CREATIVITY AND COLLABORATION IN ARCHITECTURE EDUCATION IN THE UAE

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Abstract. A review of national government literature indicates that today's knowledge-driven economy demands a workforce equipped with complex skills and attitudes. Examples of these skills and attitudes are general problems solving, meta-cognitive skills, critical thinking and lifelong learning. Reviews of the Architecture, Engineering and Construction industry indicates a gap between architecture practice and education. The Egan report states that there is a need for a change of style, culture and process within the construction industry and it identified five driving forces, the report also recognised that the achievement of these driving forces is linked to training and education. Education must not only teach the necessary technical skills and knowledge, but also the culture of teamwork, collaborative work and creativity. The construction boom in the United Arab Emirates combined with the country's mission to highly educate and train its nationals to be able to tackle market challenges provoked the necessity of implementing the culture of creativity and collaboration in education system. On the other hand, use of technology in education has been proven to facilitate and enhance the learning process. This paper will highlight the importance of implementing the virtual design studio as a technlogical platform in architecture education in the UAE in a way that aims to promote the culture of creativity and collaboration through the use of technology.

1. Introduction

Governments are becoming increasingly aware of the positive effect of education on the growth of the economy (McCain, 2002; O'Neill, Singh, O'Donoghue, 2004; Resnick, 2002); in a knowledge-driven society. Consequently there are pressures upon Higher Education (HE) institutes to respond in order to meet the demands of today's job market (Jochems,

Merrienboer and Koper, 2004; O'Neill, Singh, & O'Donoghue, 2004). One of the major challenges for HE establishments is to develop instructional strategies that promote students' complex skills such as critical thinking, meta-cognitive skills, general problem solving skills, creative problem solving skills, and attitudes related to teamwork, collaboration, and lifelong learning and at the same time to integrate advanced technologies into the education curriculum. Today's networked world requires a workforce that uses technology as a tool to increase productivity and creativity, employees are required to collaborate, work in teams, and share information across global networks in order to examine issues from multi-disciplinary points of view (Hawkins, 2002). In particular, the Architecture, Engineering and Construction (AEC) industries has been criticised for their lack of forward thinking. Many reports have concluded that there has to be a change in practices within these industries (Lathem, 1994; Egan, 1999), suggesting collaboration and creativity are vital components that should be nurtured. The Virtual Design Studio represents a means to enhance these skills. Salama and Wilkinson (2007) argue that there should be continuous attempts to design studio teaching practice, to re-configure the structure of studio content, and the way in which knowledge is delivered and experienced. This paper will discuss the importance of integrating skills such as creativity and collaboration in the educational curricula of the design studio. It will also discuss the importance of integrating skills such as creativity and collaboration into the educational curricula.

2. The Need for Creativity

According to the literature; particular practices within the AEC industry have developed for historical, economic and cultural reasons. They have become entrenched and have produced negative consequences, sometimes exacerbating the very problem they were supposed to address. This is because traditional systems are based on control and are unable to deal with the innate complexity in the design and constructive process (Lathem, 1994). Therefore, embedding trusting relationships to develop between the people involved is highly recommended practice.

According to Leonard and Swap (1999) creativity is a process that can be managed (1999). To stimulate creativity within teams, it is important to have the right level of challenge resources and stimulation within a supportive culture (Ambile, 1999, Leaonard and Swap, 1999). Leonard and Swap (1999) consider the range from day to day process until the breakthrough of idea as being part of the creative process. They believe that this creative process can be actively managed and learned by groups in a suitable and safe environment. Whilst Ambile (1998) classifies creativity

into three parts: expertise, the ability to think creatively and motivation. Ambile (1998) believes that extrinsic motivation can kill creativity whilst the intrinsic motivation can promote it. Ambile (1998) calls intrinsic motivation the principle of creativity where people are most creative when they are motivated by the interest, satisfaction and challenge of the work itself and not by external factor.

The focus of this research is to use VDS to promote complex skills including creativity and to examine the use of VDS to promote creativity in the UAE setting; therefore a general understanding of creativity and how it could be facilitated is essential.

Creativity requires risk-taking and the way the risk is managed is important to the level of creativity achieved. To foster creativity the structure of the system needs to accept uncertainty and establish practices and procedures that minimize the negative symptom that can occur as a result. The structure thereby reinforces trust and mutual support through a culture free of blame (Capra, 2003). The structure supports challenging the status quo and encouraging creativity by creating a "learning culture in which continual questioning is encouraged and innovation is rewarded" (Capra, 2003).

Reviewing the necessary skills for a the challenging future and industrial needs to achieve desired results and satisfactory skilled generation implies that implementing skills such as creativity would enable achieving best results.

In traditional systems, relationships are rule-bound, authority based and closed. These relationships create a master-servant relationship culture, where the servant to the client becomes the master to the supply chain forming a hierarchical pyramid (Ross, 1999).

Blockley and Godfrey (2000) state that the AEC industry in developed Western countries is aware of the need to change which has led these industries to invest significant research, time and money to develop new ways of working. From these investigations, a persuasive argument has arisen. It has led to the realisation that the traditional system is unable to effectively deliver in an increasingly complex environment. What has been revealed is a collaborative system that nurtures trust and mutual respect that is the key to delivering a shared purpose, such as value-driven, innovative and sustainable architecture. While the principle source of information has come from UK experiences, as they are leading this research, work has been done in other European countries and in the USA. The focus here is to concentrate these findings towards the particular issues pertaining to a rapidly evolving community such as the UAE and how this could be tackled in educational environment.

3. The Need for Collaboration

Two major reports at the end of the last decade have had a major influence on the workings of the AEC industry. In 1994, a committee chaired by Sir Michael Lathem produced a joint UK government-industry report that was commissioned by the construction industry council (CIC). Entitled 'Constructing the Team' it identifies and sets the stage for many of the resultant changes over the last decade. As the title of the report suggests, it recommends that the way forward is by improving the relationships between the parties through effective teamwork (Kumaraswamy and Mathews, 2000), and highlights the consequences of a fragmented and adversarial culture.

Four years later, the Egan Report '*Rethinking Construction'* was published recommending a commitment to continuous improvement of the construction process with the whole supply chain involved. Since its publication the profile of the construction agenda has been raised sharply, UK Government and Assembly policies have increased the need for public sector clients to fully implement the principles of 'Rethinking Construction' which are now firmly established and recognized as best practice. The report cited that, according to a British Property Federation survey, carried out in 1997 that one third of major clients are dissatisfied with their consultants' performance in teamwork.

The Egan report concludes that there is a need for a change of style, culture and process within the AEC industry and it identified five driving forces for change: committed leadership, a focus on the customer, integrated processes and teams, a quality driven agenda and a commitment to people.

The report recognizes that the achievement of these driving forces is linked to training and education. Education must not only teach the necessary technical skills and knowledge, but also the culture of teamwork. The report mentioned that the high level of professional competence in design education needs to be associated with a more practical understanding of the needs of clients and the industry in general.

Nicol and Pilling (2000) have summarized the change in the construction industry under three headings: the public image of architecture and architects, the architectural profession and its education, and the rapid growth in knowledge. In response to the Egan report the RIBA produced a policy document highlighting the issues of concern for architects as they strive to cope with the changing industry. Issues such as: lean thinking, teamwork, partnering, procurement and quality management were emphasized.

To achieve collaboration and team work in projects Blockley and Godfrey (2000) recommend system thinking, as it helps identify the variables and provide a holistic understanding of the context and thereby the process. It

also assists perceiving how the whole and the part work together. "Co-operation through teamwork, is the root of our systems thinking approach" (Blocklery & Godfrey, 2000 p.63) Co-operation and collaboration are the guiding principles that underline and structure in a healthy human system, and mimic a system in nature. This differs markedly from the mechanistic model which relies on rules to dominate and control (Copra, 2003). Healthy corporations and organizations are living systems like human systems and as such should be able to adapt, learn and evolve whilst maintaining their integrity (Copra, 2003; Holt, Love, and Heng, 2000; Walker and Lloyed-Walker, 1999). This is the hallmark of an innovative organization (Steele & Murray, 2004), and therefore, according to Holt et al. (2000), and Walker and Lloyd-Walker (1999) represent a learning organization.

To achieve effective collaboration in the AEC industry; a shift in the prevalent culture of the industry is required. Training and education, research and development are ways of helping make this change (Lathem, 1994). Many HE institutes are undergoing fundamental changes in order to meet the demands of today's job market and could enable newer institutions to steal a march on their longer established counterparts by implementing change more rapidly and more effectively.

4. Virtual Design Studio

In most western architectural schools, the use of IT is aimed at replicating the traditional role of computers in practice: to produce CAD visualisations and to digitally record and share drawings and documents. Andia (2002) conducted a survey on the effects of computers on architectural practice and education in the United States, Europe and Japan, through the past three decades. Andia identified five trends of discourse developed in the architectural academic community; design methods, CAD visualisation, paperless architecture, information architecture, and virtual design studio (VDS). VDS, the fifth and fashionable trend, according to Andia, explores the potential of communication in the digital era, and opens a window on an extraordinary cultural exchange in the traditionally protected environments in design studios. It is a computer-supported architectural studio where team members can be remotely distributed across space and time (Maher, 1999, Maher, Simoff, & Cicognani, 2000). Thus, students and staff can interact and exchange information using their desktop computers, making the traditional physical studio irrelevant. Hence, a precise definition of the VDS can be that it is a networked design studio that is assumed to enhance the performance of the architecture students in their learning of design subjects, where the use of computer mediated tools such as synchronous and

asynchronous techniques and 3D and visualisation techniques are combined with learning theories to reach effective learning.
Typical applications of VDS are transmission of lectures and exercises, enabling communication between students and tutors, experimentation with and examination of models in distant laboratories, collaborative work on design problems, and remote project assessment and critique (Kolarevic et al, 2000; Wojtowiczi, 1995),

Maher and Merrick (2005) stated that design projects involve contribution of a large number of participants and thus require synchronous and asynchronous modes of communication. She adds that for the VDS to be effective and useful it should integrate several communication tools. Others also stated that with the increase in CAD usage in design offices, there has been an increase in the interest in collaboration using the electronic medium (Wojtowicz, 1995; Maher et al., 1996). As a result it can be concluded that the effective VDS should contain the following media: text, image, CAD, communication tools such as video conferencing, email, and chat. In addition, for the VDS to be educationally successful, it should employ the following techniques: hands-on experience, reflective practice, collaborative learning, real world simulation, project-based and problem-based learning.

The essence of the above views indicates that the VDS is an IT tool that can be used to implement the necessary skills required for the future market in architecture education, Figure 1. The current work will investigate the best practice of using VDS in relation to design courses in the UAE and further to establish a model for effective architecture education.

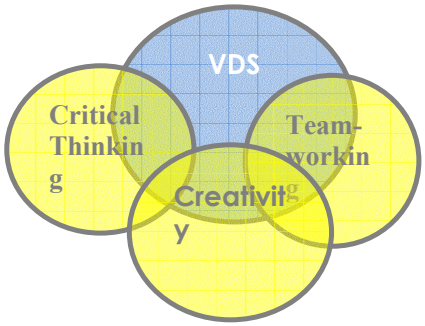

Figure 1. VDS Promotes Complex Skills

5. Proposed Educational VDS Model Based on the Best Practice

From the obtained definition of VDS the author has created a database with a view to identifying the international best practice of VDS for two purposes: firstly identifying the tools that may be useful for effective learning, and secondly to be used as a basis for a short course. The database acted as a repository where existing practice can be entered, queried and analyzed to find the practice(s) that most completely fulfilled criteria for best practice. The practice(s) that met the criteria specified by the author considered the best practice. Based on the literature review of the need of the VDS for the UAE settings, the author specified a score for each element of the VDS in which the important elements in terms of pedagogical or technological nature were given the highest scores. A conceptual framework for the proposed VDS was then proposed.

Following a comprehensive literature review, the author identified the common components characterized by a VDS and accordingly a database form was created using Microsoft Access, Figure 2. The database was created to extract the existence of the use of technology on the idea of relating the VDS tools to the features of the constructivist and cognitive learning theory.

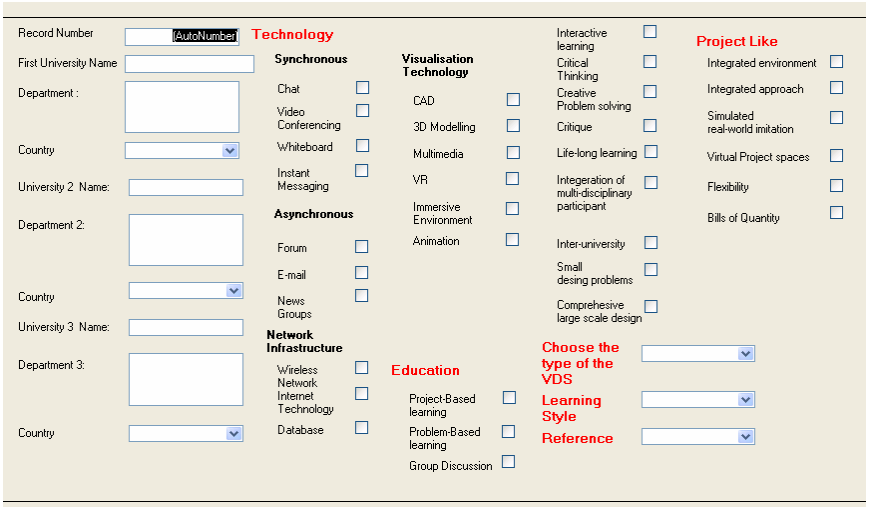

Figure 2. Database Form for Identifying International Best Practiced VDS

The purpose of the above database is to store and classify the existing practiced VDS. As illustrated above, data about the VDS, the name of the university in which the VDS is practiced and the main elements of that VDS such as the use of 3D or virtual reality are being held in a database and queried accordingly. The VDS elements have been classified according to its technological specifications and educational and pedagogical features. The educational features include elements such as problem based learning, project based learning and multi-disciplinary nature of the VDS. The technological specifications on the other hand include things like: 3 dimensional, virtual reality and real life projects.

The data for the above VDS was gathered through a thorough review of the literature and email enquiries. The data gathered included two hundred universities from all around the world amount of universities all around only 15 of which proved an attempt to use a VDS that meets the authors' criteria. The data where then shuffled according to the specified criteria. Table 1 shows the top ten universities with the best practiced VDS.

TABLE 1. Universities with Best Practiced VDS

No.	Name of University	Country
1	University of Sydney	Australia
2	University of Strathclyde	United Kingdom
3	University of Oregon	USA
4	Hong Kong University	China
5	University of British Colombia	Canada
6	Cornell University	USA
7	Massachusetts Institute of Technology	USA
8	Bauhaus-Universitat Weimar	Germany
9	University of Washington	USA
10	National University of Singapore	Singapore

As the best practice was mainly used to identified the international best practiced VDS to use it as a guide for the UAE education proposed model for this research; the educational specifications were given higher attention
Maher and Simoff (2000) have classified the VDS using two metaphors; Desktop metaphor and Place metaphor. The desktop metaphor refers to the use of collaborative tools as if they were lying on a working desk of a physical office. On the desktop, and nearby, a designer finds tools for drawing (e.g. pencils, rulers), communicating (e.g. telephone), archiving (e.g. folders, filing cabinets), organising (e.g. diary), finding information (e.g. catalogues, archives), and so on. In general, he/she has access to all the office resources necessary to perform the design task. On the electronic desktop – which is based on a metaphor of the physical one - all the functions are present on the same interface, in this case, visible on the

computer screen. This approach is the most common and is presented as the "toolkit approach" in Lin and Protzen (1997). When adopting the place metaphor, preparing a virtual design studio is much like designing a physical studio (Maher et al., 2000). The studio is set up to facilitate and support collaborative design activities. A virtual design studio differs from the physical design studio in a significant way: where a virtual studio can automatically react to people's use and presence, a physical studio is passive and is changed only when people physically change it. As the international best practice investigation resulted in the choice of two models, Maher's model was chosen to be used for this study, Figure 3.

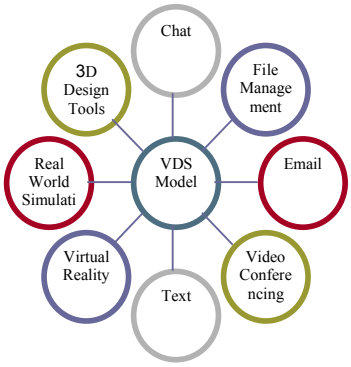

Figure 3. Educational VDS Model

6. Applicability to the United Arab Emirates (UAE)

The UAE is the second largest in terms of economies in the Gulf region after Saudi Arabia, and it is one of the most thriving countries in the Middle East. In the year 2000 the UAE GDP increased to over 60 billion dollars with a real growth of 4.4% high by international standard. The UAE is recording its fastest growth in the last decade, its economy increased by 17% with the nonoil sectors accounting for 66% of the GDP (UAE yearbook, 2006). Like other gulf countries the UAE relies heavily on the oil as the main source of income. The main theme of the UAE economic development is the diversification of economy. Some projects like tourism and trade zones have been given a great attention. Other innovative projects such as Dubai internet city and Dubai media city have been initiated.

The UAE encountered a rapid growth in the construction industry due to the country's spending on the physical infrastructure and the desire to compete in the international standard. This growth required great

dependency on expatriate workforce and a challenge to prepare a national workforce that is as skilled and knowledgeable as the expatriates' counterpart.

The political directive in the UAE ensure education for all and the national vision of the UAE is to prepare a generation that is equipped with knowledge and complex skills to cope with the current and future market challenges and demands and technological changes. In 1997 the UAE formally launched the country's government strategy for the years ahead. Covering 21 individual topics among which is the improvement of the civil service, based on competence, effective Emiratisation and leadership training.

The former president and the founder of the UAE HH, Shaikh Zayed bin Sultan Al-Nahyan emphasized the importance of education and the importance of the skilled manpower stressing that "Man is the real wealth of the UAE ". As a result, the higher educational institutes in the UAE were allocated a large budget and new plans and visions were in place.

Due to the lack of skills and expertise among the UAE nationals, dependency was on the expatriate workforce to participate in the country's development which in turn caused a huge increase in the expatriate level in the UAE as the nationals count to 20% of the population. The exposure to multiculturalism caused the UAE society to be tolerant to change and to new traditions and customs with keeping their own identity.

The UAE has a technological friendly environment. In the year 2004 the UAE was ranked as one of the most advanced country in internet use with a number of 1.25 million internet user, 31% of the population (UAE yearbook, 2006)

On the governmental level, the UAE has launched the e-government project making it one of the first countries to start such projects not only among the Arab countries but also on the international level. The United Nation gave the Emirates and e-government index of 2.17, ranking number one among the Arab states and number 21 in the world. Other projects such as Dubai internet city reflect the countries high interest in the technology (United Arab Emirates country study, 2004).

The above analysis indicates that the UAE society is a society that is tolerant and acceptable of change, and the integration of innovations and ideas seem to be going well in the country. This indicates the willingness of the UAE higher educational institutes to facilitate and make use of the VDS effectively.

Another recent study conducted by one of the authors in the UAEU to investigate the students preferred learning method and compare it to the used teaching method in the architecture school (Al-Ali, 2007), the study showed that there is a gap between the teaching method used by the teachers which could be described as traditional and the preferred learning style by

the student who are eager for change and the use of visual aids in teaching. The student in the UAE university confirm that they can understand better when visual aids being used in lectures they also showed a great interest in the use of technologies and 3D in teaching and in lifestyle in general as they shown great interest in games and gadgets in their personal life.

7. Conclusion

The current advances in technology combined with today's requirements of the modern economy created a huge demand for a workforce equipped with team work, problem solving and metacognitive skills. To respond to these demands, higher education institutes need to devise teaching approaches based on the intermarriage of technology and learning theory. A preliminary study conducted by the author in the architecture department of the United Arab University indicated the need for revising the methods employed in using technology for teaching design courses. The author also identified the best practices of using the VDS based on learning theories to achieve effective learning. The current author argues that using the VDS in conjunction with the constructivist and cognitive approaches to learning would lead to effective learning. However, implementing such a model requires a functional design method. The purpose of the proposed research is to develop such a method taking into consideration several factors such as cultural aspects, learners diversity such as self-regulated learning and attitudes towards technology, cost and time efficiency and risk analysis.

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