cost of living, but that anti-formative model (Cipolla-Ficarra, 2013; Cipolla-Ficarra & Ficarra, 2013; Cipolla-Ficarra et al., 2018b) and the elimination of behavioural values have been incorporated into educational institutions, covering all cycles of human learning.

Consequently, **we find that millions and millions of members of the new generations who have attended kindergartens and nurseries are indoctrinated to consume content from plasma screens, under the rule of debauchery and that could be expanded with an apocalyptic and non-integrated metaverse to the contextual reality of children.** In these social learning spaces, their behaviours are usually filmed by preschool teachers, with smartphones, and later presented to their parents, to verify the individual's adaptation to group behaviour. That is, with ages less than two years old, interactive multimedia technologies are used to highlight the behavioural homologation of the human being before the group, resorting to learning the local language, for example.

Many of these children, who do not even know how to walk, begin to naively interact with smartphones, as if it were an "educational toy." Precisely, the origins of such deviations lie in the misuse that the university-scientific sector is making of terms or expressions, such as "serious games", "gamification", "collaborative learning", "gender gap", and so forth. However, it is important to keep in mind that many members of the teaching staff of these nurseries do not have any type of university or secondary or primary education. In short, in many nursery schools and/or nurseries there are young people and/or adults who, without proper training, only care for children while their parents are working.

EDUCATIONAL ALIGNMENT AND THE INEFFICIENCY OF EVALUATION MECHANISMS

The suitability and human quality of the staff in some pre-school centres go through endless variables that are beyond the control of psychotherapists and eventual evaluation of educational tasks. Although it can be detected how in some cases there is a real alienation of children from an early age, their parents can do little or nothing, since for cost reasons, proximity to the place of residence and/or work, etc., they continue to send their children to mediocre schools, from a pedagogical perspective.

In the European Union, this drift is due to myriad social policies, which not only vary from state to state, but also move away from qualitative models. In addition, in many member states of the EU no one helps parents financially, in the monthly costs involved in sending their children to nurseries and/or kindergartens, with acceptable levels from a qualitative point of view. That lack of financial and social assistance is usually one of the causes enunciated in the decline of the birth rate in the EU. Hence, there are models to follow among the Nordic countries and models to avoid (anti-models) in the Mediterranean basin, to mention two examples, which a priori, are presented as polar opposites. Therefore, it is not a question of a lack of qualitative information, but rather of financial resources for families with young children to make the necessary changes that can favour the process of enculturation, which will later affect the process of transculturation (Herskovits, 1952).

However, these Nordic models also generate anti-models over time. For example, Norway in 1981 established the professional role of "child advocate" (Bennett, S. et al., 2019). Therefore, it was the first country in the world to defend children's rights, through a special state service for child protection called "Barnevernet" or Child Welfare Service. This social service, in which lawyers, social workers and psychologists are mainly involved, allows children to be separated from their parents for reasons of "lack of parental skills." Furthermore, statistics show that foreign mothers are four times more likely to lose their children to the Barnevernet than Norwegian mothers. This example highlights three fundamental aspects in the evaluation of educators from pre-school age.

First, knowledge of the local language, including the great variety of dialects and/or regional languages that may coexist within the borders of the same European state. That knowledge of languages, dialects, etc., enhances or diminishes that supposed parental skill, in relation to their children. Second, the sociological variables of an effective cultural integration of parents and their children in contexts exogenous to their places of origin come into play. For this reason, in this process of endoculturation in pre-school age, it is easy to observe, through the videos of the behaviour of infants in nurseries, how those children who have a natural imprint of leadership, little by little, lose it, until they adapt to group monotony in less than 60 days. The agents involved in the Barnevernet highlight the impossibility of establishing global evaluation strategies to accurately examine and rule on possible failures in the skills of parents and educators in nurseries, with children who have not yet learned to walk and/or to speak (Bennett, et al., 2019).

The third is related to the history of the peoples, the washing of the public image and the narcissism and cynicism of the teacher. For example, in the military interrelationships generated between the axes that triggered the Second World War in the old continent, it is easy to see how they have survived the passage of time. Still today, they establish links between some educational sectors of these nations, such as the cultural exchange of students, professors, researchers, etc., the signing of collaboration agreements, cooperation in R&D projects, with funds financed by private and public institutions of entities

(universities, foundations, banks, municipalities, associations, etc.) that are European, Arab, Asian, among others (Cipolla-Ficarra, 2021).

It is in this framework where the ideologically related sides (neo-nationalist parties, between the North and the South of Europe, for example) come together in educational projects, using cutting-edge technology and pan-European and international broadcast media, as is the news channel Euronews (www.euronews.com). The latter to raise to the umpteenth degree the narcissism and cynicism of students, teachers and/or researchers, in certain academic fields, who were born, grew up and will die, under the sign of extreme nationalism, promoting wild mercantilism in the education and the manipulation of data, in the evaluative processes of educational quality. All this, without being interested in behavioural values, the damage caused to the local community and future generations (Cha,Gao & Li, 2020; Zhuge, 2018; Williamson & Suden, 2016; Groh, et al., 2021). In this sense, the classic tactics to which they resort are generally related to recreating and remembering the barbarism of the Francoist, Fascist, Nazi movements, etc., in the Europe of the 20th century. **A barbarism that cyclically appears with the use of the latest technological developments, as a false novelty within the historical / cultural heritage, digital humanities, and education, for example.**

Next generation (Nextgen) technology (i.e., www.futurememoryfoundation.org) is an unlikely case for international broadcasting since it was repeatedly broadcast on the Euronews program Futuris (www.euronews.com, 03.18.2016). It is an interactive system, based on the use of a tablet PC that allows you to walk through the European forests, and to know the location of those genocide centres of the Germans, in the Second War (figures 4, 5, 6, 7 and 8). In short, revive the horrors of the past, through ICTs (information and communications technology) and neurosciences. Content that, contrary to what the mentors and/or authors of the system state claim, is currently used to promote these barbaric and criminal ideas. This is the case of some founders of the new ideological currents of extreme nationalism in the Eurasian continent. In this regard, it can be seen in the results of the elections of European xenophobic parties, which range from the Ural Mountains to the Atlantic Ocean, although many of them are camouflaged with the term "progressive." This is a word that historically had belonged to the "left" or "reds", as they would say in Franco's Spain. Hence, the "3D reconstruction of the Bergen Belsen concentration camp" project will always need the public to make an inverted reading of what a priori is being presented as a novelty.

Projects such as "3D reconstruction of the Bergen Belsen concentration camp", without a serious and prior analysis, denote the qualitative decline of the training process, the greater dependence on social networks and now the incorporation of neuroscience, as the only panacea to solve educational ills, which are emerging from childhood up to adulthood students. Furthermore, these three axes described will grow in the short term, with the Omega generation (Cipolla-Ficarra, 2022). The objective of the people involved in these projects and study centres is to make education a constant source of financial income with wild mercantilism. That is, through publicity and propaganda, at a planetary level, resorting to the banality of science and deception towards current and future generations (i.e., figure 7).

The members of the Omega generation (i.e., www.calgran.net, www.docu.net, etc.), **even if they are retired** (figure 9), **exercise remote control of actions in laboratories, R&D projects, the generation of international events (conferences, workshops, symposiums, and so on), the management of publications, the constitution of working groups, among many other negative activities for the future of the communities, from home until death. Some of its dogmas or premises are: "Your enemies are my friends", "Be strong with the weak and weak with the strong", "What is mine is mine and what is yours is also mine"**, and so forth. In these two links, it can be seen how the actions of

Figure 4. An interactive system designed to enhance the narcissism and/or cynicism of educators and students, in order to spread the resurgence of catastrophic political movements and thus eat away at the democratic system, in the Old World.

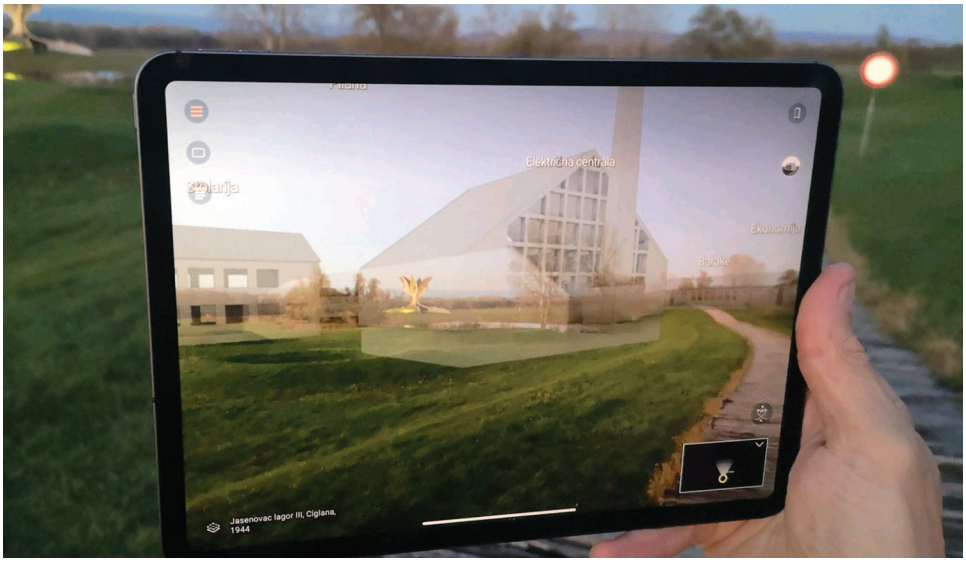


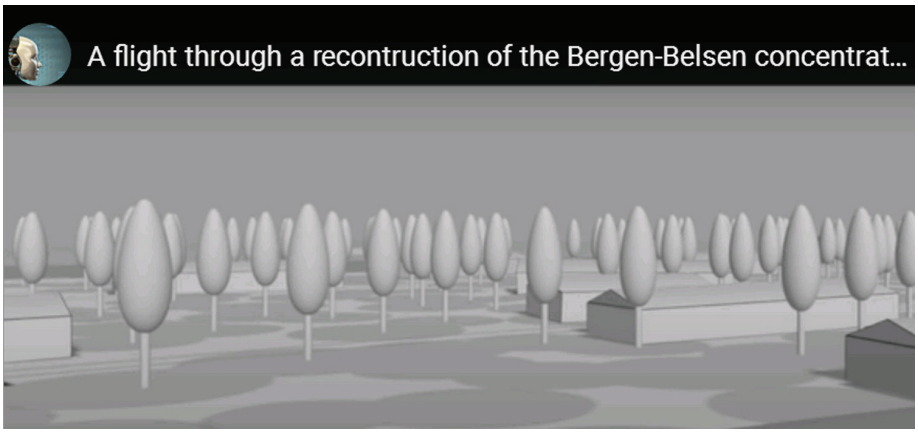
Figure 5. The social networking (Youtube) use for a detailed explanation of the operation of the system by the mentors and authors of the start-up / foundation of the project.

Figure 6. Projects with little practical use but that use the latest technologies to draw the greatest possible attention from the public, in the shortest time.

Figure 7. The tactic used is to always resort to figures of international renown to draw attention in the new / traditional means of social communication. It is the case of resorting and besieging the queen of the UK to obtain some photographic / video images of her, in front of her tablet PC.

the Omega generation have no time or geographical limits. Specifically, we are facing a destructive case of almost 30 years, based in Spain (i.e., Catalonia, Aragon, Basque country, Balearics Islands, Canary Islands, Madrid, Valencian community, Andalusia, Castile and León, etc.) and ramifications in the EU (i.e., Italy, Portugal, France, Greece, Germany, the Netherlands, Cyprus, and so on) and the American continent (i.e., Mexico, Colombia, Chile, Paraguay, Uruguay, Brazil, Argentina, and so forth). In a nutshell, a timeless and *urbis et orbis* classic example of the G-factor. Readers interested in this generation and factor, their modus operandi, behavioural values, etc., can consult the following bibliographical references (Cipolla-Ficarra, 2010; Cipolla-Ficarra, 2013; Cipolla-Ficarra & Ficarra, 2013; Cipolla-Ficarra, 2020; Cipolla-Ficarra, 2021).

Figure 8. Architecture, 3D and new technologies as a constant source to access international promotion channels such as the Euronews international channel. It is necessary to indicate that the quality of the images obtained and the graphic techniques used in the 3D reconstruction is located at the end of the 1980s.



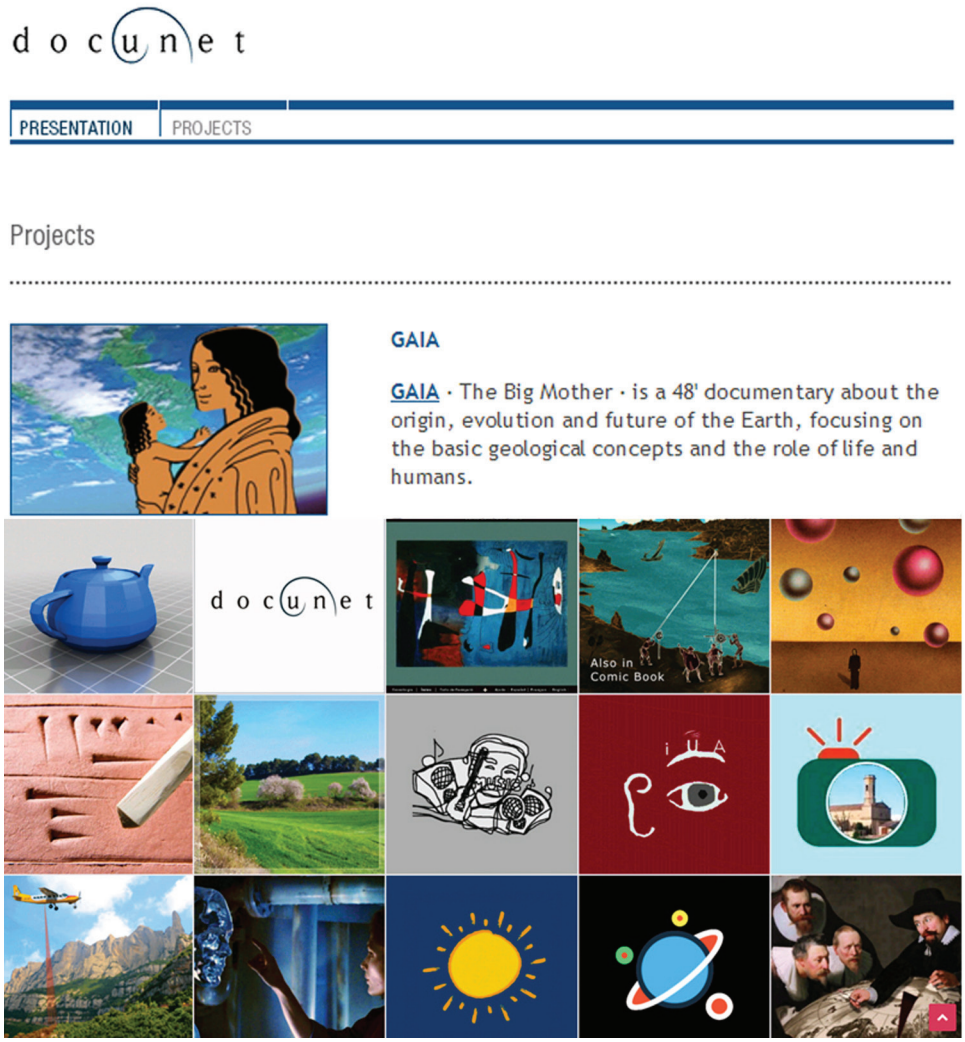
CAUSES, PROBLEMS AND POSSIBLE SOLUTIONS TO THE DRIFT OF THE PRE-UNIVERSITY EDUCATIONAL SYSTEM

Daily they publish in the newspapers, the school dropout of thousands of children and adolescents. As has already been stated, in various examples and cases of analysis in the preceding chapters, these members of contemporary societies are the main silent victims not only of wars, pandemics, financial crises, changes in the climate, human controls, etc., but also of the terrible educational model in force since the democratization of the Internet; the lack of professionalism of teachers; the loss of behavioural values inside and outside the classroom; the shortcomings in the evaluative methodologies of distance pedagogy; the legal vacuum for psychotherapists to periodically control teachers; lack of controls on those who disobey educational norms and directives, in the public, private and hybrid educational system, to name a few examples (Nevo & Horne, 2022; Troncoso, et al., 2022; Kindt, Chakraborty & Chakraborty, 2022).

To think that only with the use of avant-garde technologies the problem of school dropout can be solved is a utopia. New technologies should be considered as one more instruments that can help the training process. New technologies, with or without artificial intelligence, cannot replace the daily work of the teacher, particularly among children and young people (Mak & Pollack, 2016; White, 2018; Chasins, Glassman & Sunshine, 2021; Cipolla-Ficarra, 2022).

The aggravating circumstance of the situation described is presenting all the drift of the educational system that begins in day care centres, as something natural and without any solution. Those who support these hypotheses are unaware of the origins of the multimedia interactive and educational systems of the 1990s, when they taught reading, writing, mathematics, languages, science, history, geography, among other disciplines. Interactive multimedia / hypermedia applications, aimed at children and young people, whose ages ranged between 4 and 17 years inclusive (Cipolla-Ficarra, 2005; Cipolla-Ficarra, 2009; Cipolla-Ficarra, et al., 2018b). These were interactive multimedia systems, made by teams of real experts in pedagogy that were 100% integrated into the work of the designers and programmers of these educational applications. An interactive design and programming that involved the application of

Figure 9. Updating and constant monitoring of the successors of the Omega generation, in university places. In the image of the portal, the person in charge of the "3D reconstruction of the Bergen Belsen concentration camp" project is mentioned as successor to the position held in a former IUA –audiovisual university institute (audiovisual – ICTs department, Pompeu Fabra University, www.upf.edu –Barcelona, Spain) by a new member of the Omega generation.



pioneering methods and techniques for evaluating the quality of final products: MEHEM (Methodology for Heuristic Evaluation in Multimedia), MECEM (Metrics for the Communications Evaluation in Multimedia), HEDCDEH (Heuristic Evaluation Disk for Communication and Design in Hypermedia), HECHE (Heuristic Evaluation of Colours in HomepagE), and so on (Cipolla-Ficarra, 1996; Cipolla-Ficarra, 1997; Cipolla-Ficarra, 1999; Cipolla-Ficarra, 2000; Cipolla-Ficarra, 2001; Cipolla-Ficarra, 2005; Cipolla-Ficarra, 2008). Some examples of such multimedia systems (off-line) can be seen in figures 10, 11, 12 and 13.

Figure 10. "Kiyeko and the lost night" (computer version of a tale and book written by Vladimir Hulpach) is an interactive game of a French multinational (www.ubisoft.com, 1994), that taught children to read in five languages: English, French, German, Italian and Spanish. The success of its educational applications made it possible to open other commercial lines such as video games, with virtual characters created within the French company such as Rayman.

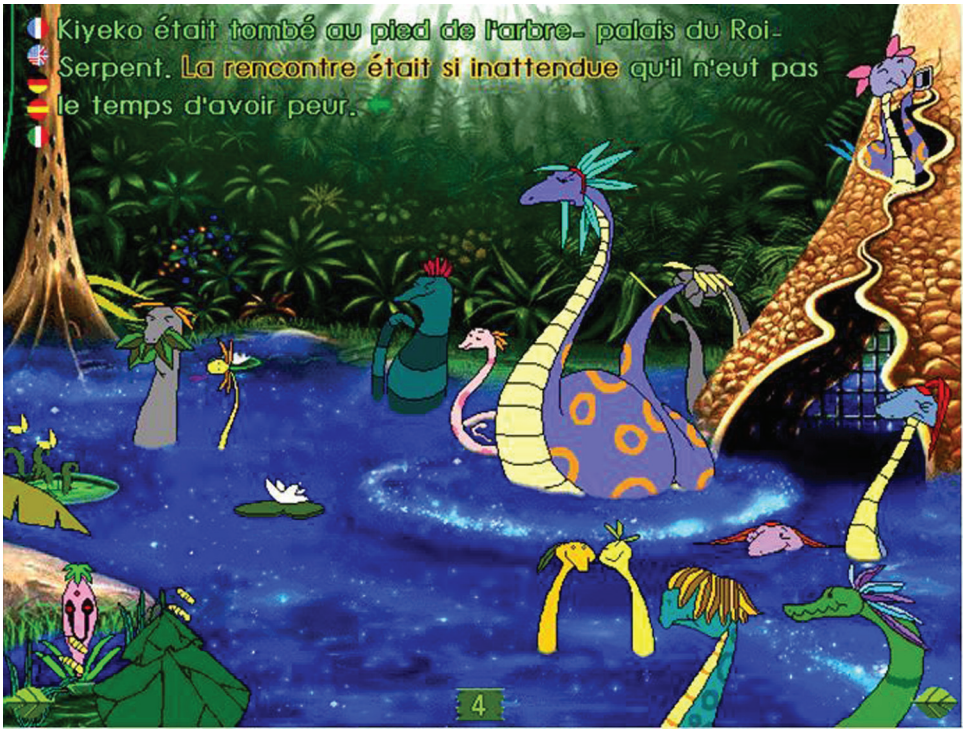


Figure 14 already shows a strategy to get to know-playing the human brain, using 3D computer graphics and computer animation. Undeniably, all of these examples provided interesting and appealing digital information to its users, who interacted from personal computers, to expand or reinforce the knowledge acquired in schools. In this sense, there are endless distance courses where the process called in the '90s, computer-aided education (CAE) was participated. A CAE that has nothing to do with Negroponte's OLPC (One Laptop Per Children) project. This is an international project (OLPC) that ended up being a real failure in developing countries.

Nations that saw the structures of primary and secondary education shake, in small countries, as was the case of Uruguay. Example featured extensively in ACM conferences (i.e., IDC - Interaction Design and Children, CHI - Human Factors in Computing Systems, and so on), magazine articles (i.e., Interactions of ACM), and so forth. However, one of the irresponsible Uruguayans that caused such disasters related to public education in the Río de La Plata, has been incorporated into the field of Child-Computer Interaction / Interaction Design and Children / Human-Computer Interaction, in the US (University of Iowa). From there, it tends to spread to Europe and the rest of the American continent to continue deforming future users of interactive systems from an early age (mainly, preschool children). In a few words, total immunity from HCI area about the damage caused in primary / secondary education,

Figure 11. Through Rayman, it can be seen how a successful entertainment-oriented character in 1995 has been adapted to various hardware platforms. His adventures have entertained children and teenagers for decades.

in Uruguay. This unfortunate behaviour and modus operandi is extensively developed in the following references (Cipolla-Ficarra, 2013; Cipolla-Ficarra, 2018a; Cipolla-Ficarra, 2018b; Cipolla-Ficarra, 2021).

Apart from the absolute fiasco of Negroponte's OLPC project, the rise of plasma screens, through the use of laptops, was already in sight (Negroponte, 1999). The truth is that as hardware has evolved

Figure 12. The use of children's stories for learning Japanese ("Nikolai's Trains" –Corel, 1995).

Figure 13. "The magic theater" (Anaya Interactive, 1994) a children's application, which allowed editing video frames, through the use of typical Paint instruments, which has been present in Windows operating systems (Microsoft), from 1985 to 2017.

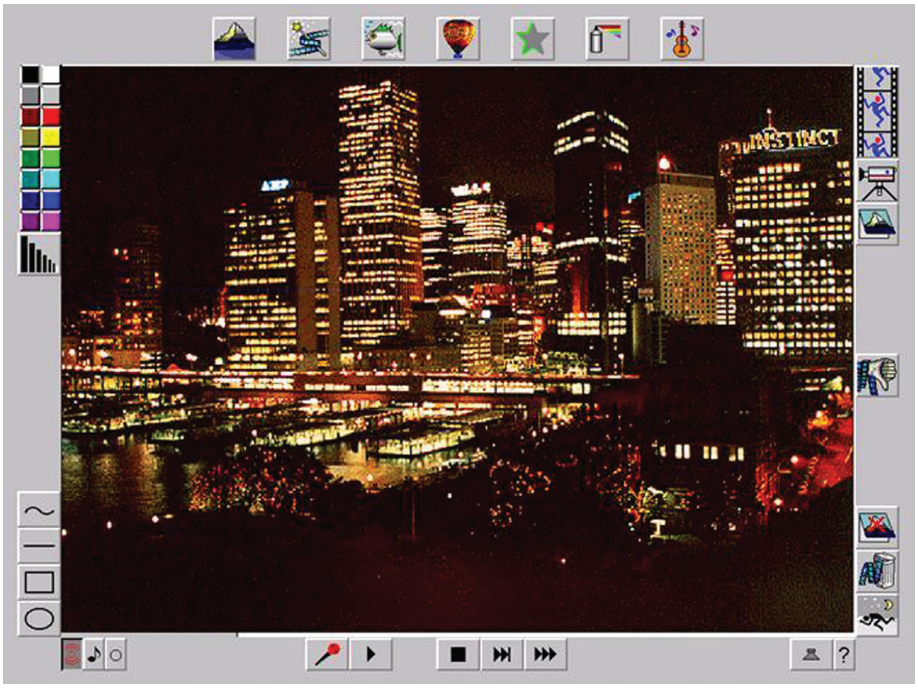


Figure 14. An educational game in 3D ("Braincity" –Digital Illusion, 1996) to learn about the brain and its main functions.

in the computer industry, the incorporation of plasma has progressively reduced the screens of computer devices, until reaching the spread of current smartphones. Synchronically, in this process of reducing technological devices, human beings have stopped writing with all their fingers on the keyboard, as was done on the old typewriters of the 20th century. Now users of the Z and alpha generations, mainly, use one of their thumbs to write on WhatsApp.

The problem found in users is that as the typing of words decreases, the worse they write. It is a phenomenon that has begun to be glimpsed with SMS (Short Message Service) messages and that, little by little, has been spreading to the educational field of primary and secondary schools. Consequently, this is one of the origins, not only in spelling due to the abbreviation of words, but also in the correct construction of sentences (grammar), textual comprehension, communication with adults, lack of interest in making resumes or synthesis of texts, poverty of vocabulary, lack of links in the narrations, and so forth. However, they communicate perfectly with their generational colleagues, through the use of animated or static stickers, emojis and gifs (graphics interchange format), to name three examples. That is, they prefer to resort to the image instead of the written word. Somehow all this indicates a return to the customs of prehistory. At a time when human, beings began to make use of pictograms in prehistoric caves to narrate events of daily life.

This regression in the acquired and natural skills of students is a source of dispute between university teachers and pre-university teachers. The first ones complain about the low or terrible linguistic and communicative level, at the moment of accessing the secondary level students, to the university. The latter, on the other hand, protest against the pseudo panacea presented from the universities, with an infinity of research and interdisciplinary results related to the latest advances in artificial intelligence (AI), robotics, virtual / augmented / mixed reality (VR / AR / MR), neurosciences, embodied interaction, assistive technology, and so on. Technologies and experts which leave unsolved three basic issues: The lack of interactive content (updated and in line with the requirements of students and teachers); dependence on the use of social networks, and exclusion from the context in which students and teachers are immersed.

In these disputes, it is also necessary to remember that in the world, not all educational centres are located in large cities and that the socio-cultural level is identical among them. There are many schools, institutes, vocational training centres, etc., that are in rural, mountainous, desert, etc. areas. Besides, it

is necessary to consider the problems of social marginalization and inclusion of students in the labour market, once the educational cycle has finished. Difficulties that exist in large cities and few address the solution of these variables in the university academic-scientific field, specifically, when they refer to educational processes and the use of new technologies.

Obviously, not considering these people and these realities makes the task of investigation easier. Hence, many concentrate their R&D efforts towards small population elite, as has already been seen in the chapter "Evolution of the Sciences, Informatics, Human Integration and Scientific Education." Unfortunately, this is the trend in the short and medium term for pre-university education in economically developed societies according to the guidelines drawn up by government institutions. However, pre-university teachers are usually more sensitive to these social issues, since in many places on the planet, they must not only deal with education, but also with the feeding of their students, due to the high rates of child malnutrition in the areas where the didactic work is carried out.

Another variable to consider is that in the final two decades of the 20th century and prior to the explosion of the diffusion of multimedia mobile telephony, students were evaluated in the classrooms of schools, institutes, high schools, colleges, universities, etc., without resorting to any type of technological device. That is, the basic instruments used to solve mathematical equations and problems were paper, pencil, pen and eraser. In some cases, books such as the table of algorithms, which are more than two centuries old, were allowed. Tables that allowed the development of the solution of the problem manually.

The current crossroads that millions of teachers are facing for the teaching of mathematics has as its genesis the massive production of pocket calculators and the acceptance of their use in schools. The first models worked on batteries until they reached solar energy. The reason for its spread begins with large-scale production in Asian countries (lower costs for end users). The main motivation for their massive use in schools was that they were never wrong and they allowed mathematical problems to be solved in less time in the classroom. **This was the beginning of the end of the human ability to perform basic calculations such as adding, subtracting, multiplying and dividing mentally, without resorting to the help of the calculator**. The interested reader can consult the following references (Cipolla-Ficarra, et at., 2009; Cipolla-Ficarra, 2011; Cipolla-Ficarra, 2021; Cipolla-Ficarra, 2022). Interestingly, the calculator was included in the first operating systems of the Microsoft firm. This is a tool or accessory for all commercial operating systems of personal computers up to the current smartphones. In contrast, spell checkers in text editors took longer to appear in the commercial computer market.

When faced with the double rhetorical question of knowing: First, how this situation has been reached in the educational system? and second, how to solve part of these problems? In the first place, it is necessary to briefly reflect on the evolution of multimedia mobile telephony and those who have been influencing the interconnection between human beings, from the interactive and ergonomic design of mobile phones. One way of doing this is by analyzing the telephone industry and its intersections with the academic world (Cipolla-Ficarra, 2011), such as Telefónica in Spain (www.telefonica.com) or Nokia in Finland (www.nokia.com). In the case of the Finnish multinational and the Scandinavian universities, we can see two electronic and telecommunications pillars have allowed it to generate not only mobile phones and smartphones, but also applications (software) for mobile phones, infrastructures, wireless systems, Internet of the things (IoT), televisions, consoles, tablets, among others.

This leads to Finnish R&D projects between industry, study centres and government authorities, which were related to usability engineering, interface metaphors, user experience, human-computer interaction, human-centered technology, ubiquitous computing, mobile interaction, human-centered artificial intelligence, smart urban environments, sustainability, etc., that have generated researchers who voluntarily or

involuntarily have increased the digital gaps between the different types of users, throughout the planet, from an educational perspective. In particular, they are researchers who have been trained in the 1990s in Finland, Germany, UK, among others, but who have seen in the field of international conferences on human-computer interaction a way of distorting the DNA of communication sciences. International and national conferences that were originally oriented towards electronic engineering, computer hardware and software, but which have gradually focused their interest on the human being, without being interested in the quality or effects of communication. Furthermore, internally its members have sought to impose centrifugal forces on centripetal ones.

For this reason, the division of the geographical territories of these congresses has appeared, placing the four cardinal points of the globe in opposition: North versus South, and vice versa; East versus West and vice versa. In a nutshell, the implementations of the old adage "divide and rule." So much so, that in the field of HCI, UX, RV, AI, etc., **today it is easy to see how in the fields of HCI, UX and information retrieval, there are "many caciques and few indigenous people", at the time of programming interactive systems or generating educational content or evaluation strategies for pre-university students / teachers**, to mention a few examples. This sad reality has been outlined by prestigious schools, universities, institutions, associations, organizations, foundations, and so on. In figure 15 we have a potpourri of terms and acronyms that refer to said reality and telecommunications. The mobile phone industry has not only negatively changed the global village announced by McLuhan, but has also generated a sheikdom system that does not contemplate at all the varied reality that prevails in schools, institutes, high schools and high schools of primary education and secondary.

Figure 15. Set of words that come from the intersections between those who have collaborated with the debacle of the educational system, through the multimedia mobile telephony industry and the HCI sector in universities, in Scandinavian region (i.e., Finland).

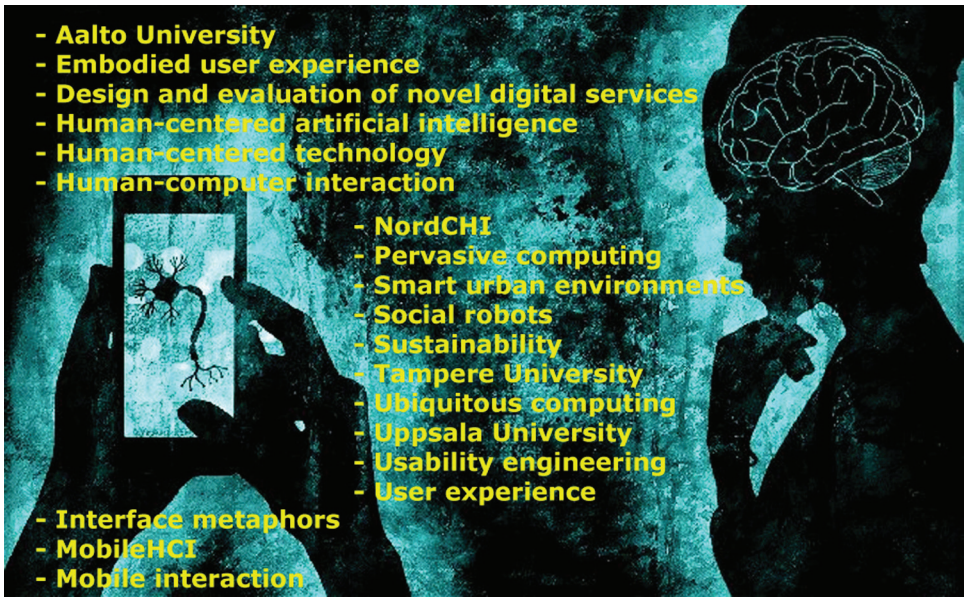


Figure 16. State of the art that denotes a cornucopia of terms agglutinated without an epistemological logic but with commercial purposes, in the field of formal, natural and social sciences. In synthesis, the most significant and cutting-edge research and development in all areas that fit the scope of the international propaganda and publicity in information technology and user interaction.

With regard to the second question, some drastic solutions include eliminating the use of smartphones during lesson times, both for students and teachers. Some experiments carried out in primary and secondary schools, institutes, high schools and high schools are giving positive results, although the legal dichotomy between rights and obligations comes into play. For example, many consider these measures as a kind of violation of the right of access to information and/or individual freedoms.

After the lockdown due to the pandemic, in the cities of Bologna (i.e., lyceum "Marcello Malpighi") and Ravenna (i.e, technical college "Nullo Baldini") in the Italian region Emilia-Romagna, the use of mobile phones has been prohibited to promote human communication. Students and teachers are required to leave these devices in a box at the entrance to the classroom (figure 17). This does not mean that the students are totally disconnected from their relatives, since in case of emergencies they can resort to the use of fixed telephony in the school secretary.

Resorting to these extreme measures indicates the absolute failure of the model imposed by the academic-industrial personnel who have been working with multimedia mobile telephony. **People who have worked on the metaphors of interfaces, ergonomic design, usability engineering, etc., of the first industrial models of mobile telephony. They have demonstrated the total lack of knowledge of human communication because since their training in formal and natural sciences they have claimed to be experts in social communication.** Today, they belong to the club of the destroyers of qualitative interactive communication, although they present a multi-year and self-inflating curriculum, in the direction of R&D projects (basically in HCI and with extension to childhood, education, the disabled, etc.), with budgets of more than 8 digits in euros, within European multimedia telephony, such as:

Figure 17. Educational institutions in Italian cities where students and teachers leave their mobile phones in a box when entering the classroom.

Expert evaluators of telematics services, supervision of final projects / doctoral theses, master's degrees, engineering, bachelor's degrees, and so forth, president of conferences, editor of magazines, books, and an extensive etcetera. In the pandemic, it has been found that without open software applications (i.e., Zoom Video Communications – Zoom) carried out in California (USA), remote work, education, communication, and so on, practically it would have been impossible. For them, the term education is something secondary and they see primary and secondary education as stages to play. Not surprisingly, many of them have dedicated themselves to gamification.

The new problem before these destroyers is the extension of their areas of interest towards neuroscience. The purpose is not to provide concrete solutions to pre-university teachers, but rather as a new source of financial income for projects. Projects that in the end are not applied democratically within the borders of the country of origin or in the rest of the European Union. Some public and private institutions of the EU that finance, partially or totally, such research, without concrete solutions for teachers of schools, institutes, high schools, high schools, vocational training centres, and so forth. **Consequently, many teachers are forced to resort to traditional or prosaic methods of remote assessment.** In the traditional case, the use of exercise booklets for solving problems in mathematics, physics, chemistry, etc. (science), writing on paper, summaries of storybooks, adventures, etc. (literature), making models, drawings, paintings, etc. (arts), the writing of the steps to follow to perform certain tasks in applications / hardware (computer science), among other typical solutions of the 20th century can be mentioned. **Modern or banal methods generally go through the use of social network applications, with photography, video and podcasting being the most used.**

Figure 18. A first set of words that have promoted the debacle of the model presented by McLuhan, when he promoted the global village, in the field of social communications; furthermore, misuse of the social networks, ICTs, neurosciences and educational software systems (theoretical and practical point of view)

NEUROSCIENCES VERSUS SOCIAL SCIENCES AND THE MIRAGES

In the new millennium, the neurosciences help psychology to increase the level of knowledge related to the complexity of how the mind works. The main objective of neuroscience is to try to explain the functioning of the millions of neurons in the brain, which generate human behaviour. At the same time, investigate how these cells are influenced by the environment. In other words, it investigates the activity

of the brain interrelated with the psyche and human behaviour. Various studies of ICTs are modifying the wealth of knowledge compiled for decades by psychology, in the way of understanding and interpreting behaviours.

This is the primary reason why neurosciences are currently coming into conflict with the overlapping topics of study, which usually belonged to psychology and pedagogy. Some of those topics are creativity, memory, autism, emotions, anxiety, depression, and so forth (Schachter, 1964; Marcia, 1966; Ekaman, 1993; Dalgleish, 2004; Hauskeller, 2012; Davidson & Begley, 2013; Koelsch, et al., 2015). A theme that directly and indirectly influences the educational process. For example, in the creative process of Leonardo Da Vinci, Michelangelo Buonarroti, Albert Einstein, Wolfgang Amadeus Mozart, among others, they were topics approached only from a psychological perspective. Today, on the other hand, from neurology it is intended to determine what were the strategies in thought, followed by those geniuses of the arts and sciences. The goal is to determine the process patterns that determine the mind of a creative and innovative genius. Currently, these last two words are fashionable, in countless seminars, conferences, workshops, etc. related to interactive design, digital art, new technologies, artificial intelligence, the metaverse, start-ups, to name a few examples. Here is a brief example of the extension of neuroscience to knowledge of the social sciences.

Recycled knowledge to present itself to the new social communication media, as authentic novelties, when in reality they are not. The tactic is to expose them as the result of multidisciplinary and informative research, appealing to scientific rigor and a pedagogical style. In our days, this distortion of reality generally responds to commercial aspects, which prevail in education. Likewise, the epistemological limits between psychology, pedagogy and neuroscience tend to disappear. This affirmation is verified when neuroscience tries to solve isolated issues such as: the various learning modalities by our brain, what are the processes that facilitate learning (biological point of view) and how it stores information.

Considering the theoretical point of view, neuroscience or neuroscience as a scientific discipline is dedicated to studying the nervous system and all its aspects. It includes areas such as structure, function, biochemistry, pharmacology, etc. and how these different elements interrelate with each other, giving rise to the biological structures and systems of cognition and behavior. These last two terms cognition and behaviour have served as the basis for generating specialization courses in the form of master's degrees and doctorates in ICTs (audiovisual, music, VR, UX, etc.), where it has been tried to combine education with new technologies of information through the neurosciences.

For example, the 4, 5, 6, 7 and 8 figures derive from those study centres or departments (i.e., www.upf.edu –cognitive systems and interactive media, audiovisual, music technology, ICT, RV, among others) with little historical background, that continue to distort the perspective of neuroscience, ICTs, multidisciplinary education, particularly when they address the mechanisms of the subconscious. Some of these deviations in human format can be seen in the appendix: "Revaluing the Strategies and Narrative Techniques of Pinocchio in the Social Media Network, Educational and Job Context." Another terminological deviation is located in the word empathy. In our days that word is often used colloquially as a kind of workhorse, to deal with imbalances in gender equality and equity, excluding the historical value that this concept has had, within social communication. Today it is considered in certain contexts, as a kind of new metric to indicate the quality or human sensitivity to certain social or individual issues. That is, the ability of the human being to hypothetically place himself in the place of the other, to better understand his emotions, in the face of certain situations or personal experiences. From the perspective of 21st century neuroscience, empathy encompasses morality, aesthetics, psychology, cognitivism, simulation theory, mirror neurons, and so forth.

However, one of the reasons for the disinterest or lack of empathy of the academic sector towards the problems of pre-university education may lie in the exercise of the teaching profession not by vocation, but rather, as a stable job opportunity. **It is very important to differentiate teachers by vocation from those who are not. The former by vocation are usually concerned with the updating and originality of the contents, the educational quality and the learning process of all their students. The second, they are just for the lifetime salary and personal image (i.e., narcissistic, bipolar and sadistic), specifically, in social networks.**

For example, in the appendix "Revaluing the Strategies and Narrative Techniques of Pinocchio in the Social Media Network, Educational and Job Context", a true case of inbreeding and cynicism has been presented in detail, under the direction of an anthropologist (founder of an Italian political and democratic party: PD), in favour of his computer science partner. That is to say, a computer science graduate who has spent more time in the trade union sector, ecclesiastical volunteering, etc., than in the programming of computer systems but at the age of 40 decides to dedicate himself imaginarily to early childhood education, in the university field. Without a curriculum vitae / resume according to that role, he not only achieves his lifetime position, but also paves the way to reach the role of professor in record time. **With zero academic merit (monographic publications) or a doctorate (PhD) under his belt, a Lombard graduate in computer science manages to direct doctoral theses or qualify professionals for the work of teachers in Italian public schools, institutes and high schools.**

In addition, the distorting power of reality, in this Lombard university educational environment (www.unibg.it) reinforces that mirage for early childhood education (lacking training, experience, merits, talent, etc.) assigning the "theatrical role" of director of the department of human sciences and social. One of the most frequent mechanisms to hide all that barbarism of the computer science graduate is his registration with psychology associations, HCI and the rest of organizations related to them, both national and international. This is an effective strategy that quickly allows the washing of image and the increase of popularity towards the rest of colleagues and students. These anomalous links between education, psychology and new technologies (HCI, UX, AI, etc.), denote the presence of the G factor (G = Gardunia) and the extension towards the field of neurosciences, in various European and American centres (Cipolla-Ficarra, 2021).

Besides, this great anomaly leads to these members of the Gardunia factor (Cipolla-Ficarra, 2021) being in charge of evaluating the skills, competencies and knowledge of pre-university teachers. All this is achieved through the mechanisms implemented by the ministries of education for authorization to teach in schools, institutes, high schools, high schools, universities, etc., for example. **Consequently, many teachers with an innate vocation are evaluated by those who are ignorant, who, through the facilitators in the educational system, are occupying, illogically and without knowledge, experiences, and merits, the cusps of the structures of educational power, in many public, private and hybrids European universities.** In short, analyzing these deviations in educational interrelationships, we are not only faced with the presence of the G factor, but also of the Omega generation, fully explained in the following reference (Cipolla-Ficarra, 2021; Cipolla-Ficarra, 2022).

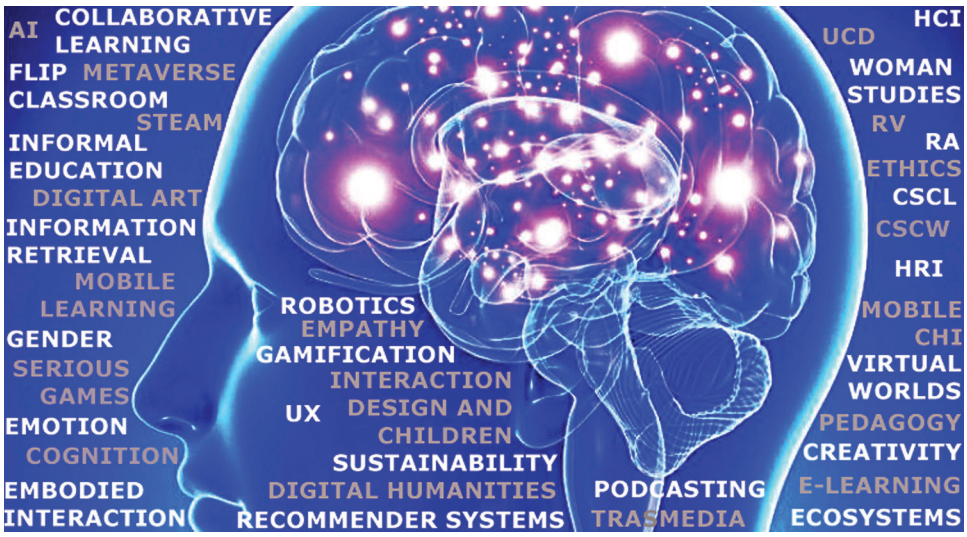
Furthermore, the existence of an international network is verified, as is the case between the computer science graduate, imagined to be an expert in early childhood education in Italy, and some mentors of the "3D reconstruction of the Bergen-Belsen concentration camp" project (Spain, Holland, UK, etc.), through ordinary students. Some students who, on the European borders, easily achieve master's and doctoral degrees in the field of neuroscience and new technologies (i.e., neural dynamics in cortical networks, affective computing, emotion, podcasting, AI, RV, angel investor, advisor / expert in multiple startups,

scale-ups, and an infinite or implausible etcetera –see example in the appendix: "Revaluing the Strategies and Narrative Techniques of Pinocchio in the Social Media Network, Educational and Job Context."

An exhaustive analysis of the field of research shows that launching projects such as "3D reconstruction of the Bergen-Belsen concentration camp" is very easy if the old mechanisms of the 1990s are used, at the time of the democratic emergence of the Internet and multimedia systems. In other words, **a market study is carried out on how a new service or product should be sold, constantly resorting to the expression: "A Systematic Review."** The purpose is to find out which keywords are in fashion: affection, empathy, feelings, emotions, ethics, innovation, creativity, entrepreneurship, and so on. Subsequently, these notions are emptied of their meaning to interrelate with computing, human-computer interaction, gamification and/or games for learning, recommender systems, synthetic perspective, and so forth.

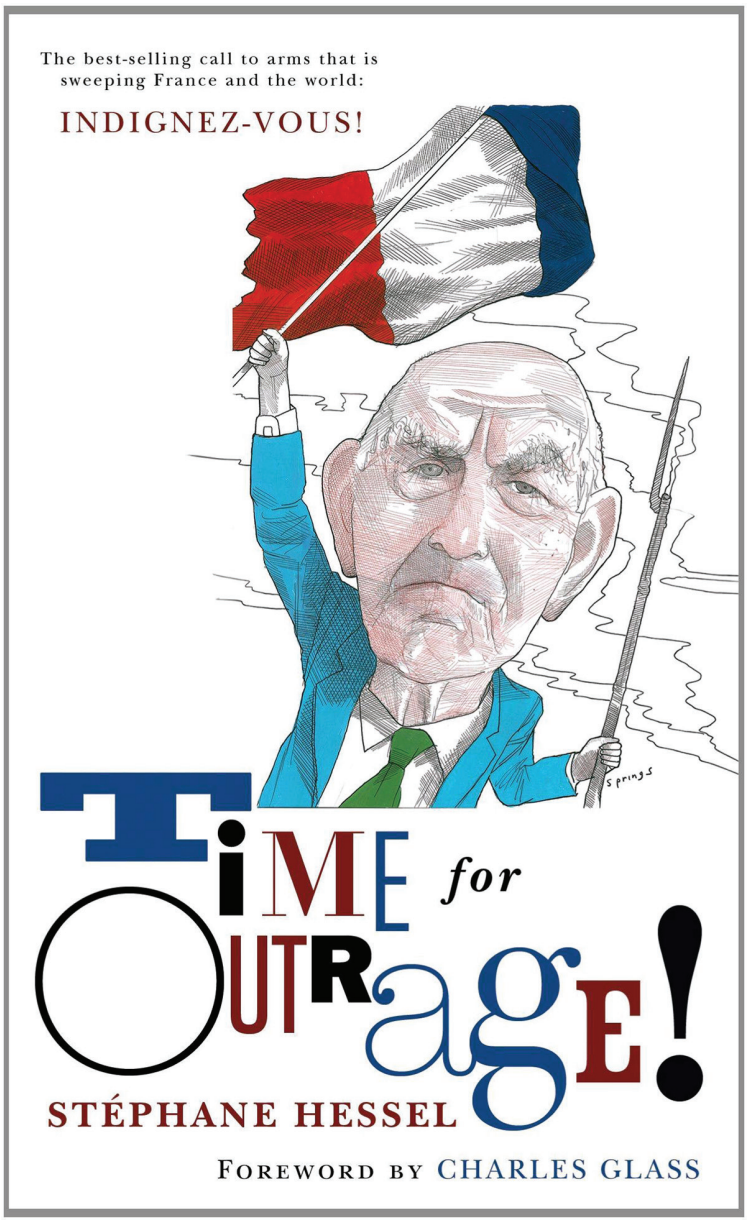
These terms have already been found in the deformed sector of multimedia mobile telephony, with wild mercantilist purposes. That is to say, it is a group of words that are repeated to infinity. In addition, it is a set of words that denote the emptying of the meaning component, which together with the implementation of certain algorithms of artificial intelligence (removal of the referent) online, are generating serious problems in the interpretation of texts, in preschool and post university students. We can see some social consequences in figure 22.

Figure 19. Group of words that currently denote the total lack of interest in preschool education, although they develop educational projects in new technologies aimed at children.



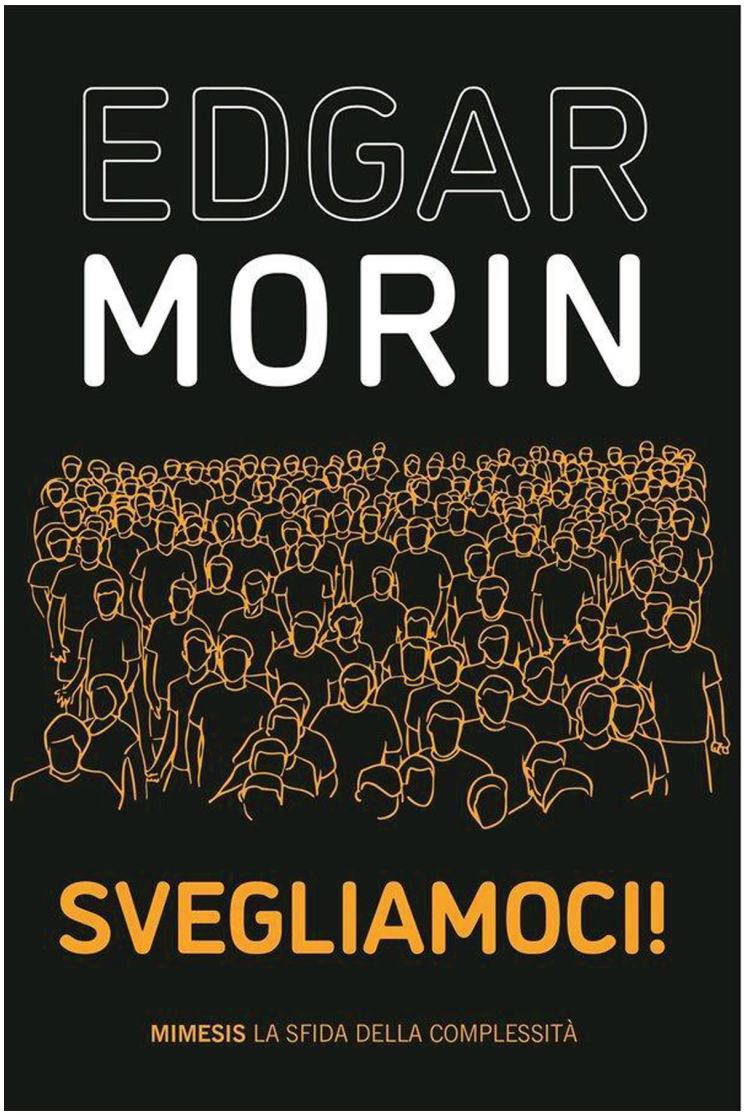
In the project "3D reconstruction of the Bergen-Belsen concentration camp", figures 9 and 19, we see once again how the Omega generation continues to influence educational actions and decisions, inside and outside its borders, even if it is a retired staff. Readers interested in knowing some peculiarities of the actions of this Omega generation, through social networks, in the Mediterranean can look up the following references (Cipolla-Ficarra, 2010; Cipolla-Ficarra, 2013; Cipolla-Ficarra, 2018a; Cipolla-Ficarra, 2018b; Cipolla-Ficarra, 2020; Cipolla-Ficarra, 2021; Cipolla-Ficarra, 2022). **Hence, in the neurosciences and metaverse, for example, are the new frontiers to be colonized by the Omega generation.**

Figure 20. Original and revolutionary French book: Indignez vous! Author: Stéphane Hesse



Religious / sects organization (i.e., Communion and Liberation, Opus Dei, Scientology, etc.) are some of the main responsible for the decline of all European educational cycles, in the new millennium. An example is the book "*Svegliamoci!*" –Let's stand up (Morin, 2022), figure 21. A book that has supposedly been written by a 101-year-old person: Edgar Morin. The mentor of this barbaric and unoriginal mirage has tried to emulate (actually plagiarize), from the perspective of editorial marketing, the work of Stéphane Hessel, with his short book "*Indignez vous!"* –Time for Outrage! (Hessel, 2011). This book is a best seller. Besides, the success of the "Time for Outrage!" book has been such that it has marked the end of Spanish bipartisanship, for example.

Figure 21. Lies, deception, abuse of power, etc., added to "copying and pasting" are typical behaviours of the members of the Omega generation (i.e, the book mentor), who act from a radical and perilous organization (i.e., Communion and Liberation –"Comunione e Liberazione / CL", in Italy or "Cielitos", in Spain) and political parties.



In figure 21, the lack of originality and concrete solutions to pre-university education are presented again. Besides, that figure complements the other editorial example by the same author (Edgar Morin) presented in the appendix "Revaluing the Strategies and Narrative Techniques of Pinocchio in the Social Media Network, Educational and Job Context." In short, we are looking at the same destroyer of the educational system, who abuses the friendship of the elderly to negatively influence from preschool to university education, either personally or through his immediate family.

Figure 22. The contextual reality is presented daily in the traditional social media, such as educational inbreeding (lobbies for access to university chairs [1] "Università: La mafia dei baroni") or The lack of merit in education, [2] "Lezioni di Merito" and some consequences [3] Wasted "Sprecati" (3 millions of NEETs –Not in Education, Employment, or Training, in Italy). Italian magazine: L'Espresso –www.espresso.repubblica.it: [1] 01.18.2007, [2] 10.30.2022, [3] 11.06.2022. Despite the massive dissemination of these publications, it is an endemic problem that has no solution in the Old Continent, even if all government authorities change.

LEARNED LESSONS

Over time, neuroscientists have marked paths to follow in their research. Some of them can be summarized as follows: communication, intelligence, memory, consciousness, decision-making process, creativity, neural networks, brain evolution, mental illness, and so forth. Unquestionably, many of these topics have been studied for decades and even centuries by other specialists in the social sciences focused on education and health.

Currently and for many university researchers, the educational topic in preschool and primary schools remains a kind of hobby or large laboratory, specifically in the fields of HCI, UX, EU, AI, VR, metaverse, and so on. Unfortunately, this type of behaviour is not evaluated or prohibited in certain university contexts. Their purpose is to verify the reactions of children, with or without intellectual and/or physical disabilities, to the use of the latest information and communication technologies.

The neurosciences have been transformed like a Trojan horse to enter the pre-university field, although they must deform all the epistemological limits of the sciences, starting with medicine, psychology and pedagogy, to name a few areas of human knowledge. In our days, this very well camouflaged pastime, from a university sector, is moving towards robotics, full-body interaction, embodied interaction, etc., with archaic projects (theory) and their partial results (practice), which are light years away from the reality of the current requirements in pre-school and pre-university education.

The technique of grouping the keywords of the current distortions in the triadic relationship of educators, new technologies and neurosciences is a valid instrument that allows pre-university teachers to be aware of certain liars. These liars with their Trojan horses transform pre-university classrooms into a constant source of financial income. The Trojan horses used usually carry the sign of "R&D projects", although later it is verified that students and teachers are not given any solution, in the

daily life of the educational process. This happens because the debauchery of the G factor and the Omega generation transcend space and time limits, as has been seen in the examples of the R&D projects in this chapter and that interconnect with those presented in the appendix: "Revaluing the Strategies and Narrative Techniques of Pinocchio in the Social Media Network, Educational and Job Context." Besides, we can see thirty years of negative influences / contributions, and a closed circle in Europe's borders. **These are projects that DO NOT take into account the successful models of structuring work teams, as it happened with the development of the first interactive multimedia systems, aimed at education inside and outside the classroom.**

CONCLUSION

Solving the problems of the evaluation of personnel related to pre-university education, in certain educational areas in Europe and America is like investigating the metempsychosis in Ancient Greece, trying to transfer it and apply it in neuroscience and the new technologies of the twenty-first century. There is a huge volume of methods, techniques, tactics, strategies, etc., focused solely on the use of the latest technological developments, based on neuroscience. Supposedly all this volume of work should improve the teaching / learning process in the pre-school stage, but with the pandemic, it has been seen that this has not been the case for millions of students, distributed throughout our planet. Global statistics are indicating high percentages of school dropouts due to the consequences of the pandemic.

With regard to statistics, it is necessary to remember that John von Neumann argued that they, like logic, should converge towards an information theory for the design, programming and evaluation of intelligent systems, complex from the logical-mathematical perspective. On the other hand, **in our days the abusive use of statistical data in presentations at congresses, workshops, interviews, social networks, etc., denotes a strong manipulation towards the recipients of the message, with commercial purposes in the educational field. An excellent means of detecting such manipulators are videos posted on Facebook, Instagram, TikTok, Vimeo, Youtube, and so forth.**

The persistence of the problem is due to the fact that they do not consider the context in which the human being is immersed, throughout life. Nor is it inquired whether the teachers who have these students are teachers by vocation, with talent and merits of their own. This is because the qualitative component has been replaced by the quantitative element. While talent and merit have been supplanted by lies, deception, infamy, mockery, provocation, personality theft, stalking, mobbing, bossing, and so on. Furthermore, now education, from pre-school to university education must yield financial benefits to those who occupy the pinnacle of power and who are locked up in their crystal spheres, *ad aeternum*. Hence, no one solves the problem of mental alignment, the control of individual freedoms, the fall of human capacities (innate and/or acquired), among many other variables. Experiences and variables that could be grouped in a great encyclopaedia, just considering the point of view of interactive communication and education, among human beings from the end of the 20th century to the present day. The problems presented are the direct consequences of the destruction of the global village paradigm, masterfully enunciated by McLuhan, through the contents of the new media, starting with social networks, whose origin is and will be in the dark web.

Many of the main responsible for the debacle of the current pre-university and university educational system have collaborated and continue to collaborate in the telephone industries and social networks. Today, from their glass spheres, in the university environment they continue to de-

stroy science and the new generations. It is enough to analyze the wild mercantilism that is done with inventions and/or scientific discoveries, beginning with the new concepts that become fashionable in ICTs, and are automatically trivialized in traditional media and social networks. Usability engineering, human-computer interaction, user experience, information retrieval, among others, are the constant engines of scientific distortions. **Unconsciously, the Z, Alpha and future generations will continue to be silent victims of the Omega generation that controls educational structures, new technologies, information networks, and little by little, the neurosciences.**

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Conclusion

In the compilation of these research works, the existence of evaluation methods, techniques, instruments and strategies has been revealed that for many years have yielded excellent results in local, national and international educational contexts, for example. These positive experiences, between users/students and new technologies, together with the negative aspects collected over a long period of experimentation, have allowed the development of a diverse set of factors that positively favour education through the new media. The new media observed from the perspective of communicability, and taking into account the theoretical-practical heritage of social and computer communication, for more than four decades. Added also to the experiences accumulated in the field of the first off-line and online interactive multimedia systems.

In addition, throughout these pages it has been confirmed that there is a kind of parallel reality in many areas of educational and scientific knowledge. The latest health crisis has worked as a kind of trigger to bring to light many truths that lay hidden. Therefore, knowing the duality of this reality allows us to have an accurate vision of the feasible horizons in the short, medium and long term. All this, regardless of the announcements made, inside and outside, of academic and scientific institutions, resorting or not to new technologies. For this reason, before establishing collaboration links with national or international entities, a piece of advice associated with prudence is to consult these compilation works, since they contain a broad synchronic and diachronic vision of ICTs, centered on the human being. Although these entities or institutions may have an excellent online institutional image abroad and be very positively evaluated in social networks, the tangible reality tells us that little or nothing is known about it, its members and the *modus operandi* of the same, to mention a few examples.

Successful techniques have also been presented to motivate students in global emergency situations, whose contents range from art to comics, through computer animation cinema, to name a few examples. In the experiments carried out, the interest of young people belonging to the new generations has been verified in everything that has meant a radical change in the past or the implementation of new paradigms to follow in the immediate future. Therefore, the important role that knowledge of the evolution of science has to motivate future generations in the study and continuous learning is verified once again. Through this knowledge, the principles and rules that have masterfully guided scientific knowledge for decades can be revalued. Rules that today are not respected by the members of the Omega generation, for example, but that the new generations at least have the moral right to know about them. The current disinterest of young people towards science can be found in the behaviour of the Omega generation.

At the same time, the process of positively weighing traditional resources from cultural and natural heritage has been verified through some of the experiments carried out with the young participants. In other words, for them it has been like a kind of source of inspiration, to rebuild everything that has been destroyed in catastrophes, regardless of whether they have been natural or artificial. In addition, as one

of the immediate horizons of the future is quantum computing. This is a new era of computer science which can also facilitate the safeguarding of the environment and its inhabitants. As long as the paths to follow are correct, in the evolutionary processes of the investigations. At the same time, in these experiments it has been detected how the integration of human beings in the scientific and educational communities plays a fundamental role for the evolution of science, and in particular, science education.

Hence the need to include examples from the origins of interactive systems in the 20th century to the present day, to serve as a guide to everything that can be done and what needs to be avoided, so as not to fall into the same mistakes from the past. In this sense, resorting to history is advisable, remembering one of the famous phrases of Miguel de Cervantes Saavedra (author of Don Quixote) when he says: "... **truth,** whose **mother is history, who is the** rival **of time, depository of deeds, witness of the past, example and lesson to the present, and warning to the future."** It is precisely this fleeting or not review of the past which allows us to broaden our horizons towards a better future. Not only does it allow us to correctly judge the efforts made by the pioneers for the advancement of technology and science, but also to know how they have overcome all the obstacles of the historical context, which they have had to live through.

Simultaneously, literature, painting, comics, the press, cinema, television, video games, interactive systems, etc., have proven to be valid instruments to generate activities among young people of generation Z or Alpha. The new media should have these contents periodically adapted to the potential offered by the new software and hardware, in the wide range of computing devices, whether they are intelligent or not. However, these interactive and didactic contents must be carried out by those teachers who are dedicated to authentic teaching. In short, excluding those who are only dedicated to the task of boasting in social networks (for example, through counters, indexes, lists, and so forth, of doubtful veracity) and presenting themselves as the "owners of public universities" or hybrids.

Another modest but important consequence of the health crisis has been the return of students to simpler means of communication with each other, such as "unintelligent" or "dumb" multimedia telephony as many currently define it. This name derives because these cellular phones carry out the basic functions of the first mobile phones which today have been destined for the elderly. Therefore, many of the fashionable paradigms in certain elitist universities, which are located in the first positions of the statistics, will begin to decline, such as the abusive use of transmedia and video / photography applications, etc., within the classrooms, instead of generating genuine content according to the context in which they and their students are immersed.

With regard to these **statistical data, it is always necessary to be accompanied by "Mrs. Prudence", since 100% validity is non-existent, regardless of the type of plasma screen where these figures are shown. The same goes for the combination of algorithms used to** obtain such results. In other words, they are data and information that leave much to be desired, from the point of view of veracity, and that in our case of analysis extend from Alaska to Tierra del Fuego (American continent), and from Lisbon to Moscow (Eurasian continent). Particularly, when the propaganda mechanisms used within those study houses, to attract students or clients are discovered. In such situations, once again, the need to value quality over quantification is highlighted. In this sense, small changes are already being observed in social networks or search engines, such as the exclusion of negative opinion totals (YouTube), or the total number of times it is repeated on Internet pages, what is done by searching with Google, to mention two examples.

With the passing of the millennium, the era **of communicability began to** move, **which has already been oriented towards the "Quantic-Nanotechnological-Self-Sufficient" era.** Learning to use

interactive systems (usability) has been largely surpassed by the Z and Alpha generations. It is enough to observe the agility in the use of smartphones, tablet PCs, PCs, and so on, by these two generations. **The user experience** (UX), **together with the educationoriented HCI leaves much to be desired, when the consequences of human or social factors are seriously analyzed, in the infinite expansion from the formal and natural sciences in the field of social sciences.** This lack of respect for the epistemological limits towards the social sciences will lead to the end of the credibility of the works in the field of HCI and UX, as they have been known and defined in their origins. All this is due to the poor results observed with students, teachers, tutors, parents, etc., in pre- or post-pandemic times, particularly within the distance education sector.

The technical and/or pedagogical aspects of the pre-university environment that are related to the strategies for improving grades, in subjects and activities with greater difficulties, such as: mathematics, reading, writing, text comprehension, concentration of attention, etc.), will be aspects to be developed in the future. We also consider as a pending issue the establishment of norms and mechanisms through psychotherapists for the psychiatric and periodic evaluation of all the members of educational institutions, which are directly and indirectly related to the educational process, which ranges from pre-school age to the university, all included.

The subject of neuroscience is a line that will also be left open for development in the future, since it is necessary to establish precise limits. This is due to the interference of the field of new technologies (formal and natural sciences) in it. In this regard, it is necessary to remember that for decades there has been a constructive interrelation between social psychology, social communication, and neurosciences. The hypothetical specialists or experts in neurosciences and new technologies do not respect the epistemological limits of the sciences, such as the current cases of HCI, user experience, usability engineering, information retrieval, audiovisual, among many others. This compilation of works can serve as a guide for teachers of pre-university education, even if they do not have a great academic or classical training, to know the different points of view that the students they are training will have to face when some of them decide to study in college.

Before concluding, we dedicate all the effort made in this compilation of research works, experiments, reflections and guidelines for a better future, to all those, who for direct and indirect reasons with the pandemic, are no longer with us, eternally thanking their wise advice and all their good deeds. Below is the list of all of them, following a respectful alphabetical order: Angel Salada, Ignacio Aso, Ernesto Rivera, Daniela Busetto, Marco Romero, Monica Borgonovo, Montserrat Trepat, Nuria Pons, Paul Dubois, Peter Rowland, and Timothée Lambert.

Finally, there is this set of famous phrases, which can serve as a kind of compass in current and future times: *"Among the greatest sins that men commit, although some say it is pride, I say it is ingratitude, sticking to what is usually said. that hell is full of the ungrateful"* (Miguel de Cervantes Saavedra); *"To keep your character intact you cannot stoop to filthy acts. It makes it easier to stoop the next time"* (Katharine Hepburn); *"Never bend your head. Always hold it high. Look the world straight in the eye"* (Helen Keller); *"I was taught that the way of progress was neither swift nor easy"* (Marie Sktodowska Curie); *"Poor is the pupil who does not surpass his master"* (Leonardo da Vinci); *"Is there anyone so wise as to learn by the experience of others?"* (Voltaire); *"We should always allow some time to elapse, for time discloses the truth"* (Seneca); *"Let the future tell the truth, and evaluate each one according to his work and accomplishments. The present is theirs; the future, for which I have really worked, is mine"* (Nikola Tesla); and *"What in the world would we do without our libraries?* (Katharine Hepburn)

Appendix: Revaluing the Strategies and Narrative Techniques of Pinocchio in the Social Media Network, Educational and Job Context

Using the "nested loops" technique of the different storytelling models, the following analysis is presented in order to intertwine different true sub-narratives, each one accompanied by its corresponding models. The purpose is to indicate the presence of *"Pinocchios"* and the strategies used by those belonging to the classic masculine version or the modern one, that is, the feminine one. All these sub-narratives, apparently loose among themselves, will be centred towards a central macro-narrative. In addition, it will be verified how in this concentric way, the effects of the sub-narratives exert their influence and effect on the rest. This nested loops technique is interrelated with the technique of converging ideas and petal structure.

INTRODUCTION

One of the biggest problems today is determining the veracity of online information, as has been verified in a myriad of examples, analyzed since 2010 and that many of them have free access. From this premise, it will be seen how the passage of time does not change the negative online behaviour of people and as well as the existence of a kind of magnet to attract all those who have the same behaviour and modus operandi. A behaviour that is governed by lies, deception, hypocrisy, egomania, indifference and irresponsibility of one's actions. To this end, online video is a valid analysis tool, not only from the point of view of the oral word, but also of body gestures (Spinetta, 1987; Noth, 1990). **YouTube continues to be an incalculable** source of **examples for the semiotic analysis of content, as are the two selected examples. Such audiovisual content should be commensurate and responsible in its generation and online distribution, due to the consumption of water, which is necessary in social networks: Servers, air conditioners, electrical continuity equipment (electricity generators), and so** on.

In our case, we will use videos that are online (YouTube) and are freely accessible in the Global Village (McLuhan, 1962; McLuhan & Powers, 1989). In case of eventual deletions of the same, in social networks, they have been copied for consultation, in the following link: www.pirateando.net/Pinocchios. Also there you have totally free access. Besides, in both videos, we will see an old Spanish saying that says: *"Through the mouth, the fish dies."* In our specific case we will continue the analysis of social networking (YouTube), which was already presented in the chapter: "Transforming Digital Challenges into Digital Opportunities: Truths and Lies." In that figure you can see the (negative) professional result, regardless of what the direct interested party says on the Internet, in the videos of 2021 and 2022. This

is an individual who belongs to the Omega generation, and who has been trained since 2000 at an Italian and a Spanish university. In departments related to languages, humanities (read camouflaged religion) and new technologies. Areas where he resorts daily to create educational anti-models. One example is the exaggerated narcissism and stupidity of some teachers —or better call them actors / actresses (Cipolla, 1988).

Interestingly, it is not by chance that the student has randomly achieved this interconnection of teachers with their lousy role models. Rather, these interconnections belong to the Gardunia / Garduña networks that have existed for decades or centuries, at a pan-European level, particularly in southern Europe (Cipolla-Ficarra, 2021). On the one hand, there is the computer science graduate (Pisa, Italy), who resorted to the abbreviation Dr. (in Italian the meaning is a person that have done a Ph.D. or a doctor in medicine), at the beginning of the new millennium.

However, without a doctorate, previous publications of individual studies, personal research, neither university teaching, nor participation in Erasmus programs, etc., at almost 60 years of age he manages to be a professor and "an owner" in the Italian public university. Perhaps it is due to ministerial interconnections of his brother-in-law, a former PD (liberal-political party, www.pd.it) senator. As other old Spanish saying goes: "Without godparents there is no baptism." Here, the term godfather has a clear reference to the American film of the same name, from 1972 (www.paramountpictures.com/movies/godfather-collection). That is, there is the inbreeding element. On the other hand, there is the graduate in fine arts, who together with his brother, with a single investigation, obtained their respective doctorates. In other words, a thesis is equal to two doctorates, in certain Catalan inbred areas. For this reason, experience tells us that we are very far from inbred contexts, whether at an educational or work level.

Technocratic and Progressive Pinocchios

Over time, these inbred unions rise in the structure of the labour organization chart, until they reach the top and, in many cases, end up imposing their ideas and actions on the rest of the members of human capital. So much so that this is a phenomenon that is repeated mathematically and regardless of the geographical place in which the inbred members are located. That is why the "supposedly technocratic and progressive Pinocchios" are generated. Some of the common denominators have been found in them, which are briefly listed below:

1) **Bipolarism or multipolarism.** In few words, we have one or several profiles inside and outside the core of membership. Colloquially called, people with "faces and masks." Usually, they resort to endless communication strategies that range from body gestures to the use of accessories, such as glasses, with practically no prescription, in order to conform to the classic cliche that scientists are bald, wear glasses, have beards, and so forth. For example, shaving the head as it is a sign of authority before the group. In the latter case, they are people who urgently need to occupy positions of command, and preferably before younger generations: 10-15 years younger. It is difficult for this typology of individuals to integrate into work groups whose average age is higher than their own. That is to say, they do not like to learn from their elders. They are the ones who dictate the rules or orders. Therefore, we are facing a classic profile of authoritarianism.

Figure 1. Constantly shaving the hair in young people serves to project an authoritarian and intellectual image, through baldness, reinforced by the constant use of sunglasses or practically without graduation.

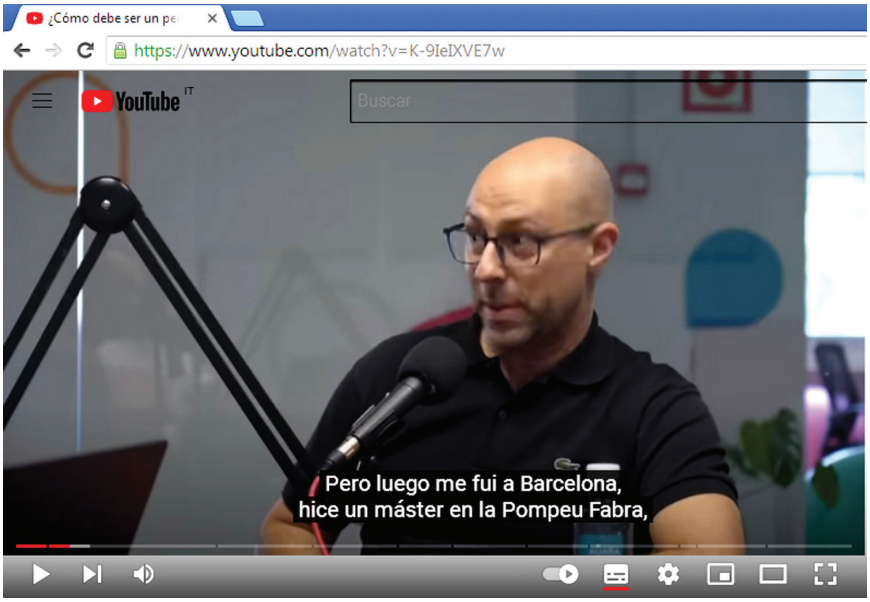


Figure 2. Turn your back and/or place your hands in your pockets as a sign of lack of interest in the public and frankness in what is being said. That is, an interlocutor who lies openly, without caring about the opinions of that action.

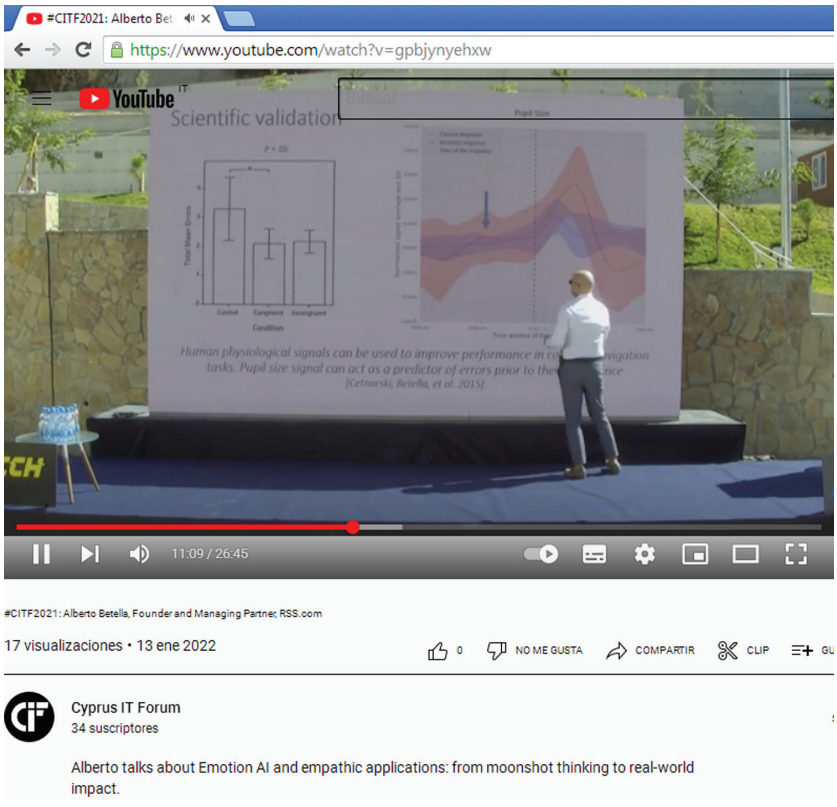


Figure 3. Putting up the middle finger or make the horns (with the index and ring fingers) in a communication process, each time a clothing accessory is touched, such as glasses, belts, pants pockets etc.

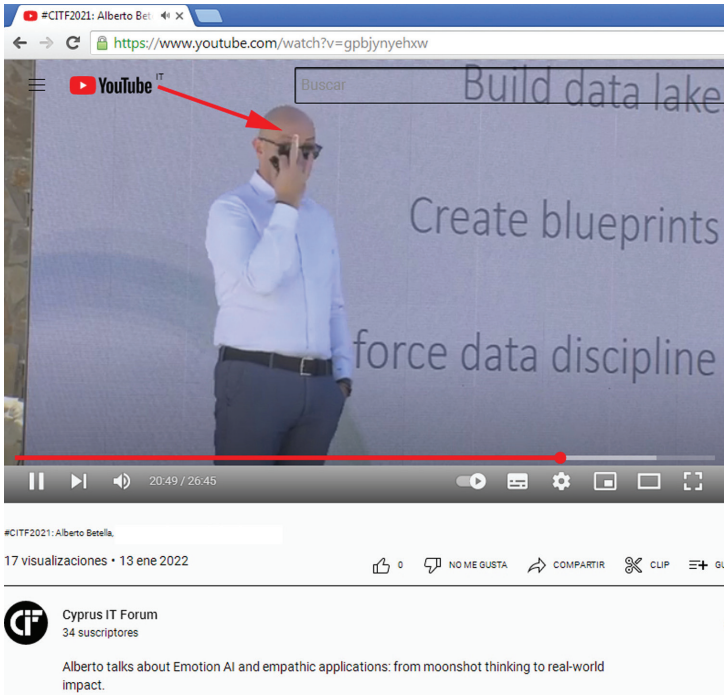
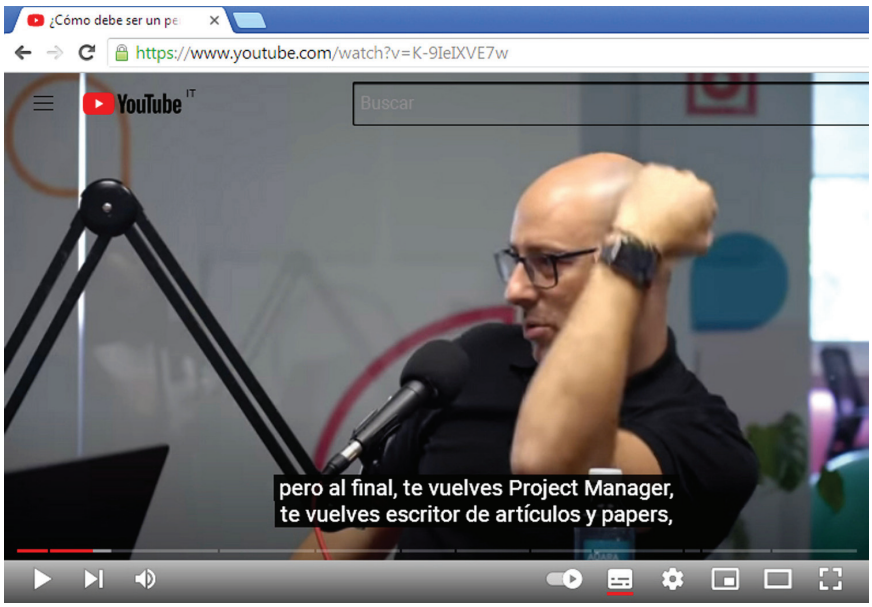
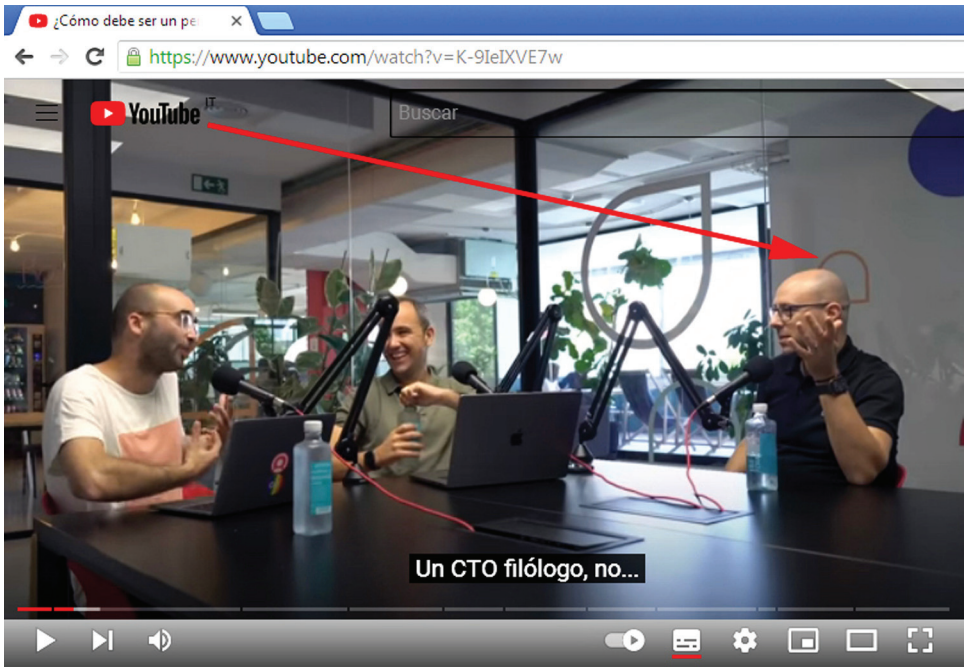


Figure 4. Closed fist with a typical angle of an Italian comb, when the right hand rests on the middle of the left arm. It is the greeting of extremist and violent formations of all kinds and anti- democratic and/or populist regimes that are causing serious damage to individual freedoms and the cultural and/or natural environment.



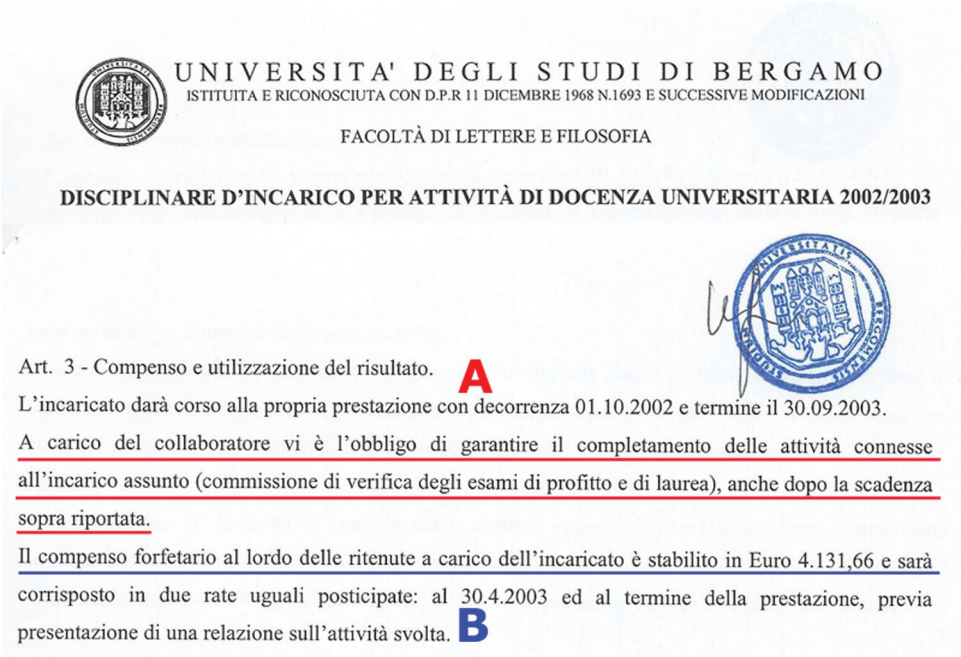
Politically and historically, this angle comes from a violent and totalitarian German military salute from the 1920s: *Rotfrontkâmpferbund* (figure 4). Many mistakenly associate it with communism in the former USSR, but there, the clenched fist greeting was hardly used. On the other hand, the fist with that modality of inclination was used by several killer gangs in the EU, such as ETA *(Euskadi Ta Askatasuna),* in Spain. Furthermore, the clenched thumb indicates the inability to delegate command and that it has a very unstable character. In the video, the announcer sends that military salute, towards those scientists who carry out activities as Project manager and article writer, to cite an example.

Figure 5. Curiously, the angle of the video camera merges the fictitious and authoritative strip, with a half oval on the wall. That is, the upper part of a fungus to indicate the presence of a cocoon (capullo, in Spanish). Hence the need to unmask all these camouflaged heirs of the Rotfrontkâmpferbund, even though more than a century has passed.



2) **Labour exploitation.** For example, labour contracts where the employee is obliged to fulfil his teaching duties, once the contract period has ended, until finishing all their pending activities. This additional and extra contractual period is not remunerated. In addition, employment contracts from hypothetically public universities, which do not contribute to social security. Perhaps the greed and labour abuse derive from the times of the Emperor Federico II and his coins referring to the church (1236 — 1302). One coin *(grosso da sei denari,* figure 7) was the logo of the university until 2018. In few words, the "classical triadic relationship + finances": **Politics, religion, and education, added to money.**

Figure 6. Labor contract in which the dean (i/ Senatur), forced his teachers to work for free until the pending tasks were completed (section A). In section B the total amount for more than one working year (teaching and research) is 4,131.66 Euros, less tax, in other words, almost 50% of the total amount.



UNIVERSITA' DEGLI STUDI DI BERGAMO
ISTITUITA E RICONOSCIUTA CON D.P.R 11 DICEMBRE 1968 N.1693 E SUCCESSIVE MODIFICAZIONI

FACOLTÀ DI LETTERE E FILOSOFIA

DISCIPLINARE D'INCARICO PER ATTIVITÀ DI DOCENZA UNIVERSITARIA 2002/2003

Art. 3 - Compenso e utilizzazione del risultato. **A**

L'incaricato darà corso alla propria prestazione con decorrenza 01.10.2002 e termine il 30.09.2003.

A carico del collaboratore vi è l'obbligo di garantire il completamento delle attività connesse all'incarico assunto (commissione di verifica degli esami di profitto e di laurea), anche dopo la scadenza sopra riportata.

Il compenso forfetario al lordo delle ritenute a carico dell'incaricato è stabilito in Euro 4.131,66 e sarà corrisposto in due rate uguali posticipate: al 30.4.2003 ed al termine della prestazione, previa presentazione di una relazione sull'attività svolta. **B**

Figure 7. When a university has a coin as its logo and then sterilizes the facade of a church, we find the source of endless deviations in the academic world that have repercussions in local society.

Figure 8. The relative of the dean (brother-in-law) who perhaps advised on this type of hiring, without social security contributions, since he worked for decades, in the Catholic union of workers: CISL (Union of the Christian Democracy), being its main political representative for decades, Giulio Andreotti (film: II Divo —www.indigofilm.it)

Figure 9. Asking a person almost 100 years old (Edgar Morin) to write a prologue to a book, after reading it. Only Pinocchio can believe it.

Besides, we can see a continuation of the model of labour exploitation towards the young generations of ICT technicians, through startups in Barcelona, for example. Some examples that parody this tragic reality of the neo-slavery of young programmers, is in the chapter: "Horizons for Information Architecture, Security and Cloud Intelligent Technology: Programming, Software Quality, Online Communities, Cyber Behaviour and Business." They are hired temporarily, officially under the part-time modality, although they usually spend hours and hours, including weekends. The latter, with the "implicit and provocative mockery of young computer scientists who work until Saturdays and do it as a hobby", as the exploiter and destroyer of new generations Pinocchio maintains, in figures 10 and 11.

Figure 10. An Italian philologist who prefers to hire young Spanish engineers or computer technicians, with rubbish contracts. Claiming among other barbarities typical of neo-slavery that: "... In small startups, young programmers work until Saturdays because it is a hobby for them and it is not bad because they are learning something ..." Here is the implementation of the apprenticeships with his Lombard trade unionist tutor (figure 8). This is very easy to apply in Spain but very difficult to implement in France, for example, because of the legal consequences, if such abuses are discovered.

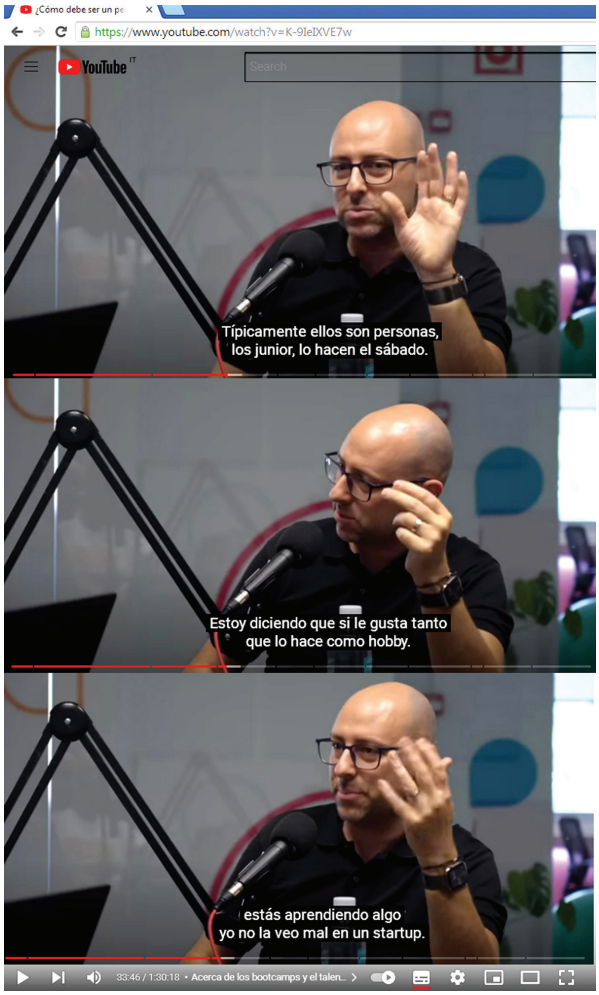
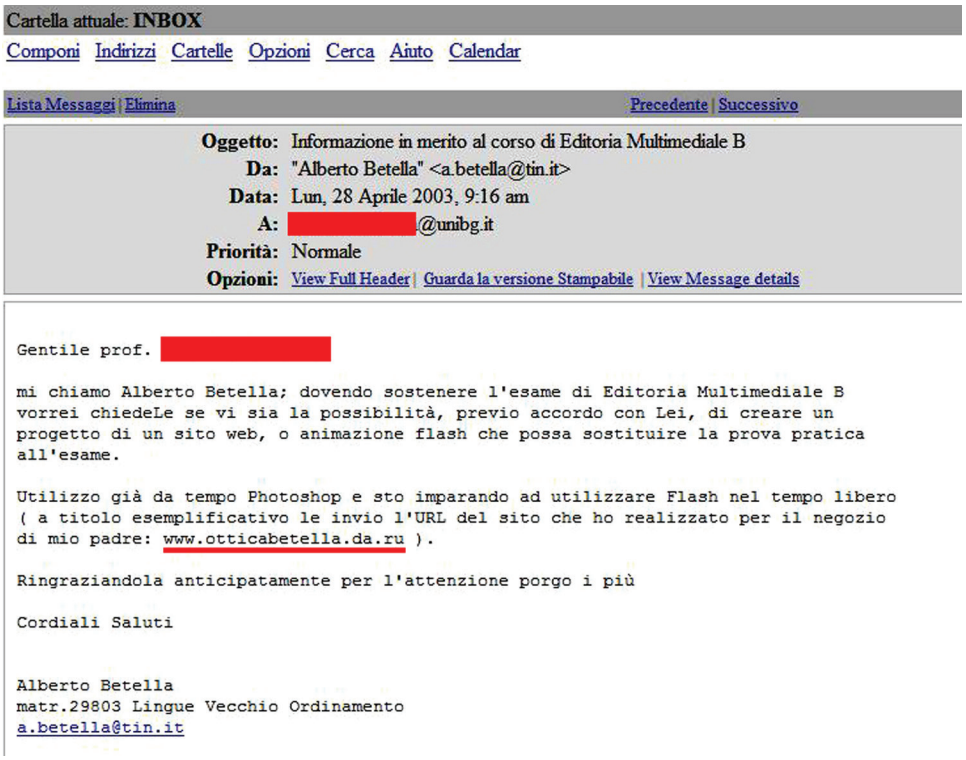


Figure 11. Company that does not have a public contact telephone number but whose owner carries out a myriad of activities (programming, consultancy, organization and exploitation of any type of activity, experimental development of natural and technical sciences, lecturer on social networks, and an infinite etcetera), local and foreign workers exploit, without the controls of the Treasury or the labour regulatory entities, in the centre of the city of Barcelona.

3) **Self-defined academic who does not have a long experience in the university environment.** For example, the austerity laws towards education due to the great financial crisis of the first decade of the new millennium made many rectors resort to the scam of hiring assistants or collaborators in multimedia laboratories or computer rooms, as administrative staff. Assigning contracts and administrative tasks mainly, and extending assistance activities in laboratories and classrooms with computer equipment. Today, these former students include these experiences in their CVs, as "academic" university professors, when in reality they mainly carried out tasks in the administrative offices of the university. The other scam used by this typology of former Pinocchio students was to change the practical exams for other activities previously agreed with the teacher, as can be read in figure 12. Those loopholes or escape route to the practical exams was the system implemented by another teacher of the same subject, with the approval of a relative (brother-in-law), that is, the dean of the faculty (figures 8 and 13). Both, originally from the Lombard province of Cremona and faithful associated with the religious movement "communion and corruption." Changing that reality generated from those strongly religious and parental ties was impossible.
In addition, as the popular saying goes *"in troubled waters of a river, more profit for the fishermen"* because we have to add the temporal context. At the beginning of the new millennium, the new university model called "Bologna" came into force in the EU. Those who have attempted change

have only hastened their way to professional marginalization and/or the graveyard. However, this trickery was the magnet to attract some students to certain pan- European religious and political movements. Some groups that allowed, allow and will allow, their affiliates, easy mobility and rise to the spheres of power (axiomatically corrupt), inside and outside the borders of the EU.

Figure 12. An abbreviated translation of the message in Italian is as follows: "... My name is AB, since I have to take your exam; I am asking you to create a portal or some animation that can replace my practical exam. I have been using Photoshop for a long time and in my free time I make animations with Flash, which I use for my father's business portal: www.otticabetella.da.ru .. "



Cartella attuale: **INBOX**

Componi Indirizzi Cartelle Opzioni Cerca Aiuto Calendar

Lista Messaggi | Elimina — Precedente | Successivo

Oggetto: Informazione in merito al corso di Editoria Multimediale B
Da: "Alberto Betella" <a.betella@tin.it>
Data: Lun, 28 Aprile 2003, 9:16 am
A: [redacted]@unibg.it
Priorità: Normale
Opzioni: View Full Header | Guarda la versione Stampabile | View Message details

Gentile prof. [redacted]

mi chiamo Alberto Betella; dovendo sostenere l'esame di Editoria Multimediale B
vorrei chiedeLe se vi sia la possibilità, previo accordo con Lei, di creare un
progetto di un sito web, o animazione flash che possa sostituire la prova pratica
all'esame.

Utilizzo già da tempo Photoshop e sto imparando ad utilizzare Flash nel tempo libero
(a titolo esemplificativo le invio l'URL del sito che ho realizzato per il negozio
di mio padre: www.otticabetella.da.ru).

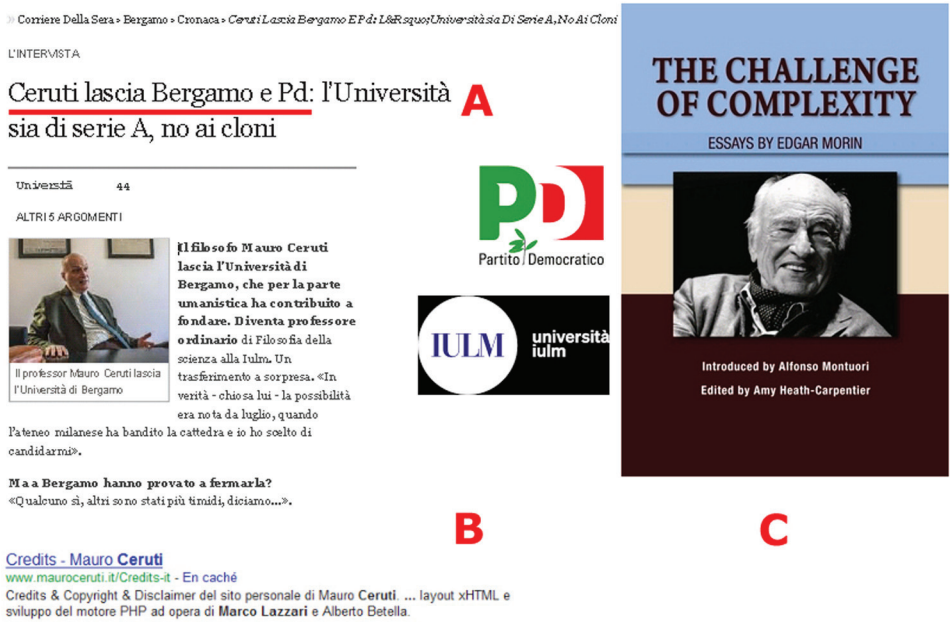
Ringraziandola anticipatamente per l'attenzione porgo i più

Cordiali Saluti

Alberto Betella
matr.29803 Lingue Vecchio Ordinamento
a.betella@tin.it

If you look closely at the portal in Figure 12, it is virtually running from a server in Russia. Thousands of cyberattacks have been received from that country for more than two decades, from the cyberterrorism apprentice and/or his Lombard mentors (University of Bergamo and University Institute for Modern Languages IULM Milan, Italy). Besides, with the union of the Mexicans collaborators (a new endogamy brothers) in Pompeu Fabra University (UPF www.upf.edu) Barcelona, Spain: 27 long years of the stalkers terrorism, psychopathic persecution, identity thieves, recalcitrant invidious, compulsive liars, obsessive destructors of professionals in ICTs, and a very long etcetera. In few words, this is an important and factual example about "the union" of the "educational corruption and attacks" from Spain —27 years, and Italy —22 years (public, private and hybrid universities). Unfortunately, these attacks and corruption are immune and impossible to solve, before the competent authorities in the old world.

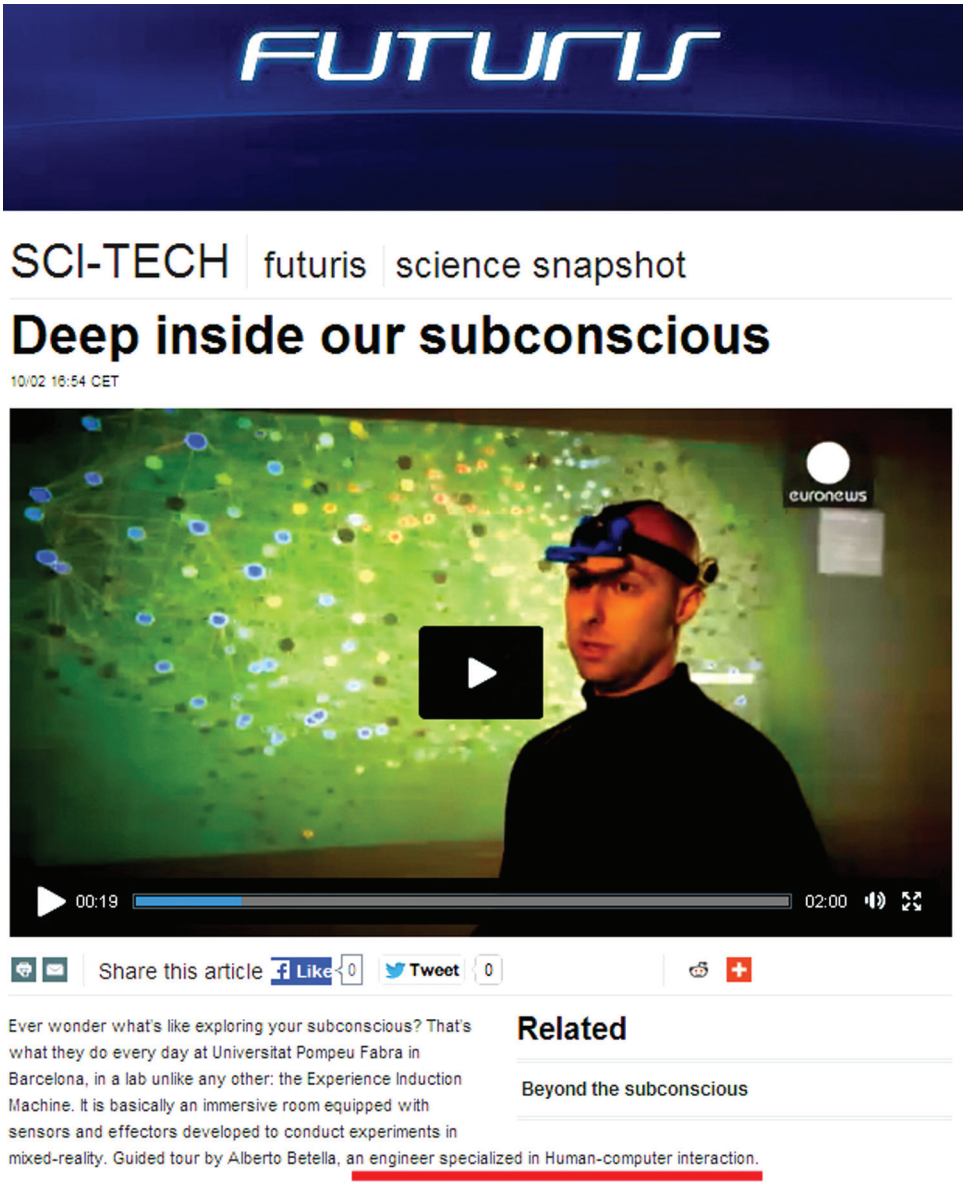
Figure 13. Anthropologist and former senator (2008-2013). After finishing his political work and after enjoying the financial benefits for life, he not only publicly discredits the university (newspaper) and his old position made to his measure, but also leaves the political party, after obtaining enormous financial benefits from politics, ad eternum.



A march of the university that must be aired through the local media, without specifying, all the conflicts generated within that academic institution (Corriere della Sera newspaper — bergamo.corriere.it, 07.11.2013), as can be seen in section A of figure 13. These conflicts in some cases degenerated into premature deaths (for example, suicide of computer technical staff). In section B of the same figure you can see how the brother-in-law turns to a university student to make the personal portal for the dean *(i/ Senatur).* This is the tangible representation of the power of university inbreeding in the Alps, but no different from other European mountain ranges. In many cases, this is the channel for the transmission of corrupt tactics and stratagems, towards the new generations, interested in ICTs. Some of them consist of blatantly stealing the personalities and activities of highly qualified personnel or cyberbully. In brief, inbreeding and political-religious influences, which facilitate access to lifetime European university places, for all those who lack training and/or previous experience or knowledge. It is a labour university reality of simple and complex interrelationships at the same time, which far exceed all the challenges of the complexity described by Edgar Morin, in one of his books (section C, of figure 13).

4) **Lack of individual publications, even for obtaining master's and doctoral** degrees. This reality is easily demonstrable in scientific databases: ACM, IEEE, DBLP, Scopus, and so on. Yet today, Google Schoolar's algorithms weight that PhDs, with or without their master's degrees. They, without having any autonomous work but who manage to be associated with a large number of co-authors, rank above many pioneers in the ICT sector in Europe. In exchange for this lack of regional research work, they offer themselves as interlocutors for the various media, transforming

Figure 14. Typical investigations of "science fiction" novels (the three-dimensional visualization of the content of the subconscious, which with the passage of time transforms into the quackery of "double consciousness" — figure 25) at the Pompeu Fabra University (Department of Information and Communication Technologies / Communication). The first phase of this alleged technological and cognitive innovation project is presented in Euronews by a fake HCI engineer. In short, the millionth project subsidized from Brussels, but which is not 100% completed, due to lack of funds (habitually, the allocated funding is used by the directors of such projects for their intercontinental trips, stays in luxurious hotels, contracting counselling services among friends, and an extensive etcetera).



university departments into advertising or propaganda agencies or likeable social media (Kerpen, 2015). For example, in figure 14 it can be seen how on European television a university student can present himself as a false HCI engineer, in the European news channel: Euronews (www.euronews.com).

The Spanish university (Pompeu Fabra) does not have this degree, but apparently the actions of disseminating false information is the common denominator in the ICT, audiovisual and communication departments of Pompeu Fabra University (UPF —www.upf.edu). The same situation is the one that existed for decades at University of the Balearic Islands (www.uib.es), where a graduate in fine arts managed to transform an entire department into his own personal advertising agency. Thanks to these actions, he was awarded by his colleagues with the title of doctor in computer science and mathematics, without ever having previously published a scientific paper. The geographical and temporal link between them is in religion: A (declared) Salesian, on the one hand; while on the other side, we have communion and corruption (camouflaged).

Figure 15. More than three decades making fun of the Spanish educational system, from the Balearic Islands. The damage caused by that individual and his bosses to the sector of the technical, serious and specialized Spanish press is immeasurable.

5) **Constantly manipulating online statistical data by resorting to a change of keywords on the same web pages and with the same content.** Covering an extensive content of topics and keywords, typical of dynamic persuaders, encourages the generation of false information online.
In this case, it is verified how the anti-models of university learning and negative behaviours are easily transmitted with new technologies, from teachers to students, and vice versa.

6) **Sadistically deleting the visitor counters and the content of portals where he/she has been collaborating.** Cyberterrorists tend to leave the system where they have collaborated (figure 17), like a sieve from the point of view of computer security, to continue to sabotage them, for decades. The goal is to annoy and discourage women interested in new technologies and economically damaging several tourist counties, in the Lombardy and Emilia-Romagna regions. Consequently, this other data on human behavior reveals the presence of psychological problems and job reliability equal

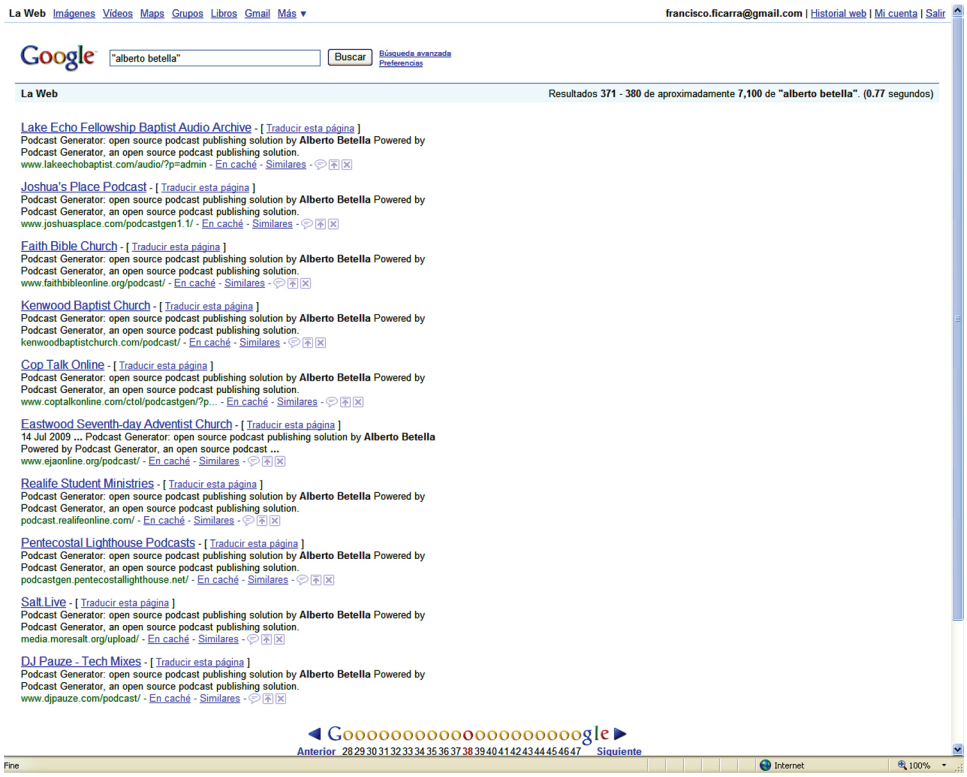
Figure 16. An immeasurable set of themes and keywords. That is to say, the new generation of dynamic Italian persuaders, this radiates from Spain to the US, with Texas being one of its gateways.

to zero. Simultaneously, the non-existent or inefficient legal system in Europe does not stop the illegal actions of such cyber terrorists, today, in their role as podcasting singer-songwriters from the city of Barcelona. Supposedly their activities serve to help the management of the podcasts. Besides, this is a project that has already been subsidized in Italy and that will be subsidized again in Spain until it is sold to a private company. Two great rhetorical questions arise naturally in the face of such a university-business hubbub: *How many times does the EU subsidize the same project? Nobody controls the completion of projects on social networks within the EU?*

7) **Usurp or modify the source codes of third-party programs to later be modified and managed as their own.** For example, the initial software of a startup, in Catalonia —Spain: Badi. This is a ruse commonly followed by those companies or educational institutions of recent creation, whose technical staff follows the typical rules of hacking. This usurpation is also replicated in the theft of personalities from professionals in the sector (through the classic negative psychological activities in the workplace: Stalking, bossing, bullying, and so forth). The main objective is that the applications developed by pirates are not copied. For example, apps to support podcasters, social media (unlimited audio storage, cross-platform stats, automatic distribution to major platforms, sponsorship opportunities, etc.) are not plagiarized by other hackers, dynamic persuaders, cyberterrorists, and

Figure 17. Resorting to the Linux platform that is usually used for the operation of portals, firewalls and computer security systems, etc., in order to alter the codes and sabotage the systems and portals on a daily basis, for decades.

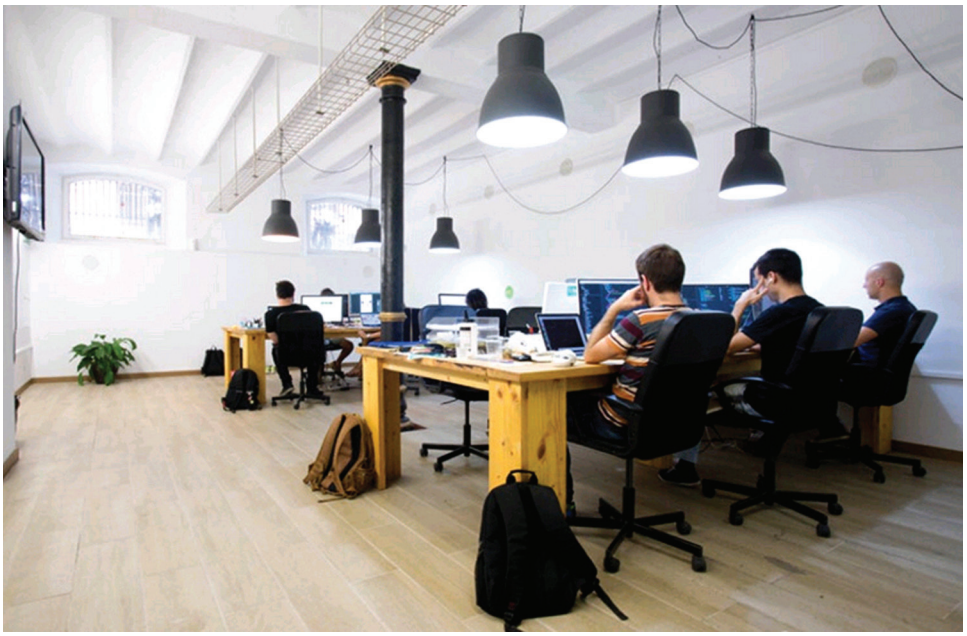
Figure 18. Infinite expansion of applications, apps, content, etc., free for podcasting, mainly through religious entities around the world (some of them included in the list of sects).



so on. This reveals an implicit and camouflaged belonging, in the dark zone of the web. In other words, we are dealing with members of international criminal cyber gangs (Still, 2016).

One of the purposes is to obtain a quick financial benefit and at the same time, contribute to the destruction of the current democratic system, from the Internet (McNergney, 1999; Obasi, 2019). Undeniably, there is a very high risk due to its boomerang effect for those companies that hire this type of professionals, since they will be at their complete mercy or dependence, starting with giving up their share of business shares. In short, they will be aware of the ups and downs of their schizophrenic and bipolar behaviours, like the rest of the members, who make up the dark network that sustains these individuals, inside and outside a national territory.

Figure 19. A group of young computer scientists have developed an application to rent rooms and flats, previously having access to the source codes of another application, managed by the bald hacker, on the far right of the image. Therefore, the copyright of the source codes does not exist for him.



8) **Egocentrism and exaggerated narcissism.** Resorting to new and traditional social media to constantly spread your propaganda messages, focused on your particular activities and/or related to startups for the podcasting service that your Podcast Generator is based on. At the beginning, an open source program, free and linked to the RSS feed. However, applications that are presented as free at first then come at a cost, especially users who are forced to access them, in order to perform their podcasting tasks. Today, that portal in Barcelona (whose violet web page betrays in advance a strong religious bond of "communion and corruption") is similar to another, which is transparent and neutral: ANCHOR (www.anchor.fm). However, it can be seen how this alternative in the field of podcasting is systematically attacked from the dark side of the web. In short, they enjoy absolute immunity. As always in these startups, the objective is to quickly obtain the great-

est benefit in the shortest possible time and with little consumption of neurons and money. In the interview on YouTube (06.13.2022), the reporters manage to get the "double subconscious" of the interviewee to issue millionaire figures (3 — 30 / 5 — 50 million Euros), before potential partners for the acquisition of the startup, such as is TVE (Spanish Television).

Hypothetically, TVE with 5 million can stay with the company and provide some of its radio services online, free of charge. Here is one of the reasons for the exaggerated narcissism in the media, faithfully following the learning of their Italian mentors, in Lombardy (figures 8 and 13), and Mexicans (figure 25), Dutch, etc., in Catalonia. Obviously, it is not logical or normal that a self-proclaimed CTO, instead of carrying out his activities within the company, dedicates himself to the continuous show of presentations to be broadcast on different YouTube channels. Some of these registrations turn out to be very insolent, when he comes to maintain in a workshop on natural languages in Aragon, that: "Native Spaniards do not know how to write."

Figure 20. Boasting yourself under the image of being a kind of NERD: "I was already programming when I was 11/12 years old". In 1992-3 children were not programming in Italian public schools, at that age, for example.

In the midst of the Covid-19 pandemic (September 2020), the self-promotion of an installation is carried out that has not been 100% carried out by the interviewee. A fine arts graduate who goes so far as to state that he is "only interested in his career" (1). In few words, we can observe a rejection or total exclusion from the social and global context in which he is immersed. That is, for him those who died from the pandemic do not exist. What an artistic sensitivity they have instilled in him in the Catalan faculty. Perhaps these mental failures are due to some short circuit in the "double

Figure 21. Self promoting as a data scientist.

Figure 22. Criticizing that Spanish academies do not teach Scrum or Kanban (software tools / methods). That is, proclaiming false news in the middle of an interview, since there are even master's degrees for learning these methodologies in Barcelona, Spain.

Figure 23. Prying into European projects of more than 6.5 million Euros.

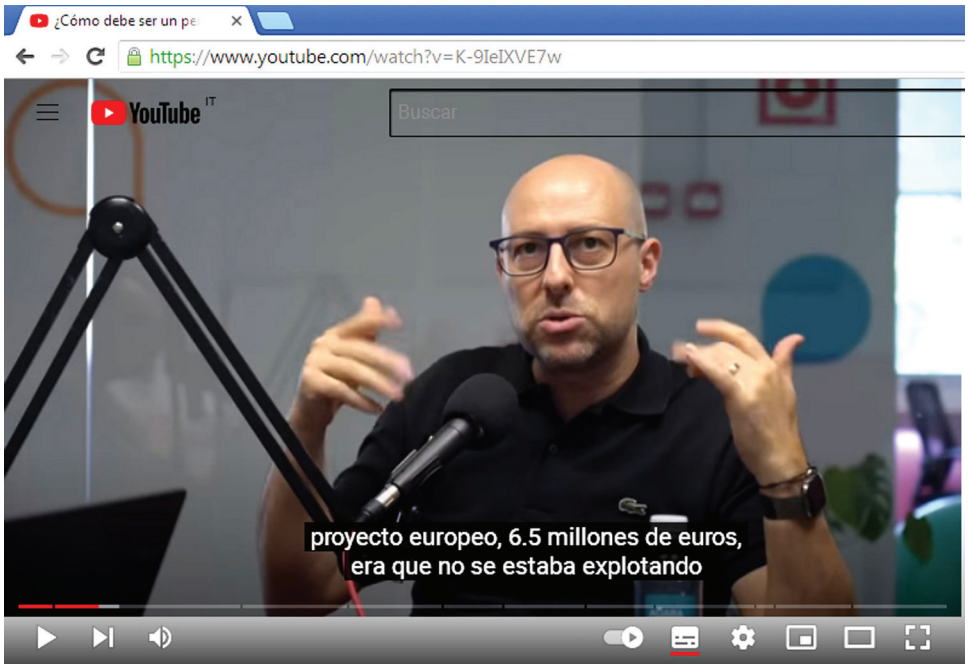


Figure 24. Pretending that the Spanish public television (TVE), buy for several million Euros (for example, 5), the start-up (RSS.com), with the classic ecclesiastical facade for work (online interface), a development of initial software typical of nursery schools, working conditions that surely did not even exist in Barcelona's prehistory and a project partially subsidized by the EU, in the first decade of the 2000.

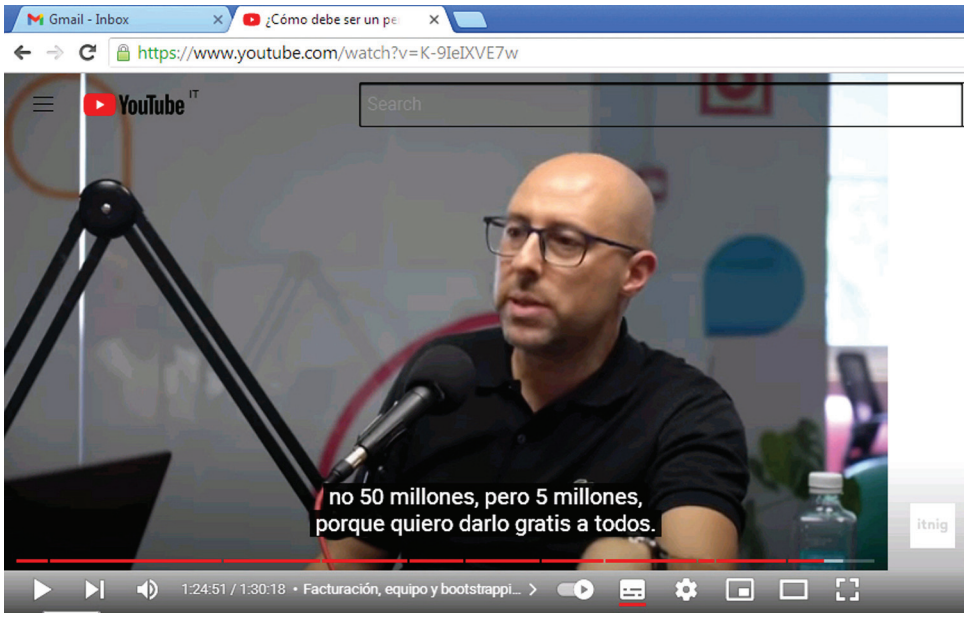


Figure 25. A sadism Mexican case in fine arts, which has spent more than 27 years, together with his brother, are deforming future generations, promoting ignorance, fake news, self- centeredness, narcissism, plagiarism, cyber destruction, etc., and carrying out a destructive persecution of the authentic professionals of social communication, interactive systems and new technologies. An example is in the umpteenth quackery about the visualization of "double consciousness."

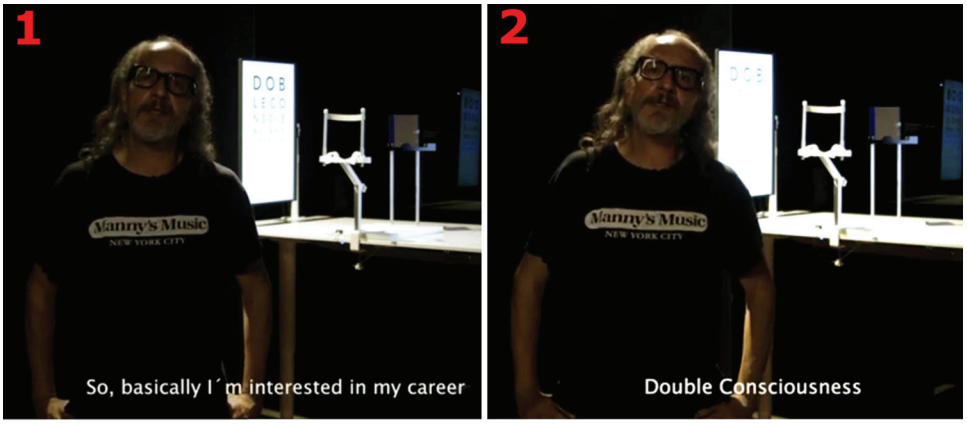


Figure 26. In this figure, a young Italian woman who is forced to promote, in an act deserted by the pandemic, the umpteenth lies of Mexicans "not born in Catalonia, because of Franco." In addition and curiously, the elderly "kids", for all their illicit activities, have a preference for citizens of that transalpine country, particularly, when interacting with the media.

consciousness" (2). This is a clear example of the triumph of ignorance over scientific knowledge, promoted from universities founded under the model of pseudo- ultra-nationalism. Figure 25 also faithfully summarizes the destructive consequences of knowledge on the new generations, particularly when there are certain university inbreedings, which are totally immutable over time. In the first point of figure 26, the false nationalism of those not born in Catalonia is exposed when they include in the list of flags that finance their activities. There is the Spanish flag but there is no Catalan flag, in the collection of logos similar to the medals of the Russian marshals of the former USSR or the current North Korean military. Perhaps Catalanism is represented in the Caixa logo. That is to say, the main and local source of its financing, after that banking entity immunely snatched the savings and real estate, from hundreds of thousands of inhabitants in Catalonia, with the global crisis of 2008. The second point highlights the thousandth lie of the activities of a laboratory that celebrated its 10 years, in 2021 but that are 30 years old, in RV, AR, MR. Finally, at point three, the classic hype of narcissism, where there is no room for the rest of the team. All this mess of lies can be summed up in two logos. The one that refers to the EU and the other, to the supposed educational excellence of that laboratory.

The list of truths in this section is not counted in the scientific and/or educational impact indexes (i.e., g-index, h-index, i10-index). Furthermore, it could be extended almost **incessantly,** since we are before the loop of **infinite semiosis of the "supposedly technocratic and progressive *Pinocchios". One of the fundamental advantages of the statements made on YouTube is that it can be reliably verified that many of these *Pinocchios* are not at all interested in the new social context. A** new context generated from the global financial and health crises of the 21st century, the current war in central Europe, the damage caused by their savage, treacherous and psychopathic behavior for decades, among many other examples. These *Pinocchios* are dedicated to lying throughout their professional careers.

Figure 27. In the equation it is possible to analyze a concatenated interrelation of actions that range from training to the workplace.

These reality-distorting behaviours will follow them until the end of their days, since they are oblivious to the consequences on the human context. This reality leads us to a kind of double equation that is represented in figure 27. In the first one, it is verified how religion added to politics generates legal immunity. The second is related to the first. Through it, it is argued that the greater the legal immunity, the greater the percentage of lies, and in conclusion, therefore, the greater the success in social networks is, the greater are the personal and/or group benefits, within the criminal associations and/or organizations. That is, opaque and/or illegal activities, real or virtual (online). For this reason, as **the old Spanish saying is repeated again: *"Through the month, the fish dies",* and it can be added:** "*... and now, through YouTube".* **YouTube is an ideal tool as a content analysis methodology, from a semiotic, linguistic and human perspective (Noth, 1990; Cipolla, 1988),** which **allows** to easily **detecting those ideal** places **to study, since academic excellence really prevails, in its "Human Capital."**

CONCLUSION

Through these micro-stories, focused on the educational methodologies of two European universities, on both sides of the Pyrenees, the existence of links in the Omega generation has been observed and verified and what are some of the consequences of educational deviations and scientific deformations in the new generations, when religion, politics, economic interests, egocentrism and exaggerated narcissism, to name a few deviations, have no limits. Social networks have enhanced this decadent system in all educational levels. It is not just about achieving balance between the different human genders. But rather, in the impossibility of exercising the norms and rules that govern civilized societies, from the educational context, since Mrs. Justice has gone on vacation. As long as she does not return, all the pedagogical methods, evaluation techniques and technological instruments aimed at education will not generate 100% positive results in the short term. With which, the debacle of the educational system will continue.

This fall is irrespective of the type of system (public, private or hybrid), and its ability to resist has been demonstrated in periods of great crisis in the new millennium. Therefore, the challenge is enormous for students, their parents and guardians, at the moment of locating the correct paths and the ideal mechanisms, so as not to fall into the abyss of the social pyramid. Many young people with specialized technical qualifications are exploited daily under the smokescreen of being entrepreneurs or partners of small realities (spin-off, start-up, scale up, etc.) but nobody says the true percentage of success of these small realities, nor the hidden networks that exist behind all of them.

Hence, we can see the importance of evaluating and analyzing the strategies used by all those who divert attention from the correct path to follow, without falling into the social abyss. An abyss that will be deeper every day due to training that does not fit the local context. This added to a world of work, totally alienated from the training received, although the professional has experimented with the latest technological developments. Statistical data is totally manipulated, computer privacy no longer exists and fake news is starting to be generated automatically, with artificial intelligence systems.

These realities have led to the writing of these pages so that the new generations do not fall into the mermaid's songs as Ulysses did in his travels. These mermaids not only have a thousand and one masks, thanks to social networks and new media, but are immutable over time, like those described in this ap-

pendix. For this reason, sometimes it is important to revalue popular heritage, since they have been right for a long time and in countless cases. In particular, there is one to highlight in the analyzed examples, and it comes from an old New Zealand saying that says: "Never trust people who do not support the heel of the foot when walking."

In these times of great confusion for all of humanity, it is important to be with your feet on the ground and choose wisely the paths to follow, to achieve success, honestly. With all the cases examined in each of the texts, the "honest and incorruptible walker" is being offered a survival kit (perfected daily, thanks to the experiences accumulated, modestly and honestly, for more than four decades), an effective compass and a map to follow. And always with an optimistic and realistic 360-degree vision, facing a future that shows us great changes and challenges, particularly, in education and in the use of new technologies, both immediately and in the long term.

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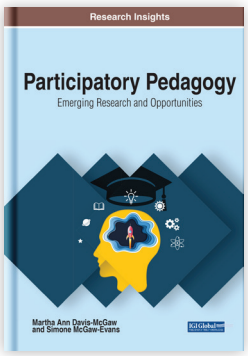

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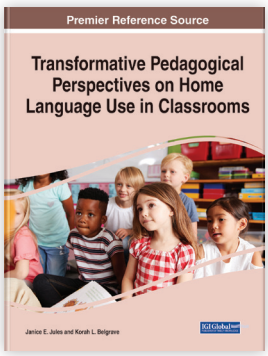

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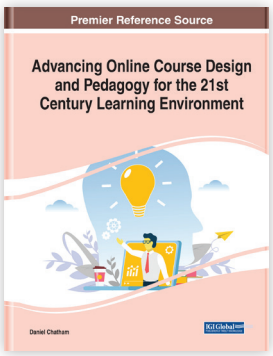

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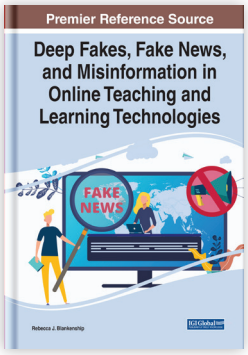

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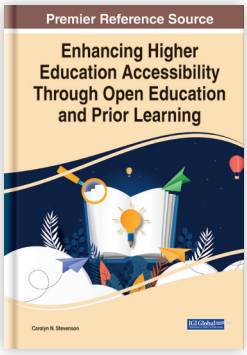

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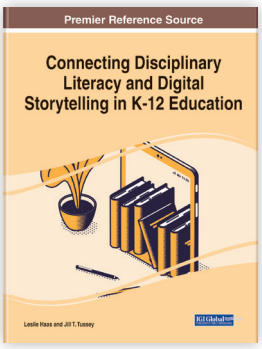

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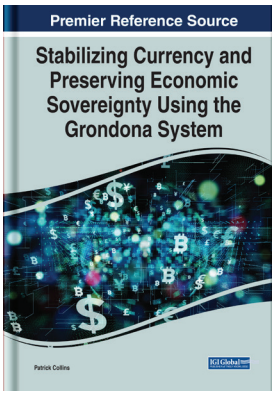

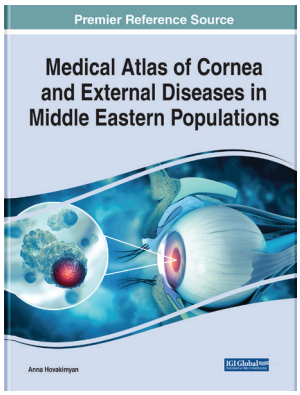

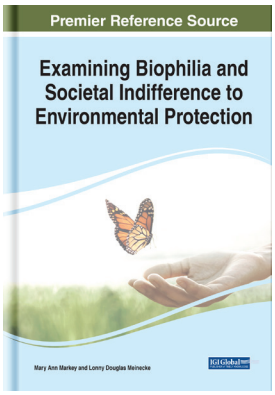

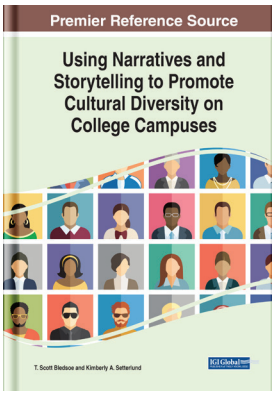

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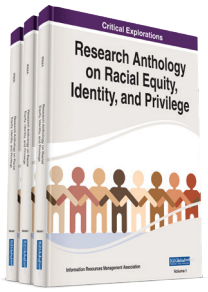

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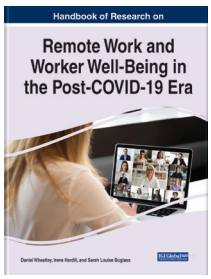

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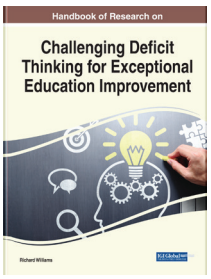

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