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Effect of E-learning on Faculty and Students: A Literature Review

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Abstract

The goal of this literature review is to examine the over-arching principles that affect the acceptance of e-learning by faculty and students, particularly in the area of the Medical Radiography education. This is achieved by first defining terms for web-based education including an overview of the uses and terminology frequently used to describe e-learning, followed by a discussion on the potential of e-learning across a broad subject field that includes Medical Radiography. The review then shifts towards the facilitators and barriers to web-based education from the perspective of both faculty and students. Few studies have been conducted specifically related to e-learning in Medical Radiography and therefore the scope of the literature has been expanded to the adoption of e-learning in health sciences education.

Keywords

e-learning, student motivation, instructional design, faculty roles

Introduction

Resources for effective learning have moved from print based teaching packages to web-based tools. This technological shift has impacted upon how students engage with education institutions and the role of educators in the learning process. Web-based technologies have and are transforming curriculum designs.

McKenzie (1998) predicted that technology would transform teaching approaches independent of whether the students and faculty are ready for the forthcoming and inevitable changes. According to McKenzie, when technologies begin taking charge, the faculty and students may resort to embracing or dismissing e-learning. This implies that teachers and students would choose either to utilize the new technologies or ignore them, but there are far reaching implications of ignoring them such as risking student disadvantage compared to the peers who embrace e-learning and technological literacy. Education systems as well as institutions may also be re-shaped by the new technologies for learning and offer teachers new options for delivery of knowledge (Ballard, 2000). They create a new challenge to institution administrators for ways of designing systems of education. This critical review seeks to explore the existing literature concerning implementation of web-based learning and teaching programs as a pre-cursor to evaluation of a newly created set of online courses in medical radiography. The findings of the review are presented in the following sections: defining the terms for web-based education; the potential of eLearning; facilitators and barriers to Web-based education.

Method

Initially, the CINAHL and Academic Search Complete online databases were searched for information pertaining to web based learning and teaching specific to Medical Radiography and Medical Imaging education with an unrestricted time period. Very few papers were found that related to medical imaging technology education programs. A second search of the same databases and unrestricted timeframe was performed with a focus on health sciences. This resulted in over 700 articles being found of which 157 directly concerned implementation of web-based programs in various health related disciplines. A second search of Sage Publications with an unrestricted time period was

performed to gather more information on the implementation of e-learning on faculty and students.

The specific search terms used during these searches included web based learning, e-learning and medical radiography, medical imaging, and online learning. Several search terms were used as authors use different terms to describe web based learning.

Findings

1. Defining the terms for web-based education

The emergence of new education formats and learning terminologies such as “distance learning”, “open education” and “Virtual learning”, not to forget “e-learning”, has resulted in them becoming pivotal to the day to day educator’s language and focus. Technological innovations and the adoption of e-learning platforms in the educational sector have prompted educators to learn how to utilize the new technologies (Urda & Weggen, 2000). There is an ever present restructuring of delivery options and creative innovation apparent in today’s education sector. Even so, there are various overlaps in the way these terms are understood. According to Urda and Weggen (2000), on-line learning is just one component of e-learning. They define e-learning as a process that is mediated by the internet yet blended to include classroom contexts. They specify that e-learning entails a wide range of processes and applications, which include digital collaborations and the virtual classroom.

Following the introduction of the internet, US Military inventions gave rise to a design that facilitated the sharing of information and internal resources. Additionally, the introduction of the internet paved the way for the introduction of CERN, the European Organization for Nuclear Research, where the first search engine was developed. Since then,

e-commerce, e-business, e-voting, e-government and e-learning have become common applications (Hauben, 2002). Compare this to blended learning, which Sims, Burke, Metcalf and Salas (2008) define as a course that integrates formal learning such as lectures and other information based resources, informal learning opportunities such as interactive activities, learning forums, and work experience and simulation. However, the application of these technologies is subject to cultural, as well as geographical context. How are web based technologies mainstreamed in the cultural-education context? How effective do these web-based technologies function? Educators are grappling to understand what underlies complex, human diversity with respect to web-based technologies of learning (Carry & Willis, 2001).

In order to effectively understand the effect of e-learning on the faculty and students, understanding the terminologies are particularly crucial. Intriguingly terms are still undergoing definition and re-definition. For instance, “e-learning”, has attracted varying definitions (Carry & Willis, 2001). Carry and Willis (2001), define e-learning processes as whichever forms of learning that applies a technological network or computerized technology for knowledge delivery, knowledge facilitation and knowledge interaction. This aligns with the definition given by Urdan and Weggan (2000). Becker (1991) suggests that e-learning entails a wide range of processes and applications, listing virtual classroom and web-based learning as constituents of e-learning. Hall and Snider (2000), refer to e-learning as processing learning through the computers over intranets, as well as internet. Their article sums up the previous points, opening up and defining e-learning as “the process of acquiring and using information which is distributed and received by means of computerized technology” (2000). It includes Computer Aided Learning (CAL) software, chat rooms, discussion forums, communication programs such as Skype, online assessment tools, real time video lecture delivery and recording.

2. The potential of eLearning

According to Spender (2001), there are various cogent reasons as to why the adoption and implementation of e-learning is crucial for the education system. Spender (2001) argues that education systems and institutions should adopt e-learning because the internet can be a rich source of information. Needless to say, students can access information at any time, regardless of place, provided a stable internet access is available. Spender also adds that e-learning is a potential way forward to impart knowledge to marginalized groups and the geographically challenged. For example, students that are at a distance from campus facilities or those with physical disabilities who have to overcome distance barriers and communication barriers to access education. Though e-learning can overcome these barriers there may be circumstances where access to courseware is restricted by technology availability, the stability and speed of internet access and familiarity with the software and hardware interface. Spender (2001) also adds that e-learning is desirable because e-learning has the potential of augmenting traditional offerings in classrooms. Spender (2001) asserts that e-learning will be the educational tool for subsequent generations, who expect a higher level of flexibility in learning. Even so, Spender also points out that, considering how globalization has drastically reduced the knowledge shelf life, e-learning is not without set-backs. In this regard, it is a matter of interest to understand how institutions exploit the potential of e-learning.

Haughland and Wright (1997), point out that e-learning derives numerous benefits to satisfy the demands of continuous processes of learning. E-learning offers quick links to learning materials considered useful, offers online material and ways of assessment to guide students through the processes of learning, as well as increasing access to materials that are rich in content. This aligns with Spenders' views on the richness of information. This could also lead to over-burdening students with knowledge that is "nice to know", but

not necessarily part of the curriculum. This overburdening and increase in the sheer volume of information can lead students to become distracted from the intended subject matter of the course. Sheehan (2001) further contributes to this idea of information overload by adding that in these instances, the learner is less able to learn, but needs to be able to give a timely review. Sheehan (2001) also adds that the learner has to be given the opportunity to develop insights. An enriched learning experience that includes encompassing student interests can be gained by ensuring a connection exists between learning objects and knowledge domains. Additionally, e-learning facilitates student interest through increased asynchronous and synchronous interactions, creates allowances for immediate response and positive reinforcements, and flexibility in learning environments that are conducive for the increasing number of ever-busy students. E-learning breaks the monotony of a traditional lecture setting while fostering balance among various sources of information, as well as facilitating dialogue among students and teachers. These previously mentioned studies offer an examination of the benefits and importance of e-learning as a tool in education. As students embrace a more flexible type of learning, the trade-off could subsequently be that faculty have to provide more flexibility when facilitating online courses. This will be in conflict with conventional office hours and in several instances would raise the expectation of faculty to be available to students off hours. Faculty would potentially have to become familiar with the technology and some instructional design practices which contribute to an increase in workload. Huang and Ling (2012) found that faculty workload was indeed greater in the online learning environment in comparison to face to face education. Specifically, faculty found that more time was dedicated to preparation of subject materials and during course delivery, more time was required in responding to students since the interaction was text-based. Bach, Hayes and Lewis-Smith (2007) hold the opinion that the new role of the tutor

requires professional development support and research based policy and value creation. This transformation in instructional methods aligns with instances where a pedagogical shift occurs when adopting e-learning strategies.

As previously mentioned, a cultural context exists in the area of e-learning. The internet may permit a bridging of diverse cultural contexts. This can become true of e-learning where curriculum can be continuously re-invented through the use of internet resources (Carry & Willis, 2001). The e-learning process has the potential to cut across cultural differences while opening doors to new ways of thinking and perhaps forcing educators to make room for innovation by addressing new perspectives on subject delivery. These implications have a bearing on understanding the effect of e-learning on the student and faculty. Such implications are an important factor to consider when introducing new learning technologies (Hall & Snider, 2000). However, cross cultural contexts can also be of concern in face to face education in instances where learners and the instructors are of diverse backgrounds. The differences would occur in how these contexts are dealt with.

According to Hartly and Robertson (2001), educators in the contemporary world are concerned about increasing the access of students to the communication process and resources. Moreover, when introducing e-learning process to the new context, teachers' participation is vital. Tham and Werner (2005) emphasize the need for educators to understand not only the technology associated with e-learning, but also the implications of implementing the technology. This involves the use of correct tools and not just the tools that are available (p. 19). Aligned with this idea is a study performed which described e-learning for paramedics and firefighters (Taber, 2008), who concluded that is the way technology is used that will dictate the effectiveness of technology in education. This

study also found that experiential learning enables knowledge application and realistic training without consequences through simulation. This implies that, despite the widely recognizable need to increase information and the information access capacity, e-learning technologies can never be effective without the participation of the groups of people who will use them. In this case, this included the teaching staff and faculty. The role of faculty, as described by Sheehan (2011, p. 224) is described to be more of a facilitator than as a leader. Also, in several instances faculty may have to move from didactic approaches of teaching to a constructivist approach that enables students to exploit the learning potential and benefits (O' Donnel, 1991). According to Salmon (2000), teachers who exhibit minimal inclinations to traditional learning approaches have higher tendencies of perceiving e-learning as a proficient method that suits contemporary learning processes. This view is supported by the work of Becker (1991), Hannafin and Savenye (1993) and Kook (1997). Kleiman (2000) and Milton (2000), in general, observe that most teachers have a positive attitude towards e-learning. More recent studies on the effect of e-learning on the student faculty have revealed that; indeed, e-learning has an effect on students and faculty motivation. Boerema, Stanley and Westhorp (2007) conducted a study on the impression of faculty on e-learning. They established that the best way to motivate faculty to adopt and implement e-learning is to arouse the interest of the faculty towards the subject. Faculty buy-in is crucial to successful implementation of online education. On the other hand, Boerema, Stanley and Westhorp (2007) indicate factors that determine the perception of the faculty towards e-learning include class size and work load size. Large classes resulted in an increase in work load compared to traditional teaching methods. These factors then impede faculty adoption of e-learning.

According to Mason (2001), the adoption of e-learning tends to be more complicated than solely suggesting it depends on the faculty buy-in. Mason (2001) explain

that comprehensive processes of training teaching staff are the pivotal steps in enabling them to effectively facilitate online subjects. Training initiatives can only be fruitful with integration of designs in education, and with a central focus on how to enable staff to use technological tools and devices to enhance the e-learning process. Mason (2001) advises that teachers should be encouraged to participate actively in the implementation of e-learning processes, rather adopting it as an imposition.

In terms of instructional design Mason (2001) also adds, for e-learning to thrive, robust technical infrastructures must be in place to support the technical processes that are vital for the course material production, course delivery and faculty and student support. Changing the process of offering education through technology requires the implementation of strategies and plans in an effective manner (Davidson and Schofield, 1997; Jamlan, 2002). For instance, proficient planning for the e-learning course calls for attention to develop the course content, which includes sound pedagogical aspects that are necessary for the delivery of e-learning. A focus on various sub-strategies is also essential in ensuring smooth integration of e-learning across education institutions (Biddara and Dia 2003). Davidson and Schofield (1997) observe that planning is a complex processes, which should be specific to educational institutions and faculties. Jamlan (2002) adds that cooperation amongst those responsible for the implementation of e-learning process is also vital.

Those faculty members interested in giving high quality and collaborative e-learning experience to students, note the significantly increased work load associated with e-learning implementation. Quality e-learning is more demanding than the traditional classroom learning, both in terms of effort and time. To echo the preceding literature, a study by Lancaster, Gilbertson, Dade and Kittredge (2005) confirmed that collaboration,

as well as resources, were pivotal in the implementation of successful e-learning process. They assert a need to incorporate reflective practices, which should be problem-based so as to encourage full student participation in the e-learning process. They also add that education principles in line with adult education should be maintained rather than discarded. Adequate developmental time and resource investment are crucial to the e-learning implementation process in the institution. E-learning process must be student-centred if success is to be achieved (Dyrby, Day, Cumyn and Heflin, 2009). It then requires a need for self-regulation, independence and motivation for a successful e-learning.

There is a need to establish the appropriate level of faculty and student interaction for achievement of satisfactory learning. Successful student learning has also been attributed to the use of asynchronous student-instructor contact. (Dyrby, Day, Cumyn and Heflin, 2009). This raises the question of whether students expect increased interaction with faculty in comparison to a traditional face to face setting. Or is this a matter of instructional design where instructions and explanations are required to be clear and concise. The same study entailed comparison of scores and perceptions of participants in the e-learning program against those on the traditional face to face learning program. A study on social science and nursing education learning methods reveals significant merits and demerits of e-learning, as from the student's point of view (Dyrby, Day, Cumyn & Heflin, 2009). These will be discussed in Section 3.

3. Facilitators and Barriers to Web-based education

Development programs for e-learning implementation have the extra benefit of requiring faculty to reflect on teaching practices thereby benefiting that practice (Biddara and Dia, 2003). E-learning implementation increases access to education, as well as

training students in technological integration, a generic skill independent to the subject content. This is advantageous, especially in innovative institutions, where e-learning constitutes an integral part of the education process by which technology is often integrated in the processes of learning (Kitiwanga, 2001).

To remain as innovative competitors in the Education market, Institutions would need to develop, maintain and continuously improve their e-learning strategies. This would include not only include ensuring hardware and virtual learning environments are updated, but would also include faculty training and student support. According to (Kitawaga, 2001), the initiatives aimed at fostering the adoption of e-learning process have succeeded at offering support to innovative institutions; hence, broadening their leadership capabilities. E-learning has affected the student by offering links to communities while linking innovativeness to student learning processes. E-learning has also encouraged collaborative change via mentoring and professional development (Biddara and Dia, 2003).

By adopting the four innovation pillars as applied in business organizations, Watt (2002) offers a clear demonstration how teachers in innovative schools are creative at risk taking. This therefore, elicits student collaboration in an environment that is constructivist and open in nature. Leaders in innovative institutions are endowed with future vision, prompting them to support e-learning initiatives. In doing so, they focus on developing students, and teachers as informal leaders to offer assistance in the development and integration of technological skills (Katagawa, 2001). There is substantial evidence to support the point that e-learning development initiatives have impacts on institutions involved in integrating information and communication technology (ICT) in teaching and learning processes (Katagawa, 2001). Additionally, integration of ICT into the curricula

lays emphasis on the skills that impact employability through skills, which students require to succeed in knowledge economies (Kitagawa, 2001).

According to Cuellar (2002), e-learning education permits flexibility in adapting to all styles of learning and may overcome the significant number of barriers pertaining to learning communication. However, for a course to cater to several learning styles, it would have to include a multitude of different learning objects and offer the same content in various different formats. This could end up being very workload intensive and repetitive. Moreover, e-learning puts the learning responsibility on the students, which would explain why most students may not support e-learning (Cuellar, 2002). This idea of self-directed learning depends on the instructional design of the course and the framework that is intended. This depends upon the ability of students to remain motivated and practice self-discipline throughout the course. This idea aligns with the views of Johnston, Killion and Omen (2005) where the effectiveness of e-learning is dependent upon on how successful implementation of e-learning is at the following three areas: skills of the student, the design of the course and the nature of the course. In a study to investigate e-learning acceptance by the faculty, Gibson, Colorac and Harris (2008) establish that perceived usefulness of e-learning indicates faculty acceptance had minimal relation to the ease of application. Incentives and financial gain are the factors that affect the adoption and implementation of e-learning among faculty (Gibson, Colorac & Harris, 2008). In contrast, Sheehan (2011) identifies several factors with the failure of web-based education such as user expectations, perceptions of e-learning and a “mismatch between organizational needs and the solution that was ultimately implemented” (p.220). Sheehan (2011) also adds that faculty are faced with barriers to adopting web-based learning strategies. These barriers include the need to keep up with technological changes and the increasing needs of the organization and students (p.220). Learner expectations of a

virtual learning space could be misaligned with what is being offered as part of a subject. Students could potentially envision a social media type environment and be disappointed by a more structured instructional design model.

A study by Johnston (2008) assessed the effectiveness of online instruction in the radiological sciences, focusing on the outcomes and student performance. However, it remains a matter of interest investigating the impediments and success factors contributing to the implementation of e-learning for students involved with the radiological sciences. This would be part of an evaluation of the impact of web-mediated education on students enrolled in the study of radiological sciences. This would lend to further investigation of the methods of the applications of e-learning technologies blend with the cultural and geographical aspects with a focus on the applications of the cultural-education contexts successfully mainstreamed through web-based technologies. How effectively do these web-based technologies function? Are radiological sciences included in the same merits and demerits underlying the implementation of e-learning?

Conclusion

Several views exist regarding the efficacy of online learning strategies in post secondary education. Factors such as pedagogy, student acceptance, faculty buy-in and instructional design play key roles in determining the success of online subject delivery. More specifically, radiography subject delivery may encompass these factors to provide students with a meaningful e-learning experience. Several implications exist surrounding faculty workload and professional development opportunities as well as student motivation and preparedness for e-learning. These implications include investigation of the role of

instructional development for e-learning in radiography education and student motivations and perceptions of the online environment for radiography courses.

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