

A MODEL FOR INTEGRATING NEW TECHNOLOGIES INTO PRE-SERVICE TEACHER TRAINING PROGRAMS AJMAN UNIVERSITY (A CASE STUDY)

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ABSTRACT

This study introduces a “Technology Integration Model” for a learning environment utilizing constructivist learning principles and integrating new technologies namely computers and the Internet into pre-service teacher training programs. The technology integrated programs and learning environments may assist learners to gain experiences using technologies for purposes like constructing new knowledge and working collaboratively as these technologies provide learners with opportunities for learning characterized by flexibility, discovery and reflection as well as knowledge construction.

Exposing these teachers to such technologies give them a chance to gain technology related skills and knowledge (S&K) for their future careers like dealing with the Internet and desktop publishing. Implementing of one of constructivist strategies namely collaboration in this environment would be beneficial for both faculty and learners as it shifts the whole teaching/learning process from teacher-centered in which the teacher is information transmitter and the learner is a passive recipient to learner-centered in which she/he becomes the main player and an active participant in the process.

Keywords: technology integration model, Internet tools implementation in the learning process, learning with technology, online learning.

INTRODUCTION

Educational technology is an evolving discipline which is strongly affected by the advancement and development of technology. This discipline was remarkably influenced by thoughts of the members of The Association for Educational Communications and Technology (AECT) which played a vital role in the field since the sixties. This organization provided a definition to the field of instructional technology. Ely (1968), one of its members described educational technology as a branch of educational theory and practice concerned "primarily with the design and use of message which controls the learning process." He also provided a description to Educational Technology as "a field involved in the facilitation of human learning through the systematic identification, development, organization, and utilization of a full range of learning resources, and through the management of these processes (1972).

It is agreed among educational technologists i.e. Romiszowski, 1997; Sharon, 1995; Spencer, 1991; Seigel and Davis, 1986, that the development of the tools of instruction was remarkably traced back to the early 1990s, the period of the audiovisual movement. In that time, the concern was according to Spencer (1991), on the effects of devices and procedures as a remedy to the extreme verbalism of traditional methods of teaching. Davis (1986) talked about the three waves of the technology and the related know-how as follows;

- The first wave was associated with the new technology itself in designing and programming of computers and applications. This is related to the science of computing and programming (teaching about technology).
- The second wave was associated with the advent of the cheap microcomputer and its use by a much greater number of people. (teaching through computers) .
- The third wave is characterised by the access of all sectors of social and professional activity to computer systems. (teaching with computers) .

Today, when we say educational technology we are referring largely to a vast array of computer-based technologies such as compact disc-read only memory (CD-ROM), interactive audio, interactive videodisc, local area networks, hypermedia, and telecommunications. The advent of microcomputers in the 1980s and developments in computerized education in the 1990s, concern educationalists today. Questions arose by educationalists like Ellul (1981), Davis (1992) , Bowers (1993) and Turkle (1997). These questions were concentrated on the role that technology will play in the educational field. This probed questions like; should we teach about technology, through technology or with technology?

Nowadays technologies of communication and delivery systems have changed the way education can be delivered. Satellite television, the Internet, for example, have transformed the means of how education can be conducted while the World Wide Web evolved from developments of computer networking becomes the main source of information and communication.

THE PROBLEM

First of all it is worth mentioning that according to my experience, teachers are not well trained to use technology in the teaching/learning process during their pre-service study programs. Solving this problem requires the treatment of all involved components of such programs which are student teachers themselves, their faculty and curriculum programs. Dealing with these components and finding solutions to the overall issue in a short paper like this is hard to reach. So, this paper is an effort to partially solve the problem as it only deals with one part of the problem which is infusing technology in the teacher preparation programs.

The remarkable effect that rapid technological development has had on our society is evident in virtually every aspect of our daily life. Thus progress in new technologies (including computers and the Internet), has changed the way we live, the way we do business, the way we communicate with each other and the way we teach and learn. This made it important for our educational establishments i.e. colleges and universities to prepare their graduates to use technology effectively in their future careers.

Specifically, teachers in these establishments need to be able to use new technologies in the teaching/learning process in order to help their pupils acquire the (S&K) relevant to and presented by these technologies. According to my experience, as a school teacher for eight years and a university lecturer for six years, most educational establishments in the Arab world and especially in the United Arab Emirates are properly equipped with new technologies (computers, digital cameras, printers, scanners, etc.) and Internet connection. In spite of the availability of such infrastructure, the level of teachers' (benefit of) being able to access and use them appropriately and skillfully is quite limited. This view is agreed by researchers participated in the first annual conference of Information Technology Special Interest Group (ITSIG) held in March 2003 at Sharjah University in the UAE. These researchers (and I was among them) expressed their concern regarding the lack of Information Communication Technologies (ICT) S&K teacher trainees acquire during their college study. All speakers agreed that schools must prepare students for the technology- rich jobs in the 21st century. This agreement harmonizes other educators i.e. Clifford & Friesen, 2001; Jacobsen, 2001, calls for a shift in teacher education who must routinely encounter the effective infusion of technology in the normal course of their learning at the university and in their practicum placements in schools.

So, student teachers need to be technologically literate in order to excel in future jobs and should learn how to integrate technology for effective and efficient teaching/learning process (how to teach with technology). This might enable them to use technology to expand their instructional repertoire, and thus enhance students' learning. Both technology literacy and learning enhancement would be difficult to reach if teachers' roles remain as knowledge transmitters and students' roles continued to be knowledge absorption in colleges of education. So, their should be a shift in the teaching/learning process and a role change of both teachers and students in these colleges.

This study proposes a model that could shift teachers involved in pre-service teacher training programs from the dominant didactic mode i.e. teacher centered teaching to a more student-centered one. The importance of the proposed model of this study lies on offering instructors involved in teacher preparation programs an approach of teaching/learning process that shifts them from the dominant didactic model i.e. teacher centered teaching to a more student-centered one. This model depends heavily on working collaboratively using internet tools i.e. e-mail and e-group discussion as an enhancement and supplement of collaboration occurs in classroom. This learning strategy of the model is elicited from constructivism principles in order to achieve meaningful learning through the construction of new knowledge (Jonassen, et al 1991). So, when implemented, the model could help inexperienced teachers acquire proper related S&K to be implemented in their future careers, as teachers of tomorrow's classrooms. The possibilities and effectiveness of such environment are explained through reviewing related literature and research findings in order to construct an understanding of the impact of these technologies on learning among pre-service teachers' educators.

Finally, the learning environment in which this model is implemented may open the doors in front of the learners for global education (Mason, 1998; Mills, 1999) through gaining proper ICT S&K which can enable them to communicate with their peers all over the world. This is of great importance for these learners to deal with global perspective on issues related to their specializations. In addition, this environment could overcome some cultural barriers in universities like AUSTN where gender separation is a common practice.

THE THEORY BEHIND THE PROPOSED MODEL

Constructivism as a learning theory, argues that learning is constructed as an active process in which learners construct their new ideas or concepts based on their current or past knowledge in a meaningful learning environment. The key to learning, in a constructivist framework, is for the learner to find multiple ways to link new information to previous experience "learners actively construct and reconstruct knowledge out of their experiences in the world" (Kafai and Resnik, 1996). Such thoughts contradict the practices of most instructors of teacher preparation programs in which the didactic expository teaching is the dominant method where the teacher is the information giver and the learner is a passive recipient. Such method is criticized by many educators especially constructivists (Oldfather, Bonds, and Bray, 1994; Cannella & Reiff, 1994; Richardson, 1997). In this didactic, memory-oriented transmission method the teacher fills students with deposits of information considered by the teacher to be true knowledge, and the students store these deposits, intact, until needed i.e. exams. According to Richardson (1997), when information is acquired through transmission methods, it is not always well integrated with prior knowledge and is often accessed and articulated only for formal academic occasions such as exams. According to Jonassen (1991), constructivism "proposes that learning environments should support multiple perspectives or interpretations of reality, knowledge construction, context-rich and experience-based activities". So constructivism focuses on knowledge construction, not on knowledge reproduction. Jonassen (1994) summarises the differences between constructivist learning environments and traditional instruction as follows: constructivist learning environments are (a) multi-dimensional, and provide multiple representations of reality, thereby avoiding over-simplification; (b) encourage learner construction of knowledge rather than rote memorization; (c) emphasize meaningful, authentic, contextualized tasks that are anchored in real-world or case-based settings; (d) encourage thoughtful reflection; and (e) emphasize collaboration instead of competition. These characteristics of constructivism learning environment requires active participation among learners with the encouragement, guidance and monitoring of their teacher.

Many educators report that useable knowledge is best gained in learning environments where learners are provided with authentic context that reflect the way this knowledge will be used in real-life, authentic activities, multiple roles and perspectives, coaching and scaffolding at critical times. They also promote reflection to enable abstractions to be formed, and articulation to encourage tacit knowledge to be made explicit, in addition to supporting collaborative construction of knowledge. According to, for example, Brown, Collins and Duguid, 1989; Carver, et al., 1992; Jonassen, Mayes and McAleese, 1993, Cognition and Technology Group (CTG) at Vanderbilt, 1990, Brooks and Brooks, 1994, the provision of a practical context, combined with authentic tasks and activities, can provide a learning environment that demands higher order thinking and problem-solving to achieve a satisfactory outcome. These educators discussed models of learning in their writings which promote philosophy of constructivism. Examples of such models are; 'Reception learning' model advocated by David Ausubel in 1968 (in Ausubel, Novak and Hanesian, H;1978). This model suggests that it is the job of the teacher to structure learning, to select appropriate materials for students, and to present them in a well-organized fashion. "Scaffolding" was conceptualized by Vygotsky. According to Vygotsky, "higher mental functions" such as the ability to focus attention or memory, or to think in terms of symbols is unique to humans and is passed down by teaching. The development of these functions in this model is tied to social context and culture. In Scaffolding, the teacher guides instruction so that students will internalize these higher functions. Then once these functions are acquired, the student will have the tools necessary for self-guided learning.

According to the North Central Regional Educational Laboratory (NCREL), authentic instruction, developed by Fred Newmann (1993) consists of; learning situations that are connected with the context of the learners' world, and is a model for high-quality instruction. Newmann lists five major components of the teaching process. These components which are included in his article 'Crafting Authentic Instruction' are;

- higher-order thinking
- depth of knowledge
- connectedness to the world beyond the classroom
- substantive conversation
- social support for student achievement.

The 5E's Learning Cycle developed by Biological Sciences Curriculum (1993), is another model which promotes the philosophy of Constructivism. The 5E's of this model includes; 1) Engage the learner with an event or question, 2) Explore the concept, skill, or behavior with hands-on experiences, 3) Explain the concept, skill, or behavior, 4) Elaborate on the concept, skill, or behavior by applying it to other situations and 5) Evaluate students' understanding of the concept.

When comparing the components of the above models with the components of the proposed model in this paper (which are; knowledge construction, learner-centered, reflection, discovery, flexibility), one finds that they all sought to achieve “effective learning which is most meaningful and therefore is transferable (Jonassen et al., 1994)”. They also move learners beyond teacher-centeredness mode of teaching and memorization by creating learning experiences that demand sustained, disciplined, and critical thinking on topics that have relevance to life outside classrooms. This form of learning is case-based and involves meaningful real-world tasks. In addition the instruction provides contextually-based environments that are meaningful to the learners.

In spite of the similarities of the mentioned models with the proposed model of this paper, it is worth saying that the latter model depends heavily on the collaboration among learners to achieve meaningful learning. This collaboration could be established; within a class with learners using the computer in groups and online by the use of Internet tools such as;

- e-mail,
- mailing lists,
- list servers,
- electronic bulletin boards,
- newsgroups,
- online electronic chat rooms,
- online seminars
- and desktop video-conferencing.

Using software applications like;

- Word processing,
- spreadsheet,
- presentation programs,
- database,
- desktop publishing

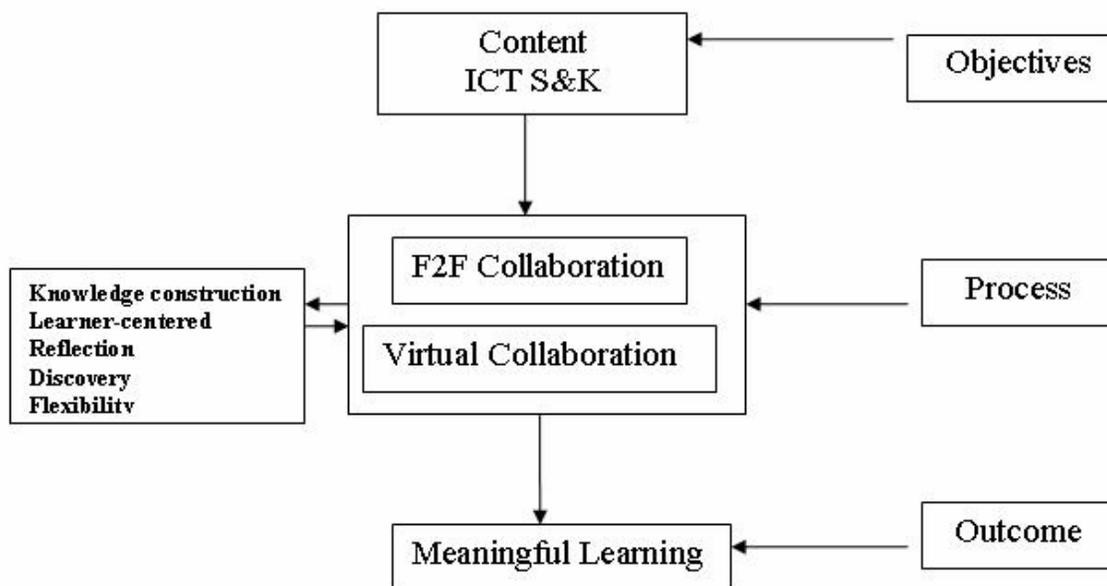
These applications could be used to stimulate students in synthesizing their own learning into projects.

So, in this model a significant amount of learning is moved online making it possible to reduce the amount of time spent in class. In addition, the model attempts to combine the best elements of traditional face-to-face instruction with the best aspects of distance learning. This makes students spend more time working individually and collaboratively on assignments, projects, and activities. And teachers spend less time lecturing and more time reviewing and evaluating student work and guiding and interacting with students.

At the end of a course implementing this model, it is expected that the objectives of that course would be met by learners and ICT S&K would also be gained by learners.

THE MODEL

The model proposed in this paper (Shaqour Model below) is developed on the basis of some principles of constructivism and its collaboration learning strategy. In this model, content related, ICT S&K related objectives are expected to be achieved through students’ collaboration under the monitoring, guidance, facilitation and directions of the instructor. Collaboration sessions of this model are carried out in face-to-face (F2F) and virtually i.e. email and e-groups modes. Meaningful learning offered by this model is reached through several strategies practiced by learners like negotiation, reflection, exchanging ideas... These strategies lead to knowledge construction (Jonassen, 1991) through providing learning environments that encourage critical dialogue and, hence, understanding (Vygotsky, 1978; Cuseo, 1997).



Shaour Model for integrating new technologies into pre-service teachers' programs

It is my feeling that implementing this model in a learning environment looks promising as it could achieve different types of pedagogical goals such as:

- providing knowledge construction
- providing multiple perspectives
- providing authentic tasks and social contexts
- providing space of participation
- encouraging the use of multiple modes of representation

The learning process of the environment becomes active and engages learners in working on tasks and activities that are authentic to their future careers. It focuses on thinking skills rather than working for the exam. In addition, learners work for defining problems and finding out solutions through reflection. And lastly, learning involves social negotiation as learners are able to challenge their thoughts, perceptions and existing knowledge by collaborating with others thus assisting their cognitive development process.

The main characteristics of the learning environment provided by this model could be;

- more learning, understanding, and retention (Brooks and Brooks, 1993)
- more interaction and discussion (Hein, 1993).
- more engagement by learners (Jonasson 1994)
- more ways of learning (Brooks/Brooks 1993):
- more accountability for learners' own learning (Harasim, 1995; Jonasson 1994)
- more active learning and less listening (Harasim, 1995;)
- more meaningful learning. (Jonasson, 1994)
- more use of existing knowledge. (Jonasson, 1994; Hein, 1993)
- more active knowledge construction. (Wilson, B., 1995)
- more revision of multiple perspectives. (Jonasson 1994 ;Cunningham1993)
- more creative and flexible problem solving. (Perkins 1992)

In this integrated model, learners would practice and experience different ICT skills and gain related knowledge. These S&K could be summarized in the following;

- word processing.
- telecommunications.
- accessing web resources.
- desktop publishing.
- Internet applications (email software, browsers, listserv applications)

Dealing with ICT tools like computers and the Internet affects learners' learning in many ways. Email for example, provides learners with clarification of ambiguous issues easily and fast and it gives the time to reflect on issues they are dealing with. The WWW provides learners with different resources in different formats which help in considering learners differences. Listserv enables learners to discuss things freely and openly without the limitations of class boundaries.

The following table describes the function of teaching/learning process components of the environment implementing the proposed model.

Components	Description
Virtual activities	Learner-centered, collaborative, interactive
Teacher Role	Collaborator; guide, facilitator, director, coordinator
Student Role	Collaborator, expert, investigators,
Instruction	Inquiry, negotiation, invention
Knowledge	construction
Technology	Communication, information access, information retrieval, collaboration, expression

CONCLUSION

The advent of new technologies i.e. computers and the Internet paved the road towards quality higher education especially when used in the teaching/learning process. Teaching with these technologies is still in its beginning stages in Arab Educational establishments so, the need for studies dealing with the integration of such technologies in higher education should be a priority for Arab scholars. This paper is an attempt to present a model for integrating new technologies that could assist educators in teacher preparation programs in their teaching/learning process.

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