

E-Learning & Digital Design in Architectural Pedagogy

Observations and Questions based on the On-line Msc of Interior Design

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ABSTRACT. In the field of design education there is a growing consensus among institutions and instructors about the pivotal role of e-learning and digital design in the future of architectural pedagogy. Departing from this observation, this study focuses on the potentialities that exist in joining multimedia, digital tools and the web together, to propose alternative educational models for design related disciplines. In order to explore and highlight relevant issues, the creation of a new Master's Degree for Designers is utilized as a case study. The description of this program, fully delivered online and created in a virtual environment will serve as the basis for further experimentation and reflection regarding the topic of design pedagogy in the Information Age. Furthermore, it is attempted to outline the challenges faced and lessons drawn from teaching design in a format that departs completely from the traditional – physical - relation and collaboration between tutor and student.

KEYWORDS: *Architectural pedagogy, Case study, Information age complexity, Tutor relation*

Introduction

“The new time is a fact; it exists whether we say yes or no to it ... What is decisive is only how we assert ourselves towards these givens”

(Mies van der Rohe, 1930)

This article aims to approach the current discourse surrounding architectural pedagogy from two perspectives. Firstly, a presentation of e-learning techniques and the methodologies of teaching design

online. Secondly, an examination of the way these new frameworks are the catalysts of change in contemporary architectural education processes. As an overarching framework for these two lines of inquiry, we have chosen to analyze the Master's Degree in Interior Design produced by the Guglielmo Marconi University of Rome, Italy. This Master's degree is a Second Level Degree that aims to lead to a professional expertise as envisioned an Italian based academic system, while at the same time being oriented towards a global audience. Taking into account the predominance of the Marconi University in the field of e-learning education at a national level, it is of considerable value to examine the concepts it incorporates in its educational programs (1).

The issues raised through the inspection of this master can be broadly categorized into two groups of interest. On the one hand, it highlights the necessities, complexities and implications that the translation of an academic program from a physical to an online context entails. On the other hand, it serves as a basis of inquiry regarding the broader changes and challenges that the transformation of the teaching process brought about by the integration of Information Technologies. Common themes that can be traced in both these groups are the latent theoretical and philosophical questions that examine the trends and future of design pedagogy in the Information Age.

The expected result, as far as the present article, is concerned it to construct a line of reasoning connecting the two aforementioned groups, that is to say the practical issues surrounding the creation of an online design education program and the broader implications of teaching design in the context of the Information Age. It is hoped that the study of these two interconnected layers can serve as the departure point for an attempt to explore possible future trends regarding architectural pedagogy in the era of the fourth industrial revolution (Shwab, 2016). Specifically, while it is acknowledged that related opinions range from wildly optimistic to downright skeptical, and effort will be made in outlining a groundwork for further discourse regarding the changing nature of the design process and its relation to the changing educational methodologies.

On a more general note, it can be argued that this change, both in the nature of the design process and the method of design teaching is inexorably linked with the new Information Age. It can be contended that in the public psyche and contemporary cultural environment the term "digital" carries connotations that range far beyond the actual practical applications of Information Technologies. Although it escapes the scope of the current article, it is worth mentioning that today, the "computer" has been in a certain sense rectified, we are living in the age of the information machine as a cultural icon.

Methodology

For the present article, we chose to raise our arguments and concerns through a three step methodological approach. Firstly, we decided to inform the audience about the state of the art- the history of using ICT with educational and informational objectives. Then we shifted our attention to contemporary methodologies for e-learning with the aim of framing the importance of the topic for the design discipline. As a case study for this part, we described the educational process that was followed during the development of the Master's Degree in Interior Design, of Guglielmo Marconi University, which is a dominant European Telematic University. We analyzed all steps of this process, looking at what constitutes the 'new class', the 'new relationship' between instructor and learner, the 'new contents', the 'new instruments', and the nature of the new 'teacher'. As a final step, we juxtaposed and enriched the previous analysis with theoretical and philosophical reflections drawn from a variety of field, such as current trends in CAAD

education, architectural pedagogy as well as theoretical and philosophical models. These it is hoped will prove the basis for future research in the field of architectural education in the Information Age.

Practically this process revealed the origins of the telecommunication's sector, the impact it has in everyday life, the potential it encompasses and the way this sector embraces education. Then, the format of the Master program, available in the online platform of Guglielmo Marconi University, was downloaded in high definition and a descriptive report was composed. In this way, all aspects of the program's contents were rendered familiar to the authors and all individual components were made available for further examination. Based on this material, two groups for analysis were created. On one hand, a detailed presentation and analysis of both the planning and the implementation of the e – learning process; on the other hand, description of issues and questions facing the e-learning process as a pedagogical system is raised. As a strategy, the authors examined both these groups utilizing a variety of approaches. More specifically, conceptual models drawn from a variety of fields are employed, the issues raised are approached through the perspective of management and coordination of the academic project and finally questions regarding the nature of the design process and architectural education are highlighted. A common undercurrent of this integration of didactic methods and Information Technology tools can be found in the highlighting of elements such as user-drive actions as well as human interaction with artificial intelligence.

Utilizing the approach outlined above, it is hoped that we can avoid potential pitfalls that include either focusing on architecture as the main objective or getting lost in a mire of sub disciplines and niche issues. On the contrary, the aim of the current article is to provide the basis of a description of the learning process itself, and present aspects that highlight the intrinsic relation between tutor and student. It is argued that these elements are relevant regardless of the context (digital or analog) of the educational framework and can consist the starting point for a dialogue with the discipline itself. In this way, the observations made through these avenues of inquiry are later situated within existing theoretical frameworks from the fields of architecture, communication and new technologies.

Considering the distance between our discipline and the ICT sector, we decided to start by an overview of the field, in a way that it can be clarified to people the historical background. Then we proceed to the analytical description of the Master's Degree. Finally, an outline of the general discussion in the field is presented while closed this first part of research with general discussions on the field.

History and impact of ict in information exchange

Originally, the telecommunication's sector was created to fulfill the need of long distance communication. Guglielmo Marconi pioneered the revolution in wireless communication through his groundbreaking innovations in the field of radio communications. In December 1901, he was the first to establish communication between St. John's Newfoundland (Canada) and Poldhu, Cornwall (England). About 20 years later, on March 1925, John Logie Baird created a form of mechanical television that could broadcast pictures. Around 1960s, 'packet switching', allowed chunks of data to be sent to different computers. In 1981 the Internet protocol was introduced that allowed the digital communication networks to contain one or more routers that work simultaneously. From that period onward, a large amount of nano or compact technologies have been created. When one examines the present day, we find an ever-increasing percentage of the world population connected to a almost continuous digital communication network that has the potential to affect all aspects of

their lives, from their businesses, to their daily communication activities and their perception of the world around them.

It is evident that this process has completely changed the way in cities work, companies develop, and people live. In fact, its impact is significant on all aspects of modern society, ranging from the cultural to the political and economic level. A cursory examination of statistical data drawn from large companies, demonstrates that telecommunications is at the core of their methods towards build global business empires. Amazon, YouTube, Navigators, all smart apps and a large number of materials were created by the telecommunication infrastructure. In cities all over the world, users use online services for everyday life activities, conducting on line businesses or lately build completely new social network sites where they coordinate social arrangements and manage their everyday life. With the advent of Web 02, the telecommunication's' sector has faced the challenge of not only transferring but also manipulating the ever increasing torrent of available information. For the majority of the case studies there is a shift to a 'cloud-based paradigm for deploying services that Public Authorities currently provide using more traditional information technologies' (Gluhak et al. 2011).

In this context, the term services refers to applications, usually made available through Internet and employed through smart phones or hardware that citizens use in order to accomplish their tasks. Lately, with the integration of smart cities strategies in cities, many broadband networks and e-services that facilitate, strengthen and enhance collaboration and the functioning of cities have been realized. These consist of both hard and soft infrastructures that create communication and interaction based on multimedia tools, sensors and interactive technologies (Hatzelhoffer et al. 2012). Critical factors to consider in this context are content management, information processing, and virtual networking. The latest advancements in mobile and pervasive computing, wireless networks and agent technologies as they become embedded into the physical spaces of cities are the core focus of the telecommunication sector (Komninos, 2015). It is estimated that digital applications – with the help of instrumentation and interconnection of mobile services, sensors and actuators that allow real-world data to be collected and analyzed with computational models – improve their ability to forecast and manage urban flows and push city intelligence forward.

The telecommunications sector is also closely correlated to the nature of smart phones, planes etc. as a medium that is immaterial as much as it is material, which is in part a direct result of it being initially restricted to users that have access in relevant technologies. As a result, smart phones, or similar devices have developed capabilities more closely related to people, building a vast user base that is worldwide. A good example of this is the fact that even communities that are under the average rate of poverty use these devices, even if they are not completely aware of the advantages telecommunications would have in managing their resources. Consequently, telecommunications have the possibility to deliver and transfer information, to numerous groups, allow also large numbers of participants to integrate smoothly into the information society. Even users that are visually impaired, nowadays, depend their mobility or their daily practices on the use of these technologies. Just to cite an example, sensors that transmit messages for crossing the streets are established in large traffic systems (Komninos, 2015).

This advantage of the pervasive nature of this sector and its reach to large groups accelerated further development in the field. In other words, compared to projects that require large investments and long term working progresses, the nature of this sector makes obtaining faster results much easier. Nevertheless, this sector has several limitations. The first one is that communication in general means being part of a network. The web networks that this sector responds to, are directly dependent

on many factors, all linked with the excellence or lack thereof of the technical methods utilized (Hatzelhoffer et al., 2012). This means that high speed, high reliability, high availability, the satisfaction of new requirements, including the connection of various types of device, effective use of carrier networks, the flexibility to support new devices and services, the economics to provide services at a reasonable price, and consideration for the environment are only some among the critical factors for the success of these strategies.

An educated user base is also of fundamental importance. To be part of the web network, users have to be aware of how to use the telecommunications sector. It requires skilled users that are capable of following technological shifts, and of course, users that are interested in interacting digitally or electronically with space. The culture of acquiring knowledge and transfer knowledge requires also an amount of maturity and a capability of filtering on which kind of information to get and how.

Contemporary design & e-learning

In the field of education, the results are more than astonishing. Computer-based training, online learning, and, where mobile technologies are used, m-learning, has completely overcome inhibiting factors such as distance, age, economic factors as well as the prerequisite of a physical presence that wouldn't allow for more social inclusion. Educators, while discovering the almost limitless potential provided by the telecommunications' sector, have initiated a trend of creating higher educational formats for adult learners, which are able to break down the barriers of time and space. In fact, the Internet offered the opportunity to provide effective, convenient, anytime-anywhere access to continuing education. Education no longer requires bricks-and-mortar locations or for all participants to be in one place at one time.

It is interesting to note that despite the fact that the popularization of e-learning methods is recent, one can trace historical precedents and case studies (Bradford et al 1994). This is in keeping with the broader observation that the current trend towards the "digital" in design (Kolarevic, 2000), (Schumacher, 2008) is actually rooted in a broader and older development (Sutherland, 2003; Negreponce, 1970). Although many elements of those case studies have been rendered obsolete by the technological evolution of the past two decades, we can still draw useful conclusions regarding the educational methods used (Cheng et al. 1994; Wojotowicz et al. 1994). It is argued that certain issues facing the pedagogical process persist regardless of technological development. Such questions include the expediency of setting up such a course (Kvan, 1997). The nature and purpose of design teaching (Cuff, 1991). In addition, a number of observations regarding the teaching process can be drawn from these case studies (Kvan, 1997).

On a separate note, it is interesting to also mention the AVOCAAD experiment, which includes the description of a broader framework for integrating e-learning methods in design education. Furthermore, it is also worth acknowledging the critique facing these new technologies. This includes among others the question if the computer can replace the physical contact between student and tutor in design education (Achten et al. 2011). Also the increased fragmentation (Vesely, 2006) and dis embodiment (Mallgrave, 2010) of the virtual world and its impact on design pedagogy. A main question that can be underlined is the social and communicative aspect of distance learning. In other words, the impact of ICT on the dialogue (Schon, 1983) of architectural pedagogy. Unfortunately, the dynamics of the (social) interactions that take part during the process of "virtual design education" (Ham, Schnabel 2012) cannot be adequately explored in the context of this paper.

Finally, it can be expected that the future will bring even further development in the field, with the introduction of new frameworks such as MOOC (Stellingwerf, 2015). It can further be argued that even more such educational models should be researched by Educational Institutions in order to innovate in the field of design pedagogy in the Information Age (Piga et al. 2015; Sopher et al. 2017). An example of this can be observed when examining the popularity of the informational and educational platforms worldwide, along with the offer of online courses by all major Universities.

In 2016 MOOC Roundup Series, one can see the popularity of the online platforms:

“Here is a list of top five MOOC providers by registered users:

- Coursera – 23 million
- edX – 10 million
- XuetangX – 6 million
- FutureLearn – 5.3 million
- Udacity – 4 million

XuetangX burst onto this list making it the only non-english MOOC platform in top five” (Dhawal, 2016).

The platforms offers a large number of courses that differ in subjects with most popular the ones that deal with computer science and management (Dhawal Shah, 2016). Moreover, a large focus is given also to courses that provide learners with new skills in a very short term and in daily life necessities. Of course, these numbers only represent e-learning in the business sector. When examining the history of Telematic Universities, back in their establishment in 2001 in Europe, the results are even more impressive. A large number of students that previously would receive education through traditional formats tend to search new forms of online education and e-learning for their formation (only in Italy, around 80.000 in 2017 preferred e-learning format for their education as extracted by the statistics of Miur).

A more detailed literature review of relevant papers on issues regarding e-learning in design education (Achten, Beetz, 2009) can further expose trends and salient issues of the field that can provide useful input for designing an architectural education for the information age.

Case study: technical description of mid

The study regards a second Level Master’s Degree in Interior Design, offered in English Language, for an international audience. It offers an example of collaborative work between instructors and smart technologies and interactive screens. The basic learning objective of the course is the fundamental skills of an Interior Designer, namely:

- History of Interiors from the 15th century and afterwards
- Design of spaces
- Construction of Interiors
- Managerial Skills for the future Interior Design Entrepreneur
- Finance knowledge for the future Interior Design Entrepreneur

Additionally, in the final months of the master a thorough specialization in one of the following sectors is offered via two ways:

a) An entire registered module dedicated on the following sectors

- Housing
- Retail
- Hotel and hospitality
- Working spaces

b) By working on a thesis project that will be focusing on one of the sectors

Furthermore, there is a specific reference in the third laboratory regarding the possibilities to work with ICT, but apart from that, the real focus on and implementation of the digital element and Information Technologies is centered on the multimedia technologies that are used for the production and distribution of the academic contents. Specifically, a set of technological tools for processing communication, creation, dissemination, storing, and managing information has been used as well as a studio – class for registrations, a studio – office for the technical elements involved.

Didactically the overall format is the result of the elaboration based on the suggestion of the scientific director during a brainstorming session involving all academic staff. Each member presented his or her specialization and spoke about the specific elements that bring him or her closer with the desired concept of the Institution (namely: contemporary version of the made in Italy). Academic content was divided in four modules that consisted of four courses each. Issues of interest that emerged where related to the time of publication of the academic material: which module goes first, the desired time duration between two modules, and how mixed should the academic contents be. Considering the fact that technically the virtual campus where the material is published is static and each module is published in its entire version, a holistic approach was decided upon in order to mix the key didactic topics throughout the modules, in a way that this initiative would allow students to acquire knowledge in an all engaging way, without the shift to a hierarchical pyramid of contents. Text books and self evaluation tests would follow up and support the course as it progressed. Moreover, each module was split in two parts: the theoretical one, and the laboratory. Each theoretical part consisted of the recordings of the lectures, while each laboratory also included exercises whose answers could be found online in a storing link that allows interaction with other students and the instructor.

The possibility of collaborating with an external partner was also examined. This partner would supposed to host the workshops in physical presence, in case of a blended versions. Yet, in the end, it was decided that for proximity and effectiveness’ reasons, in the case of blended version, more attention will be given in maximizing educational results inside the headquarters of the University and less in presenting new members visiting. The lack of that step was covered by a proactive activity: a number of interviews of all visiting partners were registered and inserted inside the course. In this way, students will have the opportunity to listen to experts while describing their personal developmental stories, and then strictly work on the design phase once enrolling to the blended version.

Technically, the process of development encompassed the integration of telecommunications, computers, software, middle ware, audiovisual systems and web networks in the overall construction

of the course, and this process played a fundamental role in designing the didactic contents. All material was physically recorded in the multimedia studios of the University (the professors prepared their lectures at home and then utilized the studios to record their sessions). In the studio, at least three people were required for the overall development process:

- An administration's assistant responsible for the coordination of the administration issues and the communication among all work partners
- A studio director that was helping the professor acquiring a more 'reaching profile'
- A member of the technical staff that was monitoring and editing all material recorded through the editing software and hardware of the studio

Each lecture lasted around 50 minutes with no disturbance, during which the professor spoke and presented his lectures in front of the 4k cameras. At the end of the process, the material collected was edited and special attention was given to the audio visual reproduction and assessment. For each lecture, three cameras were used, one focused on the lecturer, one on the PPT presentation, while a general view camera captured the whole of the scene. The overall number of lectures is 120. It must be noted that this refers to 120 academic hours, while in reality 1 hour in the studio translate to 1 and a half hours of a normal class. At the end of each didactic material, a fully online system of self-evaluation as well as a system that predicted examination questions in the format of open- questions was created. Professors were offered a professional email account where they could communicate with their students, and additionally academic tutors were assigned to be of assistance to the students on an eight hours per day basis.

Analysis of case study - innovative technologies in the educational process

New day at School – Description

There are a number of interesting observations extracted as key issues from the overall process described above.

The new 'class': Although the lectures are presented in traditional locations, such as the multimedia studio, these places are only partially following the functionality of a traditional setting for teaching. In this new setting, we observe the existence not only of three interrelated spaces. That is to say, the first one is the one where the professor is teaching, the second one is the place where the assistant is situated and edits during the registration, the third is the place of the on-line platform where all material is gathered. In other words, where previously everything was developed and delivered inside the limits of the surface of a class, in an e-learning format, new concepts of space are introduced, which are the projection of a teaching moment inside a studio, saved into the online platform and transferred to the screen of a student. None of the three cannot but function perfectly, or else the transfer of education will not be realized. The only interior design scene that is to analyze is the one of the studio where fundamental differences but also similarities with a traditional setting are occurred: there is only the desk of the professor and no need for further desks, the black board is transformed to a smart screen for projections, and physical lighting is not anymore involved in the process as it used to be to the traditional class, but technical lights that accompany the studio settings were installed. For the background of the walls it was used the green color for a friendlier eye- sight.

The new 'relationship': The communication developed is not confined only to the one created by the interaction between students and instructors, but also consists of the interaction between instructors and cameras, and learners with tutors, internet and the virtual campus. In other words, the University does not only offer the presence of the expert in the field, but also new services that previously did not exist.

In fact, there are two chronologically discrete services that are offered to students:

- The video registration of the didactic material
- The support from tutors by many real-time communication services to students such as instant messaging, presence information, video conferencing, desktop sharing, and data sharing including electronic interactive whiteboards

ICT covers all non-real-time communication services, such as unified messaging while tutors cover the second sector through a variety of mediums including e-mail among others. In other words, ICT gave the users the ability to interact through a connection of nodes and links that can carry audio, visual and data communications, while tutors act as the intermediate between Institution and the Course. They are the 'educational agents'. The video registrations acted as the transmission of information, as words, sounds, or images, usually over great distances

This process encompassed the existence of a certain number of basic new 'instruments':

- A transmitter, meaning an electronic device, which, with the aid of an antenna produces radio waves
- A transmission medium which is the physical channel that carries the signal
- Receivers that take the signal from the channel and convert it back into usable information
- Studio Support equipment such as professional lighting systems, cameras and a smart screen

The receivers are not limited any more to the presence – role between instructor and students but consist also of the directors, assistants, technical staff and the academic agents, or tutors. In this sense, there are already changing patterns of collaboration at an academic environment, and in reality collaboration is achieved among more members than before.

In designing for delivery of online content, strong consideration was given to organizing the content, ease of use of the Web site, technological requirements, look and feel, navigation, functionality, learner interactivity, and quality. Any graphics used should convey the message of the content. Font style and format can affect the readability of text-based content online. Motivation and assessment strategies also should be identified at this stage. Development and testing of a single learning module prototype is recommended at this stage.

The new format – The new teacher

Creating a new educational format for designers from scratch meant starting from the basic question of – what is the target audience. - Unfortunately, this question does not have a simple answer. In a distance learning business model, students can be any one, of every age, at any place of the world, (statistics show a majority of adults). In this context, while identifying the learning goal, the learning objectives but also considering the additional value of the delivery mode one risks to mix didactic

with commercial objectives. Therefore, what was proposed was an 'all-encompassing' logic of first looking at the learning objective considering the local strengths and qualities and then adjusting these models in a global market.

Specifically, the format is designed into three main sequences that depict necessities for the future Interior Designer following the order of an inverted pyramid, slowly narrowing down from the historical - descriptive scale, to the design approach of a project until it reaches the specificity of building and reproducing one's personal practice. To define the excellence of the Made in Italy inside the project, professors employed a multidisciplinary strategy. They started from the impact of interior design in history, passing to the actual impact of Italian design of the 70s, and leading students to more contemporary issues. They then blended the same module with introductory courses of design both from a theoretical – pure design orientation- as well as a technical – software design implementation. An inspection of the materiality of the spaces revealed issues dealing today in a modern city, with minimal design, and modern/contemporary materials (steel, glass, among others). Then colleagues specialized in managerial and finance sectors entered in the analytical phase of actually building as an autonomous entrepreneur in the context of their own studios.

This process required a large number of meetings before and after the construction of the material. Practically professors should be turning their attention in understanding the material projected to their colleagues models, so that to avoid repetition and to reinforce coherency. Before registering any of the lessons, they were introduced to the potentialities of the online platforms and they were naturally led in classifying their contribution in three steps: a) the creation of the didactic process for any global mind, b) the creation of their own material in respect to the other colleagues, c) the establishment of new means of communication (for example personalized email and new relationship construction with the tutor). The teacher of this specific format, in the end of the educational process could have acquired skills that extend the local offer to a more international logic.

Discussion – the issues and questions raised

a. Translation

As the second part of the present article, we will now outline certain broader points raised by the introduction of Information Technologies in the design education process and the impact the aforementioned paradigm shift has on design pedagogy. It escapes the scope of the current article to attempt a detailed examination of the plethora of issues raised, and rather than attempting to provide and in depth analysis of these questions we will limit ourselves to a brief description of certain salient topics that is hoped can provide the basis for further examination.

In order to take advantage of the endless possibilities offered by the Internet, it is obvious that architectural education must recast itself in a format that is compatible with Information Technologies. In other words the change in the method of teaching (the HOW) ultimately affects the educational content (the WHAT). One could also argue that the purpose of architectural pedagogy (the WHY) is also affected, but this line of thought cannot be adequately pursued in the context of this article. Focusing on the content of a distance-learning course, it is obvious that the introduction of new media, such as video recordings, electronic presentations and so forth has a certain impact on the methods of teaching. For example, whereas in a traditional, physical setting, it is common to utilize tracing paper in the design studio, in an electronic setting it is more probable to utilize CAD files transmitted through email.

This means that the whole philosophy of the teaching process is affected, both in obvious as well as in more subtle ways. One must consider a whole spectrum of problems that accompany this change in media, problems that range from practical, to methodological and theoretical.

An example of a purely practical problem is that of the file system. (It is a common architectural joke regarding the naming of files as "FINAL", "FINAL2", "FINALFINAL", "FINAL1234" etc.). This joke hides a deeper organizational problem brought about by the new media. What is actually exposed is the commonplace lack of organization of the participants in the education process, both teachers and students. It can be argued that evidence of this can be found in the latter professional career of architects and designers. This problem is extended and compounded in the e-learning framework.

A methodological problem that can be used as an example involves the creation utilization of CAD in the teaching process. More specifically. The use of states or layers in the CAD drawing in order to establish both a chronological order as well as differentiating between a student's drawing and the correction of the tutor. Again this hints at a more pertinent issue, that is to say of the lack of structure in the teaching process. Furthermore, it can be argued that the shift to new teaching methods using ICT forces us to define this structure of design education.

Finally an example of a theoretical problem is how to adequately translate the essence of a design presentation to an electronic format, in other words how to organize the presentation of a project in such a way that it can be understood without the direct input that is afforded by a physical presentation. In this sense, one can underline a lack of understanding of the design project both on part of the students, which are unable to concisely prepare such a presentation and on part of the educators cannot guide the educated in the desired direction. Although theoretical issues such as this ultimately refer to an ontology of design that cannot be elaborated upon here, it can be pointed out that the Information Revolution affects, as has been noted previously, the how, what and why of design education (Kolarevic, 2000).

One could compose an endless list of such problems, ranging from amusing to downright dangerous. What is important to note is although to a certain extent these issues are to be expected in a discipline such as architectural design, we should attempt to create a framework that anticipates, addresses and resolves them. In order to achieve this it is not sufficient to simply transfer traditional teaching methods to a new environment. On the contrary, a re-evaluation and a re-interpretation of the norms and frameworks of current educational strategies is needed in order to situate architectural education in the Information Age.

This re-thinking of the structure of architectural education is a task that obviously escapes the confines of a single paper, or even a series of papers. Nevertheless, it can be pointed out that the examples mentioned above bring to the fore deeper issues regarding architectural pedagogy. In other words the need to evaluate and interpret the design process in order to transfer it to an electronic setting, may force the educational discipline to deal with a series of issues that have not been addressed even in the context of traditional architecture teaching. What do we teach when we teach design? How do we transmit architectural knowledge? What is the nature and structure of the design process? How do we evaluate architectural projects? These are but some of the issues that the integration of ICT in the education process brings to fore. Nevertheless, at the same time it can be argued that actually these questions predate the Information Age. Whether the new technologies are a pitfall that exposes the weakness of design teaching or an opportunity for architectural pedagogy to provide some new answers to timeless questions is something that we argue depends on the new educational systems themselves.

b. Communication

One of the main issues facing e-learning is the distance between student and tutor. As has been described by Donald Schon, the process of design education is one of dialogue between tutor and student. This dialogical process aims at understanding the design problem at hand and through a series of questions and answers leads to the articulation of the architectural project. It could be argued that the same dynamic cannot operate in a context of asynchronous learning as has been described above.

The question raised is what educational model can be utilized in order to replace the lack of this direct dialogue described above. There are two possible answers to this question that shall be briefly elaborated here.

On the one hand, one could argue that new technologies effectively substitute the lack of physical contact. It is true that in a world increasingly dominated by social media and electronic communication platforms, the difference between physical and electronic contact is mostly superficial. Put simply, we are equally comfortable using an email, or video call to communicate as we are to actually meeting someone, without believing that this type of communication is in some way inferior. What is more, one cannot credibly argue that the information transmitted (which can be argued is the essence of an educational process) through these media is in some way less valid to that transmitted through traditional means or via physical presence. On the contrary, one could contend that the added capabilities offered by the new media actually enhance the quality of information that is sent and received. Think for example the ease by which digital photos are shared compared to the cumbersome method of developed film.

This is not to say that there are not valid objections to be raised regarding the depersonalization and anonymity that has become synonymous to the Information Age. Nevertheless, what is important to note is that these objections are not so much centered around the information transmitted per se, as they are around other factors that come into play during a physical dialogue that are in some way missing in its electronic counterpart.

Although it escapes the scope of the present paper to attempt a psychoanalytic inquiry into the nature of dialogue, it can be assumed that at least part of these reservations are based on the preconceptions older generations have regarding the physical and the digital. To elaborate, it can be debated that the preference shown towards physical dialogue is more a matter of habit rather than something based on the intrinsic value vis a vis its electronic counterpart. This means that a younger generation of "digital natives" will be equally, if not more, at home in an electronic environment as in a physical one. One cannot help but wonder if current discussions surrounding the merits and drawbacks of electronic learning will seem to them as out of place as the debate between sailing ships and steam ships, or cars and carriages is to us.

On the other hand, it can be argued that in the case of distance or asynchronous learning the actual material itself takes on the role of the tutor. That is to say that the student no longer enters a dialogue with the teacher but with the material itself, such as electronic presentations, videos and so forth.

The conception of the electronic teaching material and by extension the new technologies themselves as an interlocutor can be considered as a type of reification. That is to say treating and abstraction or an object as having living properties. One can make three implications based on this.

First, it is conceivable that ICT in the near future can fully take over the electronic educational process. Already algorithms determine what videos are suggested to us, what advertisements we

are shown and what pages might interest us. It does not require a great stretch of imagination to conceive an artificial tutor of design. One can further theorize that the accumulation of online material in a course is in some way a primitive such attempt. In this case, what is important is deciding what should such a teacher teach. In the same way that artificial intelligence systems learned to play chess or go by analyzing thousands of such games, it is interesting to wonder what form would a comparable training program for artificial design tutors entail.

Secondly, the danger in treating ICT as the partner in a design dialogue is that of pseudo communication. According to hermeneutics, a dialogue is partly affected by the preconceptions or prejudices each party brings to the table. In other words, how a dialogue evolves is based on the presuppositions of those involved in it. Without being able to elaborate on the specifics of the working of the hermeneutic circle in the context of this paper, what is of importance to note is that these preconceptions are in turn affected by the evolution of the dialogue. In the case of Information Technologies playing the role of the interlocutor, it becomes important to establish what – if any – are the digital prejudices that accompany them and how – if possible – can they be affected during the course of the dialogue.

Thirdly, there remains the issue if the totality of design knowledge is actually translatable to an ICT setting. To phrase this question in another way, are there aspects of architectural education that cannot be transferred to a digital setting? Again this is a discussion that cannot be adequately explored in the context of the present paper. Suffice to say that although the potential of Information Technologies may indeed seem limitless, it can be argued that proper attention must be given to the dangers of developing certain aspects of design and design education that are more amenable to digital interpretation, while others are marginalized either due to the difficulty which they present to be translated or because the ICT environment does not add something to them. One can cite the example of social issues in design, a field that has been generally overlooked in the Information Age, while issues such as organic forms or robotic construction have witnessed a profound evolution.

As has already been stated, one cannot hope to reach a definitive answer on any of the questions raised above, nor indeed of countless more that can conceivably be raised in the context of architectural education in the information age. Nevertheless, it is important, in a time where the paradigm of architectural education is shifting, to remind ourselves of issues that predate this revolution.

Conclusions

The overall article raised a number of issues that aim to merge the link between innovation technology, distant learning and the relationship between learner, instructor, contents and conception of the educational approach in the field of design-oriented courses. The methodology, all encompassing among history, research and argument development was approached as a topic of itself and led to a number of interesting conclusions that are the result of thinking locally and globally of education in general. Firstly, it became clear from the process that joining traditional educational practices with new technologies for information transfer and digital design creates a new field of study, with exponential character. The field consists of several layers of constructive pillars: from the philosophy of architectural education, to the changing nature of the University, instructors and practices between all members of the educational approach. New technologies, ICT and business development acquire a salient role.

Related to the presented review of literature, the article revealed the extreme popularity of the

topic. This research resulted in acknowledging that other similar initiatives are well documented across many academic disciplines, such as sociology, anthropology, philosophy and even finance and software engineering that already use educational technologies, the Internet of Things, quantum computing, artificial intelligence and computational logic in their educational agenda. In this spectrum, it was understood that the academia has fundamentally altered the educational agenda of some of the biggest institutions in the world, such as M.I.T., Harvard, Instituto Empresa to name but a few. And this explained and confirmed the importance that stands in the objectives of the paper. Specifically, this paradigm shift was traced in the increased focus displayed regarding the potential of Web 2.0 as well as a shift from traditional educational strategies, based on real time physical teaching towards an electronic, asynchronous model. In other words, the article argues that e-learning is more than a simple change of method. It is not either a concept that is neutral or passive but a highly pervasive one that can be in some form found in all discussions surrounding new projects and paradigms in the field of architectural education. What has become implicit by research on the topic is that e learning is not simply the vision of a system information transfer that is capable of overcoming the spatial dimension. In reality it is much more, it is the idea that “access to information should not be understood and then designed as limited to the performance of a purposely designed educational place, but should be exploded, dissolved and dispersed” (2). This flow and dispersal of information described above is indeed a key aspect in constructing an argument regarding the new agenda for the e-education of architects in an increasingly digitalized world. However, it would be wrong to limit ourselves to this aspect, which only plays a restructuring role in the overall objective regarding the construction of a new agenda. If we delve deeper, we find the underlying idea that revolves around bridging the gap between what architecture educations is today and how new technologies transform the design process, the design product and by extension the very nature of design teaching. In other words, the essence of the argument is whether and to what extent do ICT alter our perception of architecture and the future directions of the field.

We do not end up with an answer to this concern but in this extent, the article proved that a fundamental part of any educational process is the definition of the object to be taught. Therefore, it suggests that if any approach to design pedagogy is to a certain extent determined by how the educational system in question conceptualizes the design process itself, then the alteration in our perception due to the use of ICT pass in a second phase focus. In other words, the paper argued that the priority in the e-learning for designers goes to the way the methods through which we attempt to teach design are affected by what we define as design. Of course, this is a broader discussion, one that cannot be adequately developed in the context of this paper. The questions surrounding the new dynamics currently active in the field of design as a consequence of the technological evolution brought about by the Information age are complex and many layered. What is of interest, is that the idea of defining design would encompass a wide range of dimensions spanning among the social, economic, cultural, political, physical understanding of educational, and all these can be transformed and explained throughout the process of building the educational contents.

Regarding the case study, the article resulted in the following concepts:

The integration of Information Technologies has affected both the design process itself as well as the frameworks of design education. To what extent this apparent paradigm shift will change the nature of the architecture discipline as a whole remains to be seen.

Nevertheless, the article revealed important new concepts in the online formation for architects:

- There is the introduction of the new class, which is the one that is built in a studio, while projected in a different time online, inside the place of an educational platform
- New services that are offered to the students are also part of the discussion for the changing nature of the educational format in architecture. Where previously assistants would substitute the educational reinforcement of students, now tutors within 24h act as the online help desk, while the technical stuff of any university acts as the secretaries of the traditional universities
- There is the introduction of an overall new sector of informational technology that is built while studying the master's itself
- Teachers and students exit the educational process with additional skills and more sensitive in a wider global context
- Finally, it must be noted that the lack of a physical place where students meet and mix, imposes certain limitations as far as collaboration of any sort is concerned. This is not limited to an educational, academic or professional context but also extends to a broader social and humanitarian level

Finally, the literature review of current trends in CAAD education, the challenges facing architectural pedagogy as well as the theoretical models briefly outlined aided in highlighting salient issues of teaching design in the Information Age. It is hoped that the analysis attempted here will provide the basis for further inquiries in the field, both from a theoretical standpoint, as well as practical research towards better educational methods.

As a closing remark we believe it is fitting to return to Mies van der Rohe, and his description of another new age, that of the Industrial revolution:

“We must set new values and point out ultimate goals in order to gain new criteria. For the meaning and justification of each epoch, even the new one lies only in providing conditions under which the spirit can exist”

This metaphysical argument we argue remains of primary essence when discussing architectural education in any age.

Notes

(1) The authors chose an -open ended discussion format- to present their ideas, since some concepts are part from their PhD topics as combined with empirical work on the creation of the Master's Degree

(2) This statement is connected not only to the possibilities that the digital component and the Web 2.0 offered, but also with a large part of literature of the 60s-80s that was manifesting towards the urbanization of the University and Research clusters, and their opening up to society. For example, De Carlo in an article titled *Why/How to build school buildings* and published on the "Harvard Educational Review" in 1969, manifested his un institutional review on education and knowledge, by arguing that the student protests around the world had made education return "to the city and to the streets", and hinted to the possibility of reconciliation between education and total experience (De Carlo, 1969)

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Sintesi

Nel campo dell'educazione al design sta nascendo un crescente consenso tra le istituzioni e gli insegnanti sul ruolo chiave dell'e-learning e della progettazione digitale nel futuro della pedagogia architettonica. Partendo da questa osservazione, risulta necessario studiare le potenzialità che esistono nell'unire multimedia, strumenti digitali e il web, per proporre modelli educativi alternativi per le discipline legate al design. Al fine di esplorare ed evidenziare questioni rilevanti, la creazione di un nuovo master per progettisti viene utilizzata come caso di studio. La descrizione di un tale programma, interamente distribuita online, e creata in un ambiente virtuale, servirà da base per ulteriori sperimentazioni e riflessioni legate al tema della pedagogia del design nell'era dell'informazione. L'obiettivo punta a delineare nuove sfide per l'insegnamento del design in un formato che si discosta completamente dalla relazione tradizionale, fisica, e dalla collaborazione tra tutor e studente.