THE TUTORS' VIEWS ON THE UTILIZATION OF E-LEARNING SYSTEM IN ARCHITECTURAL EDUCATION

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Abstract

The design studio is the core of Architectural education where – face to face – social interaction, negotiations and communications happen between tutors and students. These communications are essential for development of the design concept and initiation of student's innovation. At the University of Dammam, an ambitious e-learning system plan was initiated in 2011 and the system was gradually installed during the year 2012. The faculty have been encouraged to use it and integrate it with their traditional teaching system. However, the use of e-learning system was assessed by the e-learning deanship and it found that the system is of little use by the faculty of college of Architecture. So, a pilot study followed by a questionnaire survey was launched in early 2013 and it targeted the faculty of college of architecture and planning. The aim is to find out why the faculty are reluctant to utilize the system and the utilization's obstacles. The survey's results showed that the faculty appreciated the qualities of the e-learning system. However, they felt that the e-learning system has not been tailored to respond to the requirements of architectural education. They said that it can be used, to a certain extent, for theoretical courses but it would not be beneficial for design studio courses. This paper argues that potential shortages of the system should be dealt with; otherwise, the present e-learning system, as it is, will not respond to the architectural education's needs and would have negative impact on architectural education.

Keywords: e-learning system, architectural education, virtual learning environment, virtual design studio

Introduction

The design studio is the core of architectural education. Through the design studio, students learn how to gain creative skills and produce innovative solutions and this would be considered as the real value of design studio's education. This would help them when they start practising architecture, to apply their creative problem-solving skills to real life design problems and produce creative design solutions. On the other hand, e-learning tools such as Blackboard help tutors to manage virtual classes and communicate with students out of the class hours. It is however, noted that architectural tutors are reluctant to use e-learning tools and they stick to the traditional face-to-face teaching methodology and tools. The aim of the present research is to find out the reasons behind the negligence of e-learning tools and the negative attitude of the faculty towards this emerging technology, and how to encourage tutors to adopt and implement these e-learning tools in the architectural education.

Characteristics of the architectural education

Architectural curriculum consists of a number of theoretical, lab and design studio courses. For example, most of the colleges of Architecture in the Kingdom of Saudi Arabia (KSA), have ten design studio courses (i.e. Design I to Design X) at undergraduate level. These courses are the core of architectural education. The architectural curriculum is based on the design studio model

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which focuses on "*learning by doing*". The architectural design studio offers a prime example of a collaborative, multi-sensory, learner-centred, constructivist, experiential problem-based teaching environment (Sidawi, 2012a; 2012b). Learning about how to do architecture and how to 'think' architecture requires a great deal of cognitive processing, the manipulation of mental images, understanding of complex cause and effect relationships, functional, technical, performance, aesthetic, cultural and physical aspects (Juvancic, Mullins, Zupancic, 2012). Visuospatial thinking theories are especially suited for the purpose of learning in and about architecture which both rely heavily on the notion that thinking consists of mental images and principled manipulation of mental images (Mayer, 2005) on the premise that: "a) appropriate visuospatial thinking during learning can enhance the learner's understanding, and b) multimedia presentation can be designed to prime appropriate visuospatial thinking during learning" (Mayer, 2005). The education in the design studio stimulates its' characteristics from the nature and process of architectural design. The development of architectural project from initial concept to the end product is an interactive social and psychological process. Through the design process, the designer negotiates various solutions of the design problem with oneself and communicates ideas with colleagues and tutors (Sidawi, 2012a; 2012b). This would help in exploring new solutions thus it would lead to the discovery of creative solutions of a design problem.

The use of e-learning systems in architectural education

There are a number of e-learning systems used in higher education. Blackboard is a Learning Management System that supports online learning and teaching. Blackboard provides an integrated environment for the learners to interact by using course. Blackboard forms the core of the Virtual Learning Environment (VLE). It integrates various components of the VLE, such as BB Mobile, Elluminate, Tegrity and Elicitus to each other and it also integrates the VLE to the university systems such as the library systems, university portal and student information system. Oracle's PeopleSoft is used for student administration and it is a feature-rich student information system. Architectural students and faculty usually use the University email and social communication channels such as Facebook, Academia and Twitter for communications.

The use of e-learning pedagogies and methodologies is an area that is rapidly becoming core to many teaching and learning institutions worldwide such as Bartlett School of Architecture, UCL (BSA, 2012) and Welsh School of Architecture, Cardiff University (WSA, 2013), in the effort to enhance their educational provision and meet current professional demands.

Juvancic et al. (2012) highlighted a number of e-learning platforms or what so called Learning Management Systems (LMS). These systems share common aspects and elements that are suitable for a cross-section of common e-learning activities and tools for running and managing (blended) courses. Moodle, for example, can be applied to many levels of teaching and used for different topics and in different settings (ibid). Another e-learning system is VIPA which addresses many relevant issues of e-learning in architecture, using traditional LMS e-learning tools and integrating new ones (Kipcak, 2007).

Mizban and Roberts (2008) reviewed the use of e-learning system in schools of architecture, UK, and its implication on architectural education. They highlighted that schools of Architecture could benefit from the use of e-learning system if they do the followings:

- provide professional advanced technical support for both staff and students;
- select appropriate technology;
- investigate how technology can best be integrated into the traditional studio setting and the curriculum; and

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- assess the time and effort necessary to introduce and maintain this mode of learning.

On the other hand, virtual Environments can support teaching in a single studio within an institution and bring together students from several institutions (Reffat, 2005a; 2003). Virtual Environments present an essential learning for practice of the future, exploiting technology in design teaching, researching the nature of design communication and processes, and searching for ways to improve the educational experience of a student (Kvan, 2001; 2000). The advent of virtual design studio (VDS) appears to raise promising opportunities for reconsidering the way we teach design (Reffat, 2005b).

Pioneering schools of architecture, such as the University of Sydney, Cornell University, ETH, Massachusetts Institute of Technology, the National University of Singapore and the University of British Columbia have experimented the use of worldwide virtual design studios. In these studios, students and tutors work together on a design project. They discuss design problems and try possible solutions. The virtual design studio provides the students with an opportunity to practice their creative thinking skills by sharing their concepts and ideas with a broader spectrum of students and instructors from different cultural, educational, and even philosophical backgrounds (Alraouf, 2006). VDS provides a powerful communication and navigation environment where users can collaboratively design in centralized or distributed real-time virtual environments (Reffat, 2005b). Ruschel et al. (2009) highlighted the viability to promote collaborative learning with the support of the electronic learning open source system TIDIA-Ae in distance education courses for competent designers. However, the researchers found this open source system falls short in the support of collaborative design. Pinho et al. (2008) also found that the 3D collaborative environments mostly promote interaction in chat modes whereas cooperative object manipulation is still limited.

Blended learning methodology has been recommended by researchers as it spans over face-to-face (f2f) and e-learning connecting them, combining learning on site with distant learning under the joint name of distributed learning (Mizban & Roberts, 2008). Blended learning with f2f component can produce a stronger sense of community among participants than fully online course, socio-cultural context for learning environment and helps maintain the link with traditional design studio practices in the field of architecture (ibid). So, it can be argued that blended learning would enhance design studio courses (Mason & Rennie, 2006). Blended learning would be a possible solution as it offers a great deal when used to enhance teacher education programmes (Al-Nuaimi & Aboukhatwa, 2012). It can bring together students from all locations and a range of backgrounds and can provide a media-rich, collaborative, personalized and interactive learning environment (ibid).

Previous research showed that university teaching staff has generally positive attitudes towards integrating technologies into teaching (Panda & Mishra, 2007). Alenezi (2012) reported an overall positive attitude toward the adoption of e-learning among faculty members, students, and administrators (see also Alajmi, 2010). Hussein (2011) conducted a study in the KSA on the attitude of faculty members toward e-learning, it was found that faculty members in Saudi universities have positive perceptions of e-learning. Al-Nuaimi and Aboukhatwa (2012) conducted a survey on university tutors and they inspected the tutors' views on blended learning. The surveyed tutors said that blended learning can be implemented in the subject of architectural design, meanwhile they were concern about the efficiency of such implementation and they said that they would have a difficulty in teaching architectural design using blended learning methodology.

Despite the benefits that the use of e-learning system would provide to students and educators, there is a considerable resistance of faculty including the architectural faculty to the use of e-learning. Recent research has shown limited use of educational technologies in university teaching

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(Juvancic, Mullins, Zupancic, 2012; Schoonenboom, Roozen, Sligte and Klein, 2004; Selwyn, 2007). Among various other concerns, there is a common doubt that e-learning can be as equally effective as traditional face-to-face architectural studio teaching and culture (Kipcak, 2007).

Such negative attitudes towards technology would be explained by the influence of a number of factors such as limitations in national and institutional policies and management practices (Selwyn, 2007). Also, poor Internet infrastructure, and a lack of distance learning education, as well as lack of support are still major barriers (Alenezi, 2012). In the KSA, recent research on e-learning has indicated that despite the importance and usefulness of e-learning, the most apparent inhibiting factors are lack of knowledge and skills (Al-Sarrani, 2010).

However, the negative attitudes are not merely influenced by the lack of technological knowledge or poor infrastructure but the fact that the university teaching staff are more focused on institutional issues and pedagogical applications of technologies, so they would choose to integrate technologies into their teaching if and when they see educational value in doing so (Waycott et al., 2010). Also, it can be referred to the nature of academics' beliefs about what constitutes good teaching (Foley & Ojeda, 2008). The staff believes that technologies should be seen as a means to enhance student learning and manage teaching activities. So, the staff attitudes towards the use of technologies in higher education are substantially influenced by their approach to teaching [ibid]. Abouchedid and Eid (2004) suggested that e-learning attitudes among faculty members varied significantly depending upon the level of perceived usefulness of e-learning technology in promoting job performance.

The research design and methodology

The literature review has highlighted some of the possible reasons behind the little use of e-learning technology by the university staff and their negative attitudes towards the emerging technologies. In the annual report for the year 2011-2012, the e-learning deanship, University of Dammam reported that e-learning system is of little use by the faculty of college of Architecture. To find out the reasons behind the little use, a research study was initiated at the college of Architecture and the research objectives are:

1. to find out the level of staff's technical knowledge and skills and whether they have used any of online education tools;
2. to find out the faculty's views on the potential use of online education tools in the architectural education and specifically architectural design; and
3. to make recommendations.

To achieve the research objectives, a survey was launched. The survey consists of two stages; pilot study and the main survey. The pilot study was firstly conducted. The use of pilot study is recommended by many researchers such as (Oppenheim, 1992; Morse, 1991) to define possible problems, to establish foundations for the main survey and to formulate the wording of questions of the main survey. A combination of research tools is used. This combination was chosen because the findings that relate to each method will be used to complement one another and, at the end of the study, to enhance theoretical or substantive completeness (Ausubel, 1968).

The pilot study includes a critical examination of the strategic plan of the e-learning deanship from architectural education's perspective followed by a discussion on issues concerning e-learning with a number of faculty. In January 2013, the main questionnaire survey has been conducted on the faculty of college of architecture, University of Dammam. Prior to the initiation of the survey, a verbal consent was obtained from the heads of departments of college of architecture. Tutors were asked to fill in a short questionnaire and they were informed that their

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personal details and the information that they supply will remain confidential and will not be revealed to a third party. Fifty three out of ninety eight have filled in the questionnaire and handed back. This represents around 54 % of the total number of faculty. The next section discusses results of the pilot study and questionnaire survey.

The survey results

The pilot study results

An examination of the strategic plan for the implementation of e-learning system on the university and colleges' level revealed that there is a need to have a financial, ethical, and administrative/ managerial framework for the whole e-learning process. Furthermore, the e-learning strategy did not take into account the possibility of interdisciplinary, cross-disciplinary, multi-disciplinary education/ courses between the university's departments and colleges. The strategy did not consider how to provide an e-learning system that integrates the professional training and Continuous Professional Development (CPD) with the architectural education as in the case of the Western Universities (see for instance BSA, 2012 and WSA, 2013). The document suggested that a quantitative measurement of the user's performance (i.e. the student and the tutor) would be applied. However, the measurement of user's performance cannot be achieved by applying quantitative measures only. Furthermore, qualitative/tangible issues should be considered and measured using qualitative assessment measures. The matter is not about the mere satisfaction of students, it is rather about possible problematic issues such as social and psychological issues surrounding the utilization of the e-learning system.

Consequently, a number of faculties of college of Architecture's were invited to a meeting to discuss the potentiality of e-learning system's use in architectural education. The meeting revealed the following problematic issues:

Strategic planning and policy issues

No strategic plan has been set yet for the implementation of the e-learning system in the college of Architecture. This should be on the course level i.e. undergraduate or postgraduate group of courses, such as building construction courses or design courses' level. Also, this should be on each academic year and department's levels, and at the college level. The implementation of e-education system will affect the traditional education system. Therefore, it would be helpful to see how to integrate these systems together. Also, the impact of integration on the traditional educational system should be examined.

Infrastructure and technical support

There is a shortage in the infrastructure and technical support so the following issues were noted:

- classes should be equipped with proper cameras, microphones, loudspeakers, special lights and so on. This would enable the staff to produce good e-lectures videos;
- the electronic materials including the videos produced by staff should be regularly assessed to see whether they meet the required standard or not;
- as the aim is to provide 24/7 access and use of e-education tools, 24/7 technical support should be provided in case of any technical problem;
- assessment tools that measure intangible feedback do not exist yet; and
- robust integration is required between the e-learning tools with Microsoft office, other software products, and architectural software products

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The communication system

Transparency is a must at all levels from the department and the college's levels to the strategic level. The college's staff and coordinators should be frequently informed about the progress of the e-education process and development of its tools, requirements, obligations, passwords, tutorials, support staff etc.

Student-wise issues

The faculty has raised a core question concerning how these systems would develop the student's competence in design courses. Also, the negative attitude of some students throughout traditional learning process and the concern that those students would have the same attitude during the e-learning process

Architecture-wise Systems

It is essential to provide special online Architecture-wise systems that is integrated with e-education system and can be used by distant learners. Such system would help them appreciating certain design parameters and constraints. For example Eco-spatial interface that enables the learner to choose the spatial settings for the building and choose the greenery around and apply external finishing to the building. Another example is the Virtual environment and Virtual Design Studios' systems and tools.

The questionnaire survey results

The results showed that many of the faculty have novice experience regarding the use of PeopleSoft, Blackboard and the University's online resources. Also they have slightly better skills in using online communications tools (Table 1).

Table 1: The extent of technical experience regarding the use of the following online/ web tools (note: the total number of respondents is 53)

Type of online software/e-tool/e-resource	Novice (%)	Beginner (%)	Competent (%)	Proficient (%)	Expert (%)
Peoplesoft	11	35	37	15	2
Blackboard	33	44	11	8	4
Online Communication tools such as Facebook, LinkedIn, ResearcherGate etc.	2	32	32	25	9
Online intelligent search engine such as Google and Google Scholar	0	10	26	43	21
The University of Dammam e-resources including e-journal and e-books databases	21	24	24	23	8
Online Library catalogue	9	31	33	23	4

Table 2 shows that many of the faculty did not upload the course information on Blackboard yet. Also, they are hesitant to provide their courses online in the near future.

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Table 2: The use of Blackboard for the above issues
(Note: the total number of respondents is 53)

Use of the Blackboard for these issues	Yes	May be	No
Have you uploaded information (e.g. course syllabus, grades, web links assignments etc.) of any of your courses on Blackboard yet?	20	–	33
Do you aim to provide any of your courses online for distant learning purposes?	13	35	5

Table 3 shows that most of the respondents are against teaching design and lab courses online, whereas around half of the respondents are happy to teach theoretical course online. Table 4 shows that 72 % of the respondents disagreed that design studio courses can be taught Online.

Around half of the respondents disagreed that lab or practical courses can be taught online and they said online teaching courses will not provide the same quality as the f2f courses (Table 4). Thus these courses will not provide the student with a degree that is somehow equal to on-campus degree. These respondents also highlighted the fact that the technical support for online courses is not always available (Table 4).

Table 3: Which of your courses/ modules can be taught partially of fully online?
(Note: the total number of respondents is 53)

Course title	None	Module 1	Module 2	Module 3	Module 4	Module 5	Some modules	All modules
Design courses	38	3	4	3	2	1	2	0
Lab courses	38	2	3	1	4	1	1	3
Theoretical courses	25	9	2	4	1	2	7	3

Two third to three quarters of the respondents said a clear policy and bylaws should be developed. Consequently, rules that include clear vision, mission and objectives, should be set for delivering online architectural courses (Table 4). These respondents said that the e-education system is more suitable for theoretical courses and it requires more self-disciplined, independent, and more organized students (Table 4). However, they said that a mix-up between the traditional and online teaching is beneficial as it would provide students with more help and support (Table 4).

Table 4: The respondents' opinions regarding the below mentioned statements surrounding the use of e-education system at the college of Architecture (number of respondents 53, note: the second to fourth column figures represent the percentage of respondents. Mean value column scale: 1 strongly disagree to 5 strongly agree)

Issues surrounding the use of e-education tools and implementation of e-courses	Disagree (%)	Neutral (%)	Agree (%)	Mean	Standard deviation
A mix-up between the traditional and Online teaching would provide students with more help and support	10	14	**75**	**3.9**	1.015
Clear vision, mission and objectives should be set for the online curriculum	10	14	**75**	**3.86**	1.096
Rules should be set for delivering online architectural courses regarding online	8	19	**69**	**3.84**	0.976

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communications, culture, methodology and process					
Online assessment tools can be used to assess the success of online architectural courses	10	11	**76**	**3.84**	1.007
Clear policy and bylaws should be developed concerning the implementation of online teaching courses in the architectural education	8	26	**66**	**3.79**	0.988
Online teaching courses require students to be more self-disciplined, independent, and more organized	12	21	**65**	**3.78**	1.064
A strategy and clear plan should be set on how to implement and integrate Online teaching courses into the architectural education	8	31	**57**	**3.72**	0.902
E-education system is more suitable for theoretical courses	12	19	**69**	3.71	1.035
Online courses would provide the remote learners an opportunity for mid-level qualifications	10	23	58	3.7	0.954
Online teaching courses are more convenient and more compatible with students and tutors' lifestyle	25	26	43	3.22	1.055
Resources and tools that support online courses are always available	33	20	43	3.04	1.274
Online teaching courses would suite the way that architecture is traditionally taught	43	37	18	2.62	0.987
Online teaching courses would provide the same quality of f2f courses	**53**	17	28	2.58	1.144
Technical support for online courses is always available	**58**	14	23	2.55	1.292
Lab or practical courses can be taught Online	**54**	28	18	2.4	1.107
Online teaching courses are too complicated for my computer skills	**59**	28	11	2.38	0.993
Online teaching courses would provide the student with a degree that is somehow equal to on-campus degree	**57**	23	19	2.37	1.067
Design studio courses can be taught Online	**72**	19	10	2.02	1.083

To conclude, the respondents agreed that a mix-up between the traditional and online teaching would provide students with more help and support, meanwhile a strategy and clear plan should be set on how to implement and integrate online teaching courses into the architectural education and a clear vision, mission and objectives should be set for the online curriculum. Also, online communications, methodology etc. rules should be set, for delivering online architectural courses including the design courses. The respondents disagreed that lab, practical or design studio courses can be taught online. They said that online teaching courses will not provide the same quality as traditional face to face courses; and online course degree is not equivalent to the on-

campus degree. They also disagreed that the online teaching courses would be too complicated for their computer skills.

Discussion and conclusion

The study revealed a number of problematic issues inhibiting the utilization of e-learning system by the faculty of college of architecture and the possible reasons behind the negative attitudes towards the use of e-learning system (see also Juvancic, Mullins, Zupancic, 2012; Schoonenboom, Roozen, Sligte and Klein, 2004; Selwyn, 2007).

One of the issues is the weak infrastructure and technical support. This issue has been highlighted by previous researchers such as Alenezi (2012). So robust infrastructure should be implemented and advanced technical support should be provided to the faculty and students. Accordingly, innovative synchronous communication and visualization tools should be designed, specifically for architectural design users (Mizban & Roberts, 2008; Ruschel et al., 2009).

There is unclear and limited strategy and policy concerning the implementation of e-learning system (see also Selwyn, 2007). So a clear strategy and policy should be developed concerning the implementation of online teaching courses in the architectural education and a clear vision, mission and objectives should be set for the online curriculum. The strategy should consider possible integration between the professional training, the Continuous Professional Development (CPD) schemes and the architectural education.

Many of the faculty have not used the e-learning system yet, have novice skills and lack of knowledge regarding the use of online educational software and resources such as PeopleSoft and Blackboard (see also Al-Sarrani, 2010). So tutors should be trained not only on how to use various online e-learning tools for theoretical courses only but also how to use these tools within the traditional design studio's context.

Previous research has pointed out the positive attitudes of the university teaching staff towards the use of e-learning system (Panda & Mishra, 2007; Alenezi, 2012; Alajmi, 2010). However, architecture's tutors were concern about the efficiency of implementation of e-learning system (Al-Nuaimi & Aboukhatwa, 2012). This survey revealed that the faculty were against teaching design and lab courses online whereas some of them were happy to teach theoretical courses online. This is because that the faculty did not see a real educational value in teaching these subjects online (see also Waycott et al., 2010; Foley & Ojeda, 2008; Abouchedid & Eid, 2004). They said that the online courses will not be of the same quality of f2f courses. Therefore, they recommend a blended courses' approach as it would provide students with more help and support. Other researchers were also concern about the efficiency and usefulness of the implementation of e-learning system and suggested blended courses (Al-Nuaimi & Aboukhatwa, 2012; Abouchedid & Eid, 2004). It should be noted that the faculty's approach to teaching affects their utilization of e-learning system (Foley & Ojeda, 2008). So, it is crucial to examine how to incorporate their teaching approach in the online educational process. Researchers have highlighted the usefulness of blended courses (Mizban & Roberts, 2008). However, prior to the adoption of blended courses, a pilot experiment should be carried out to assess the usefulness of blended design and theoretical courses in comparison with traditional f2f courses.

The previous research identified some technical limitations of the virtual design studios such as the limited cooperative object manipulation (see for instance Ruschel et al., 2009; Pinho et al., 2008). Also, there is a problem in integrating architectural software such as 3D modelling, virtual environment, visualization and simulation systems with online learning systems. Thus, potential technical problems should be identified and sorted out as possible. Therefore, the future research

should inspect how new e-learning systems should be developed to overcome the present shortages and meet architectural education requirements.

The present survey found that many of the respondents were against online teaching of design courses. This can be referred to a number of reasons such as; the faculty's concern of shortages of the ICT infrastructure, weak technical knowledge of the faculty particularly of how to plan and run virtual design courses online. The previous research found that virtual design studio would offer real benefits to tutors and students as it crosses the traditional design studio boundaries, blends the traditional design studio teaching with the virtual design teaching thus would enhance the design studio teaching (Reffat, 2005b; Alraouf, 2006; Bender & Vredevoogd, 2006). So, the benefits of virtual design studio concept and approach should be demonstrated to the faculty. Thus, the development of virtual design courses can be discussed with the faculty and see how it can be integrated into the traditional design studio settings and the curriculum (see also Mizban & Roberts, 2008) taking into account how to overcome the present technical, policy, and knowledge-wise barriers.

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