

The Role of E-learning in Science Education vis-a-vis Teacher Training Institutes in Middle East

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This paper describes the effect of “online science teaching” in teacher education institutes in the UAE (United Arab Emirates). The study was undertaken to understand the mindset and perceptions of educators with respect to online education with a sample comprising of 20 pre-service teachers in the second semester of a one-year post graduate course in education. A quantitative research methodology was adopted to investigate the pre-service teachers’ perceptions of online education. Also, there were interviews conducted and included in the analysis. A major result indicated that participants had a better understanding of course materials through using the online medium. Other results indicated the effectiveness of the online instruction to measure participants’ expectations regarding the course design, role of the facilitator and interactions between the participants themselves and the instructor or facilitator. Supportive interviews indicated key aspects and also comparing the two modes: online and face-to-face.

Keywords: online teaching, face-to-face instruction, pre-service teacher perception, teacher education programs

Introduction

Science teaching is conducted primarily in three types of learning environments: classroom, laboratory and outdoors (Orion, Hofstein, Tamir, & Giddings, 1997). The importance of SCLE (science classroom learning environment) has been recognized by many researchers and teachers during the past two decades. The specific criteria for a science learning environment will depend on many factors, such as the needs of the students and the characteristics of the science program (National Research Council, 1996). Online teaching and learning can also contribute to a good learning science environment and can bring about good science education standards through proper designing and effective utilization of technology.

Importance of Science Education

Science literacy is of prime importance in the development of students. Each and everyone have to develop this literacy level to deal with the changes in the transient world. Science education must be the basis for informed participation in a technological society, a part of a continuing process of education, a preparation for the world of work and a means for students’ personal development (Science Council of Canada, 1984). It is needed to solve various problems along with the ever evolving technology. This scientific literacy will benefit students to deal with the various problems they face in their daily life.

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According to G. Ram Reddy (2007), science has connected to innovation and brought about viable technologies and a beneficial manufacture, leading to a sustainable development in the modern world. It can be conveniently said that science, technology, innovation and manufacture are the pillars of a sustainable development in an industrialized world and plays a major role in the world economy. It has also been observed that education provides the basic foundation for development in science and technology. It has also been observed that science education has been at the core of all developments and has reached greater dimensions in the world.

Online science education can definitely help in increasing science literacy and also enable students to develop advanced computer skills. Online science education can definitely help students in developing a good understanding of scientific concepts through the advantages offered by latest Web designs.

Online Teaching and Learning

In an online environment, the role of the teacher changes from “the sage on the stage” to “guide on the side”. Such new roles for online instructors require training and support. Faculty training and support is a key component of quality online education. Some case studies of faculty development programs indicate that such programs can have positive impact on instructors’ transition from teaching in a face-to-face to an online setting.

Participants’ satisfaction towards the learning environment is a critical factor in online learning (Andreatta, 2003). Participants’ satisfaction with online courses can attract them to register for the courses and ensure that they complete their studies (Halstead & Coudret, 2000). The studies by Blackwell, Roack, and Baker (2002), Hong, Lai, and Holton (2003), Klinger (2003), Motiwalla and Tello (2000), and Young and Norgard (2006) reported that most participants were satisfied with the online courses and learning environments they had gone through. However, Lauren, Jennifer, and Marguerite (2004) in comparing participants’ satisfaction with face-to-face courses and online courses reported that generally participants reported higher satisfaction with face-to-face courses. Gallo (2007) and Strachota (2003) reported that characteristics, such as gender, age and computer skills could influence students’ satisfaction with online courses. On the other hand, there are studies that reported otherwise (Hong, 2002; Hong et al., 2003). Furthermore, Graham, Cagiltay, Lim, Craner, and Duffy (2001), Hiltz, Coppola, Rotter, Turoff, and Benbunan-Fich (2000), Motiwalla and Tello (2000), Sher (2004), and Young and Norgard (2006) also reported that interpersonal interactions and positive feedbacks by instructors impacted positively on participants’ satisfaction with online courses. Andreatta (2003) believed that feedbacks with affective components supported students’ motivation which in turn resulted in higher satisfaction. However, investigations on the relationships between participants’ learning styles and satisfactions with online courses did not yield clear results (Hong, 2002; Klinger, 2003).

Perceptions Towards Online Education

Hong (2002) and Hong, Liau, and Lee (2006) reported that participants tend to perceive flexibility in course structure as strength of online courses, and they found their learning experiences in these courses to be motivated. In fact, they stated that positive attitudes towards learning, self-discipline and high self-motivations were the basis for their success in online courses. According to Krebs (2004), participants of online courses tend to view online learning environment as enabling them to study at their own pace, be actively involved in the learning activities, improve their intrinsic motivation to learn and practice self-study compared to those attending traditional face-to-face classes. They appreciate the flexibility and the structures in online classes where learning can be carried out individually and independently (Pedone, 2003). Generally, the literature

stated that participants of online courses had positive perceptions on the collaborative nature of online learning experiences. They believed that collaborative group activities were interesting and stimulating (Young & Norgard, 2006). Lavooy and Newlin (2003) and Woo and Reeves (2007) further added that the use of unsynchronized communication would yield a more conducive learning environment in the understanding and learning of course materials.

Pedagogy and Technology for Online Education

Several research studies have covered effective pedagogical strategies for online teaching. Partlow and Gibbs (2003), for instance, found from a Delphi study of experts in instructional technology and Constructivism that online courses designed from Constructivist principles should be relevant, interactive, project-based and collaborative, while providing learners with some choice or control over their learning. Additionally, Keeton (2004) investigated effective online instructional practices based on a framework of effective teaching practices in face-to-face instruction in higher education. In this study, Keeton (2004) interviewed faculty in post-secondary institutions and rated the effectiveness of online instructional strategies. These instructors gave higher ratings to online instructional strategies that “create an environment that supports and encourages inquiry”, “broaden the learner’s experience of the subject matter” and “elicit active and critical reflection by learners on their growing experience base”.

Technology has played and continues to play an important role in the development and expansion of online education. Accordingly, many universities have reported an increase in the use of online tools. Over the past decade, countless efforts have sought to integrate emerging Internet technologies into the teaching and learning process in higher education. Several studies have reported cases related to the use of blogs to promote student collaboration and reflection.

Inquiry Based Online Learning

Science is the systematic study of the structure and behavior of the physical and natural world through observation and experiment. Science is investigative, and an emphasis on inquiry must be modeled in the classroom, just as it is practiced in the research laboratory. The NSES (National Science Education Standards) were developed by the National Research Council to “promote a scientifically literate citizenry”. The standards frequently encourage the use of inquiry in the science classroom, defining it as a multifaceted activity that involves: making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze and interpret data; proposing answers, explanations and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations (NSES, 1996).

The project of the LAMS (Learning Activity Management System) at the University of Sheffield assessed the effectiveness and impact of design in relation to acceptability to: practitioners; learner outcomes; effectiveness for the organization; and capacity-building across the organization. While practitioners indicated that the aim to foster learner independence and autonomy was fundamental to their pedagogy, they envisaged a range of different approaches to providing guidance and scaffolding for students. Some of these could be characterized as more strongly teacher-led approaches and others more strongly student-led.

Online Education in the United Arab Emirates

Institutions of higher education in UAE have increasingly embraced online education, and the number of

students enrolled in distance programs is rapidly rising in colleges and universities throughout the UAE. In response to these changes in enrolment demands, many states, institutions and organizations have been working on strategic plans to implement online education. At the same time, misconceptions and myths related to the difficulty of teaching and learning online, technologies available to support online instruction, the support and compensation needed for high-quality instructors, and the needs of online students create challenges for such vision statements and planning documents. In part, this confusion swells as higher education explores dozens of e-learning technologies, such as electronic books, simulations, text messaging, podcasting, wikis and blogs, with new ones seeming to emerge each week. Navigating online education requires an understanding of the current state and the future direction of online teaching and learning. Only recently that the Ministry of Higher Education and Scientific Research in the UAE has allowed graduate programs to include online medium as instruction of portion of accredited programs. In our study, just published, Forawi, Almekhlafi, and Al-Mekhlafy (2012) used an exit e-portfolio, a questionnaire and follow up interviews to describe development and evaluation of e-portfolios with teacher education graduates in their final capstone experience at a major UAE national university. One of the major results found that the use of e-portfolio, as an online medium, is considered as a pragmatic tool to assess pre-service teachers' performance in their study and evaluate the teacher education program.

The Importance of Revamping Teacher Preparation Programs in the UAE

At the beginning of the 1990s, John Goodland, the head of the National Network for Educational Renewal, commented that teacher education had been an unstudied problem for three decades. His network now engages two dozen institutions in restructuring teacher education. The Holmes partnership, a consortium of research-based institutions, has proposed reforms of teacher preparation and emphasized links between universities and schools by using public schools as professional practice sites.

Accreditation by the NCATE (National Council for the Accreditation of Teacher Education) is one link in the continuum to bring about standards-based reform of the teaching profession at US colleges and universities. In 1995, the NCATE called for various approaches to create new rigorous standards: a coherent program of studies for each student rather than the typical hodgepodge; a firm foundation in the liberal arts and teaching disciplines; programs that prepare teachers for the higher content standards set for students; programs that prepare teachers for classroom diversity and new technologies; and the use of performance-based standards rather than "seat time" in classes to determine the readiness of candidates to teach. Similar efforts are necessary for the teacher education program in UAE.

Teacher education program has always had problems regarding their standards to be maintained in UAE. A lot of efforts are being taken by the Ministry of Education to upgrade their system. They have brought in a lot of changes by bringing in experts for revamping the teacher preparation programme.

Online teacher education programme is also speculated upon, but a proper agenda regarding it needs to be developed. The Ministry of Education has to give accreditation for every program. The proposals have been put up, but it may take some time to materialize. Online education in teacher education institutes of UAE is at a very preliminary stage. A lot of developments are there on the way, but online mode of training is still a long way to go. A mind-set is required to accept and accommodate this change.

A study was undertaken to understand the mind-set and perceptions of the educators involved with respect to online education comprising of 20 pre-service teachers in the second semester of a one year postgraduate

course in education. They were interviewed on a schedule of eight questions and their answers were jotted down in a log book for further referencing. The interview questions pertained to study the participants understanding about what an online course entails and how it can benefit them. It was also to measure their expectations regarding the course design, role of the facilitator and interactions between the participants themselves and with the facilitator, and comparing the two modes: face-to-face and online. The data was compiled and a general analysis was done based on their answers.

The interview schedule had the following eight questions:

- (1) What do you understand from online learning?
- (2) How will online learning benefit you in the long run?
- (3) Do you think that online learning will benefit you more than face-to-face learning? If yes, then in what ways?
- (4) What do you think about starting of an online teacher training program in the university?
- (5) Do you have any doubts regarding the design of the online course and its implementation? If yes, what are they?
- (6) How do you compare an online teacher training course and a face-to-face teacher training course?
- (7) How do you envision yourself as a participant in an online teacher training course?
- (8) Would you like to teach your students online?

Findings

Perceptions of Pre-service Teachers About Online Learning

The participants perceived that an online course will benefit them to a large extent. It can give them an opportunity to learn at their own pace and help them build up their self-confidence. It can give them a lot of exposure and help them develop insights. They also felt that there should be some kind of mental discipline to succeed in the course and overcome their difficulties. An important aspect they perceived is that the course can really test self-discipline, because there can be a lot of distractions and the concentration of the participant may get affected as the facilitator is not presented face-to-face. They also felt that the course can help them with their ICT (information and computer technology) skills.

There were also many apprehensions about the course being in online mode, such as availability of proper server facilities, need of basic ICT skills and coping with virtual presence of facilitator and peers to follow the course effectively.

They were also worried about the designs, materials and course activities amongst the participants as well as the role that would be played by the facilitator. They felt that the face-to-face and online learning both have their advantages and disadvantages. They were of the opinion that the design of the science courses should be based on constructivist approach. They provided a positive feedback on the implementation of an online course though they were slightly apprehensive regarding the learning environment. They wanted to be trained before handling an online environment for their students but were not sure about how practical aspects can be handled in such situation. Since they have not participated in any online course earlier, they could just envision the advantages and disadvantages of online learning.

The interviews suggested that the participants in general believed that the facilitator should be very effective in facilitating the course activities. Few participants believed that they should assist them in critical thinking skills and should provide opportunities for increased interaction.

Reflection

The study conducted on the students of the teacher training institute was very interesting and helped the author reflect on the needs of the students in UAE. They were very open and forthright about their views regarding the implementation of an online teacher training course. They expressed their apprehensions as well as acceptance of such a training course. But, they were overall very positive about such a course being introduced. They were very sure that such a course would be convenient course, as they can learn on their own schedule and can even pursue a job. They felt that they can pace their workload without getting overwhelmed.

They can concentrate more on the topics and materials that they find it difficult to grasp. They were also curious to know about the fee structure of this course. The courses are very expensive there and they were keen to know the affordability of such courses. It was a general consensus amongst the participants that the course might be very interactive and will benefit them in developing their interactive skills.

To sum up, the online science education courses using social constructivist approach ought to be given serious attention, at the same time the pedagogical considerations in designing and implementing online courses need to be considered seriously to minimize problems that participants might encounter. In retrospect, an implementation of an online teacher training will work very favorably in context to the cultural, historical and geographical background of UAE. It would reinforce emancipation and develop a generation of well trained teachers, as it would lead to an easier accessibility to being trained.

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