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Educating the New Generation of Architects: from ICT to EPT

Educando a la nueva generación de arquitectos: de las TICs a las TEPs

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Abstract

In the last decade, architectural studios have adopted more dynamic communication and work structures thanks to the management, storage and dissemination capacity of digital technologies. Consequently, schools of architecture have faced the challenge of training professionals with digital skills. They have progressively incorporated ICT into Design Studios. Its implementation has initiated a process where teaching through ICT has been substituted by learning with LKT. For the moment, it seems that the educational model of the Design Studio is still in transformation as well as the professional practice. Therefore, schools are introducing modifications to the Design Studio model while these changes are occurring. In this context, it can be ventured that its future seems to be heading towards the inclusion of EPT as empowering and participatory learning environments.

***Keywords:** ICT, LKT, EPT, Educational Innovation, Design Studio.*

Resumen

En la última década, la capacidad de gestión, almacenamiento y difusión de las tecnologías digitales ha hecho posible que los estudios de arquitectura puedan disponer de estructuras de comunicación y trabajo más dinámicas. Ante el reto de formar a profesionales digitalmente capacitados, las escuelas de arquitectura han incorporado progresivamente las TIC en los Talleres de Arquitectura. Su implementación ha desencadenado un proceso donde se ha pasado de enseñar por medio de las TIC a aprender con las TAC. Por el momento, podemos afirmar que el modelo educativo de Taller de Arquitectura donde se integran las TAC sigue, al igual que la práctica profesional, en transformación. Por tanto, a medida que dichos cambios van produciéndose, las escuelas están introduciendo modificaciones en el Taller de Arquitectura. Teniendo esto en cuenta, podemos aventurar que su futuro parece encaminarse hacia la inclusión de las TEP como entornos de aprendizaje participativos y de empoderamiento.

***Palabras clave:** TIC, TAC, TEP, innovación educativa, Taller de Arquitectura.*

***Bloque temático:** 2. Herramientas TIC (HT)*

Introduction

In recent years the profession has faced the need to redesign itself. Architects have diversified their profile, have fostered specialized knowledge and have adopted alternative practices to the traditional ones. The capacity of digital technologies to manage, store and disseminate information globally has also facilitated the adoption of dynamic communication and work structures, the access to free databases, the collaboration with other experts and the publication of architectural work in a more extensive manner. The role of the architect (understood as a designer) has also evolved, therefore, towards other professional profiles that require networked thinking, collaboration in multidisciplinary and temporary teams and, above all, expertise in digital technologies (Masdéu, 2017).

Following the objective of training qualified architects, schools of architecture have progressively incorporated ICT (Information and Communication Technology) in the Design Studios.[1] Its integration as a pedagogical tool has meant a change in the traditional educational system, from a closed and face-to-face model of teaching to an open, timeless and delocalized learning space. After two decades, however, the real question is whether the incorporation of ICT in the Design Studio has really brought the current educational model closer to the professional.

In this regard, ICT is now fully rooted in the daily lives of our students. Thus, ICT is an inclusion of the information technology in the teaching of architecture. It is precisely for that reason that the instrumental use of ICT in the Design Studios is limited and insufficient to provide adequate training. Schools have resorted to LKT (Learning and Knowledge Technology) over the past few years in order to guide ICT towards more formative and personalized uses. Instead of providing students with technological knowledge related to the management and exchange of information, they are now moving towards giving more importance to what can be learned and created with technology.

It is possible to affirm for the moment that the educational model of the Design Studio and the professional practice are still in the process of transformation due to social, economic and technological circumstances. In the field of digital technologies, there have recently been significant changes connected to a new social network movement based on coalitions that are built around values and projects.

Nowadays, the Internet (understood as the heart that articulates the different multimedia) allows the access to large quantities of information, unlimited networks of people and unique learning opportunities. Social media is also boosting people's innate ability to share knowledge and, more importantly, is becoming an integral part of the professional practice and public life (Castells, 2000). The emergence of the Internet and social networks is helping to recover the social condition of the human being. The traditional top down and hierarchical organizations are giving way to more massive, multimodal and horizontal relationships. Society is facing a new communication and work model whose followers are distributed all over the world and are globally interactive. From this perspective, it is no longer just a question of introducing quantitative changes in the education of students (more frequency in the use of digital devices or a greater number of connected individuals) but of incorporating qualitative changes in behaviours, habits and interpersonal communication styles (Reig and Vílchez, 2013) that will affect the psychological and social development of the new generations of architects.

[1] In this communication the term Design Studio is used to designate the place and the space (in a non-physical sense) where the professional practice is simulated in order to teach the skills and professional competences necessary for the profession. The term has a physical component that determines a specific place in which the design activity occurs but, at the same time, also represents the very action of teaching architecture.

The next step will be to integrate these aspects in architectural education by introducing modifications in the Design Studios. It is reasonable to assume that their future seem to be heading towards the integration of EPT (Empowerment and Participation Technology) in the learning processes. EPT will not only be used to manage, create or communicate information but to influence and create trends (at a social and professional level) transforming data into collective knowledge. In other words, the architecture of participation and openness will become a key part of a virtuous circle of contribution and collaboration that will make collective knowledge grow (O'Reilly, 2004).

1. Educating for an Information Society

At the end of the nineties, the incorporation of ICT in the traditional model of the Design Studio introduces important changes in the way of teaching architecture, the place where learning occurs and the training time of students. Distance Learning and E-Learning are also integrated in order to create a learning space where students participate synchronously and asynchronously in the design phases of a project by manipulating and exchanging information using several digital technologies (Maher, Simoff and Cicognani, 1999). The Design Studio becomes a networked studio distributed across space and time where each student has instant access to other members' designs in-progress (Wojtowicz, 1995).

An example of this is the Internet & WWW Module Project, created by the Department of Architecture and Building Science of the University of Strathclyde (United Kingdom) (Grierson, 2004).Teachers organized annually (from 1999 to 2003) several Design Studios in order to familiarize students with the following questions: how to use the information available on the Internet to develop architectural projects, which online media is the best to work effectively in teams and how to exchange digital data with the client and partners. Students were grouped into teams of three people. During a four-week period, they had to write a housing programme for an artist, digitally develop a design proposal and perform an online presentation for the client (in this case the teachers). Online discussions and works were recorded for review. A subsequent study of the project was conducted by the teachers. They noticed that, in the beginning, students put more emphasis on the use of asynchronous communication tools. The exchange of files via email was initially used as a means of promoting communications between the teams and the client. Over the years, however, this trend changed and students began to use more synchronous communication means because, in their opinion, it facilitated the contact with their peers and the exchange of the information. Students chose the chat to share design data and the digital whiteboard to add comments to drawings in real time. The result was that the process of brainstorming was more immediate and direct. In summary, the intention of this project was to use ICT to create a learning space (beyond the physical one) where students had access to all the contents of the work developed in different digital formats and media. The exchange of information to carry out collective design proposals was the main reason for using specific ICT (emails, chats or digital whiteboard).

At the beginning of this century, with the development of new ICT, schools begin to make an intensive use of other digital tools to create work and consultation spaces linked to the Design Studio. Online educational platforms are used to manage the teaching material while digital repositories are handled to catalogue the information and turn it into educational resources usable in new activities. For example, the Facòlta di Architettura of the Università Iuav di Venezia (Italy) developed the T-Labs System Repository in 2005. The information, generated during the realization of a project in the Design Studio, was saved on this platform to be reused

in successive learning activities (Spigai, Condotta and Stefanelli, 2006). The idea was to combine the contents of the Design Studios with the information available on the Internet. According to its creators, this enabled students to find for themselves possible solutions to the design problems. Following a similar line, in 2006 the School of Architecture of the University of Lincoln (United Kingdom) conceived the Lirolem Project (Lincoln Repository of Online Learning Materials) to promote Peer-to-Peer Learning using multimedia stored files (Earl, O'Coilly and Win, 2008). The digital repository was also created because students had no way to access the best work done in previous years and the school did not have enough space to store paper presentations. All the material produced in the previous Design Studios was digitally catalogued. Teachers and students used all the information stored to reaffirm the theoretical content of the classes and to complete the learning tasks. Both parties valued its usefulness against other digital resources such as the virtual campus of the school. They considered that the digital repository was a practical tool because it provided immediate access to previously unavailable information.

Unfortunately, over time, the use of ICT has been limited for three reasons. First, teachers have focused more on the technical aspects (management and exchange of information) than on social and pedagogical ones. Thus, current students seem to use ICT proficiently but, in many cases, they have not been provided with the methodological resources and thought structures that allow them to develop personal long-term learning strategies. Second, learning has been included within an online teaching management system which is closed, controlled and isolated from the rest of the contents and resources of the Internet. ICT is only used as a simple administrative tool by teachers and students. That appears to limit what is exciting about the Internet: global communication, free reproduction and collective commitment. Moreover, it might reinforce what is problematic in traditional teaching: rigid learning structures, scant information and controlled exchange of educational experiences. Third, there is a limited use of ICT because some teachers have not been sufficiently trained. The result is that they cannot effectively teach their students how to handle this technology and apply it in a process of lifelong learning. This is fundamental in a context like the current one, in which digital resources and information flow constantly and become quickly obsolete (Reig, 2012).

2. Educating for a Knowledge Society

Recently, schools have introduced changes in the teaching of architecture in order to overcome the limitations of ICT. Their goal is to shift from teaching through technology to learning with it. To achieve this, they have implemented LKT in the Design Studio giving ICT a more customized and didactic use. This change has also created an excellent opportunity to favour Lifelong Learning and creativity in a context of abundant digital content and resources (Pink, 2008; Florida, 2002).

The number of informational inputs and knowledge opportunities available on the Internet has increased during the past decade. The use of LKT in the Design Studio has been the key to avoid overexposure to information by providing filtering methods to the students and to promote new ways to facilitate the production and distribution of knowledge. These Design Studios have been mostly created to teach students to detect important sources of information (sometimes located outside the university), to recognize the educational potential of this material and to take advantage of this knowledge in order to promote critical thinking, research and Personalized Learning. Schools have achieved these goals using Personal Learning Environments (PLE) and, especially, exploiting specific digital resources accessible from any mobile device.

The following example illustrates how students have worked with diverse digital tools and applications to improve their own learning. The Escuela de Arquitectura of the Universidad de Málaga (Spain) has focused on the development of educational strategies based on the potential of LKT taking as a framework Problem-based Learning (PBL) (Ruiz-Jaramillo et. al., 2016). During the 2015/16 academic year, the teachers of four areas of the Degree of Architecture developed an innovative educational project to enhance the transversality between subjects combining face-to-face and online learning activities in the Design Studios. The idea behind the project was that the incorporation of technology in the studios has not led to significant improvements and, therefore, teaching continues to focus on the mere transmission of content in a unidirectional way. This is turning students into passive recipients of information when their role as active content producers should be recognized. On that basis, teachers decided to use LKT in order to enrich the educational processes and encourage Autonomous Learning. Most of the activities were designed in order to make students tackle real problems with transversal approaches between areas. Each of them used different digital resources to meet the educational objectives set.

In Architectural Projects, teachers organized a Design Studio where the main activity (entitled 'The digital notebook of the architect') was to create a personal and public blog. Students had to record the experiences associated with their initiation into the architectural project; both inside and outside the studio. The blog served as a complementary learning space where students could record the documentation of the project, save the information extracted from other digital media and write down ideas and thoughts derived from the design action. According to the organizers, the fact of being able to show the works openly on the Internet helped students to focus more on the learning activities and to develop a synthesis capacity to manage and transmit concepts and reflections through different graphical means (drawings, sketches and small texts). In Architectural Composition, the activities focused on two instruments: the Pinterest platform (an online pinboard to collect visual pieces of multimedia) and a practical exercise based on the PBL. The aim was to seek the active participation of the students, to give them more control and decisional power over the subject and to introduce a reflection on the positive and negative aspects of using web contents. Each student created a digital portfolio with personalized images which was later used by their teachers and peers as a template to make theoretical presentations, to take notes and to perform the exercise satisfactorily. In Architectural Constructions, teachers opted for the SCORM application (an online web to create units of training material that can be shared and reused in different systems and contexts such as PLE) to create and disseminate interactive presentations of the discoveries made by the students during the process of solving the design and structural problems. Finally, in Urban Planning, students handled digital cartographic bases to delve into the analysis of the territory. This method encouraged them to work collectively with the information gathered and, ultimately, to design a joint urban proposal. However, it is appropriate to note that despite having successfully implemented the main idea of LKT in the Design Studio, the transversal coordination between areas does not seem to be taking place. Therefore, the academic staff should recapitulate and design a new strategy to link the different fields of knowledge through LKT to offer a less compartmentalized training. Thus, it would be possible to go a step further: not only using LKT to promote specific didactic activities designed in each Design Studio but to unify the knowledge in order to make students work on the same assumption from different perspectives.

It is significant to underline that thanks to LKT students are learning to have more control over their training and to maintain a more direct relationship with the real world. This also implies a

greater openness to novelty and constant curiosity. However, there are certain limitations if LKT is used improperly. Students tend to use it as a personal means of learning with closed contents and tailor-made information. If they work only with their ideal sources of information, they can isolate themselves from alternative facts and standpoints (Sunstein, 2006). Given that scenario, it appears appropriate to think about whether the application of LKT in the Design Studios can go further and take advantage of the experiences of third parties to collectively build the architectural knowledge. The teaching of architecture should be considered from a participatory perspective, i.e. students should belong to online communities of interest and learning in order to be able to interact with people with different backgrounds and common interests.

3. Educating for a Networked Society

Nowadays, society has undergone a significant social change due to the emancipation and democratization of social networks. The web 2.0, which includes practically all of our vital environments (personal relationships, work, leisure, information, politics and education), is characterized fundamentally by the value and the prominence given to citizen participation (Bautista, 2012). The popular and political demonstrations of the Arab Spring (2010-2013), the 15-M anti-austerity movement in Madrid (2011), the Occupy Wall Street protest in New York against economic inequality around the world (2011) or the 8-M feminist strike in several Spanish cities (2018) are outstanding examples of how people make their voices heard through the means that web 2.0 puts at their service (especially social networks and their ability to transmit content quickly and in real time). They also show how the Internet is interacting with society creating a new form of sociability which affects human interconnections, information sciences and digital identity. In fact, there has been an important paradigm shift because of this. If at the beginning of the century the traditional web was used to access information through searches and exchanges, the web 2.0 is becoming a means of communication, interaction and social organization where users have the leading role and the power. In other words, it seems right to talk about the emergence of new ‘public spaces’ (i.e. digital agora), which through social technologies, connect us to each other with the different aspects of life (Reig, 2012) and allow us to achieve together great goals.

In this context, schools of architecture have to revise their programmes to develop teaching methods that enable them to adapt to the current situation. The web 2.0 and the social networks have to serve to renew the learning processes by teaching students the true meaning of empowerment and participation. It is necessary, therefore, to impart an emotional education along the lines of socio-affective processes. The aim of schools must consist in learning from one another in order to progress and break with the classical idea of the university as the core of knowledge capitalization. In this case, the communities of practice and interest become the ones in charge of attributing value to education. Schools - based on the concepts of the Zone of Proximal Development (Vigotsky, 1978), Social Learning (Brown and Duguid, 2002), Collective Intelligence (Lévy, 1994), Sharism (Mao, 2008) and Digital Connectivism (Siemens, 2010) - must create new learning environments that encourage participation and collective construction from a cognitive and ethical point of view. The integration of EPT in the Design Studio could be a way of going from a closed and isolated teaching method to one based on the hyperconnectivity and sociability of digital media and its users.

In the professional field, there are more advanced examples of EPT but equally applicable in the teaching of architecture. EPT are used to promote the participation of citizens and professionals in social and urban issues, to create virtual networks and to transmit specialized

knowledge on a global scale. RaumLabor (*http://raumlabor.net/*) (Germany), Arquitectura Expandida (*http://arquitecturaexpandida.org/*) (Colombia) and Arquitecturas Colectivas (*https://arquitecturascolectivas.net/*) (Spain) represent diverse examples of virtual communities where architects work online temporarily in horizontal organizational structures. Their practice model is based on bottom-up dynamics with specific and long-term participatory actions inside and outside a virtual platform. The project Zoohaus is also a case in point (*https://www.facebook.com/Zoohaus-181636341954/*). In 2007, the architectural studio Zuloark (Spain) created a multidisciplinary work platform formed by professionals from diverse disciplines (architecture, urbanism, art and design). Its members want to bring together in a single virtual space the largest possible number of experts to carry out collaborative projects on citizen participation, reactivation of public space and collective intelligences. Their work methodology was based on mutable and open networks. These structures changed depending on the project and adapted to multimode relationships.

In 2009, Zuloark also created the project Inteligencias Colectivas 2.0 (*www.inteligencias colectivas.org*): an internet portal to create a meeting place, a free database and a record of collective constructive details based on real examples of non-standardized constructions. In the Human Network Archive Space, citizens could exchange work methodologies and create partnerships for the development of projects through a local and global network of contacts (architects, suppliers, neighbours, craftsmen and builders). By having a space to share ideas and experiences freely, participants established a mutual commitment that resulted in very diverse and interesting results. The initiative provided new opportunities for social and professional inclusion encouraging its participants to use their own experiences to build an active knowledge network.

In the educational field, the integration of EPT in the Design Studio is taking place through social networks. Schools intend to create nodes (elective ties) that establish communities of practice and multimodal learning where each member (teachers, students and collaborators) share their knowledge and, at the same time, receive feedback from others. Thus, the traditional Design Studio becomes a space for exchange and encounter between people who employ the permanent hyperconnectivity of social networks as a powerful source of creativity. This is the case of the #TwitterCritter Project of the School of Architecture, Construction and Environment at the University of Lancashire (United Kingdom) (Armstrong and Vanner, 2013). The point was to explore to what extent social media could be used as part of the review process in the Design Studios and how to establish relationships outside the university that may become valuable educational and professional sources. The teachers chose the social network Twitter as a pedagogical tool for two reasons: first, it is one of the most used current media in the field of information (becoming a simile of the agora or the public space) and, second, it is an easy-to-use means that enables real-time dialogue, limits messages to 140 characters and allows to make brainstorms and feedbacks during the creation process. They invited architects and construction professionals to contribute in the reviews and encouraged undergraduates from other courses to do the same. Students had to upload a picture of their work to the Twitter account weekly so that the experts could evaluate it by providing constructive feedback through the comments written by both parties. Students valued the experience as positive because it helped them to better understand this social platform and to discover that, with a proper use, one can have unlimited access to virtual professional communities, technical updates, architectural news and employment opportunities. Nowadays, the teachers and students of the school continue to use Twitter as a common learning space by making contributions related to the work sessions in the Design Studios. This project, although its application was made on a

small scale between the school and some professionals, points out the scope that EPT could reach if its integration in the Design Studio was carried out thinking about its hyperconnective and multimodal capacity. Thus, EPT could become the key to enable the creation of increased learning environments where small and large participation actions turn students into better professionals.

The incorporation of EPT in the Design Studio is taking place in a timely manner for now. It is occurring only in specific subjects without global repercussion in the school programme where the professional skills of the students should be outlined. One of the reasons is that the web 2.0 is experiencing a social explosion with features still to be discovered. In terms of social innovation, EPT is still in an initial phase that will require time before reaching some educational successes. Right now it is at the limits of the academic communities where people are mostly free to think about new ideas that, over time, could be transferred to the centre. The other motive is that some teachers are willing to introduce these changes in the current educational model but innovation requires a strong investment in research programmes and institutional support that is not always available to architectural schools.

4. Conclusions: What does the Future hold?

In the coming years, the teaching of architecture in the Design Studio should become conversational, horizontal and equal. It should take place in person in the studios and, simultaneously, at any time and place where there is a device connected to the net. Some moments of connectivity, collaboration and co-creation in the web 2.0 could be alternated with others of concentration and individual creativity in order to take advantage of both models. A further possibility is to provoke the already underlying crisis in the conventional teaching system, which is unable to respond to current reality, to create new educational models that prioritize the proactivity and the innovative spirit of our students. In addition, the disinhibiting effect of the Internet (interrelations without barriers, free participation with the hope of building something better and self-recognition) should be the engine to adopt an attitude 2.0 (dialogue, collaboration, transparency and effort) and to develop new scenarios of sensory, inclusive and social learning.

Some proposals to educate the next generation of architects could be: the Storytelling Design Studio where students would learn how to move and mobilize people with transmedia images and narratives; the Digital Identity Design Studio would make students recognizable on social and professional network services; the Open Data Design Studio where students would deal with the hyperconnectivity of mass media to analyse (from the perspective of the social sciences) the behaviours of their users and their possible application in architectural projects and, finally, the Design Studio 3.0 would promote new strategies for creation, visualization and impact of architectural information and projects using tweets, fake news, WhatsApp or other digital resources. Obviously, these are just some examples of how, with small actions, the Design Studio could provide certain knowledge and skills related to the current professional and social digital needs. The final goal would be to transform the Design Studio into a learning space that takes full advantage of the technological and social power of the Internet using LKT and EPT to establish local and global synergies between the academia, the profession and the society.

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