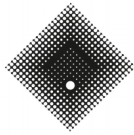# VICTORIA UNIVERSITY

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State-of-the-art of recent research on educational technologies: a literature survey approach

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State-of-the-art of Recent Research on Educational Technologies: A Literature Survey Approach

STATE-OF-THE-ART OF RECENT RESEARCH ON EDUCATIONAL TECHNOLOGIES: A LITERATURE SURVEY APPROACH

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Technology adaption has become very popular for education and learning purposes throughout the world in recent years. A large number of institutions and educational organizations are using these technologies to improve and enhance their learning systems and improve students' learning outcomes. Due to the fact that understanding the different e-learning classifications is a prerequisite to understanding the effectiveness of specific e-learning formats, in this article, a review has been done on educational technology journals publications and a new classification of e-learning technologies is proposed.

Keywords: Technology in education, e-learning, e-learning technologies classification.

Introduction

Implementing technology in education has gained a lot of attention and developed very rapidly these days. There is a substantial growth in employing these technologies in different learning systems and a lot of schools, universities and other educational institutions are adopting them to improve learning outcomes (Committee, 2005).

Electronic learning or e-learning are playing an important role to mitigate learning process and making course content more accessible for students by using various kind of technologies. And this contribution has been strengthened after emerging the Internet. e-Learning has created a lot of opportunities for teachers and students to extend their technology adoption and enabled them to have access to many learning sources and materials without time and distance limitation (Gunasekaran, McNeil, & Shaul, 2002).

With the rapid development of technologies in this advanced era, varieties of technologies are used in learning and educational systems and they grow continually (Chapelle, 2004; Conole & Warburton, 2005; Dash, Magidin de Kramer, O'Dwyer, Masters, & Russell, 2012; Felix, 2005). Part of them are designed specifically for educational purposes such as Learning Management Systems (LMS) (Williams van Rooij, 2012), and some are designed for other purposes, such as social networking technologies, but are utilized by educators (Amador & Amador, 2014; Veletsianos, 2012). This study has categorized the main technologies used in recent three years in e-learning journals and proposed a new classification for them. Some sub-categories are also offered and then some explanations and examples are provided for more clarification.

This article is organized as follow: section 2 gives some background of the research and more definition of e-learning and applied technologies in it. In section 3 research methodology is discussed and

study process is explained. Section 4 contains the results of analysing the selected data set and proposes the technologies classification and section 5 which is conclusion and contains the summary of research.

Research Background

Wide ranges of views about application of technology in education are offered by researchers from all over the globe. Some of them assert that e-learning technology is as effective as traditional methods (Rosenberg, Grad, & Matear, 2003) and there is not any marked differences in learning output of traditional and technological methods (Cavanaugh, 2001). While other argue that it has a substantial influence on academic performances and they propose very positive reviews (Breuleux, Laferrière, & Lamon, 2002; Kulik, 2003). Advocates of the application of electronic technologies in learning materials believe that computers have the potential to take over the learning environments and increase the quality of the learning. For instance, facilitating access to information (Bransford, Brown, & Cocking, 1999), making learning environment richer (Bagui, 1998) and improving students' motivations and learning outcomes (Yazon, Mayer-Smith, & Redfield, 2002).

However, there are some researchers that explore the necessity of investigating different e-learning adoption issues and impacts on learning processes to develop operative strategies for teaching and learning (Meredith & Newton, 2003) and address students' needs of the effective e-learning activities(Crawford, Gannon-Cook, & Rudnicki, 2003). Some researchers xpress different concerns regarding the lack of empirical evidences to support the effectiveness of e-learning technology application (Torgerson & Elbourne, 2002). One difficulty facing the improvement of research in the field of reviewing e-learning technologies is the fact that e-learning researchers are not all identical in the methods used and technologies applied. This study aims to address this gap by proposing taxonomy for e-learning technologies to make a broader view for users and learners.

Research Methodology

In this study, we have carried out a systematic literature review to identify studies on the application of technologies on education and learning. A systematic literature review is a type of research methodology that focuses on a topic or research question to identify and interpret available empirical studies. It contains planning the review, conducting the review, and reporting on the review. The following steps are done to finalize this systematic literature review.

Selection Process and Criteria

Among different research recourse, we selected the following journals that are completely relevant and include most of important databases. Then last three years (2012, 2013, and 2014) have chosen to conduct the review. Table 1 indicates the journal names, databases, and the total number of papers in their published issues in these years.

Table1. Journals and their selected criteria

Journal name	issue p/y	Total paper No. 2014	Total paper No. 2013	Total paper No. 2012	Journal Database
Journal of Computer Assisted Learning	6	34	42	45	Wiley
Educational Technology Research and Development	6	26	37	57	Springer

Internet and Higher Education	4	31	35	37	Elsevier
Information Technology, Education and Society	2	-	5	8	James Nicholas
International Journal of Computer-Supported Collaborative Learning	4	13	18	23	Springer
Journal of Research on Technology in Education	4	17	16	17	ISTE

Study Process

Based on table y the total numbers of papers that are selected were 461. In this step some of them excluded by reading the title of the papers, then the abstract of remain papers were studied and those were about e-learning research or did not examine e-learning technologies were discarded. Thereafter, the final set of 343 papers was defined based on reading the full text of the remaining research. Figure 1 illustrates the number of papers after each stage.
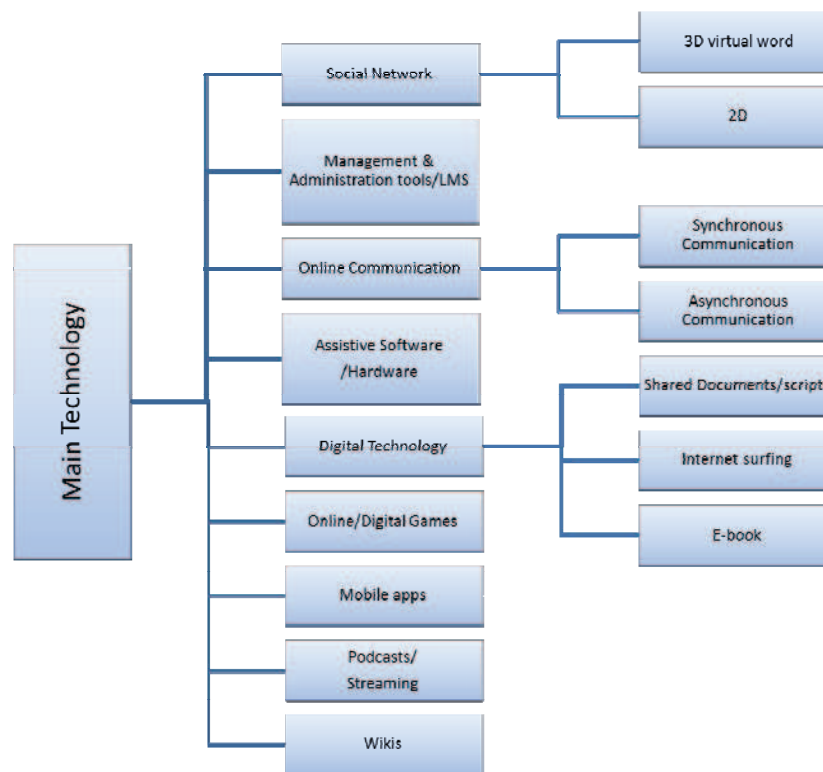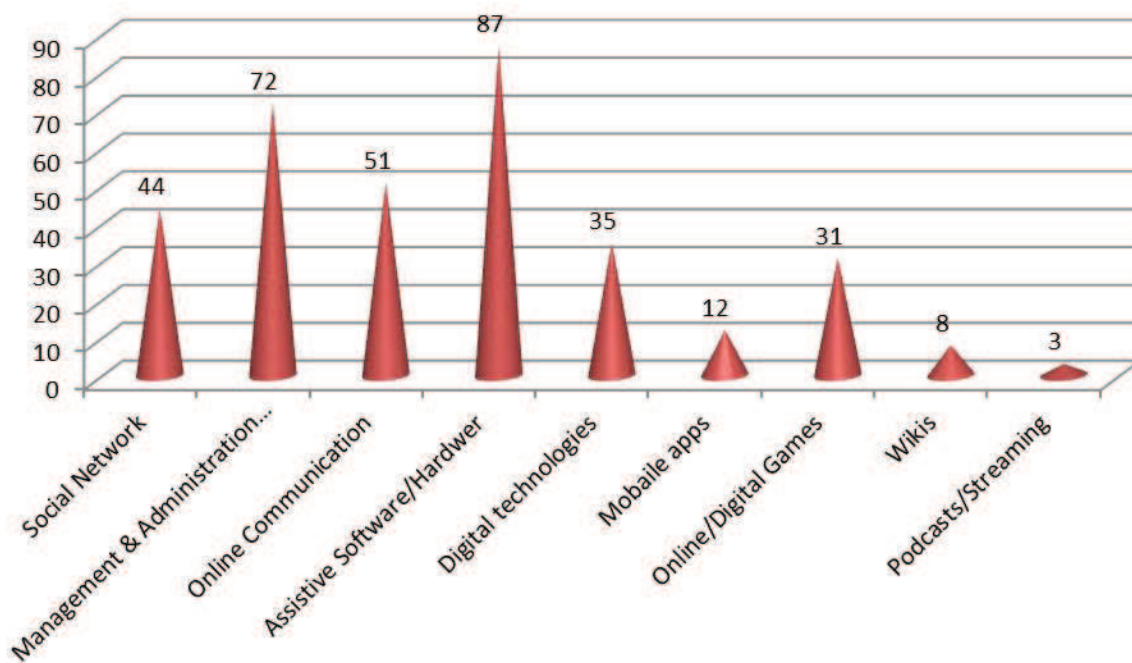

Figure 1. Stages of study process

Results

E-learning Technologies

There are several classifications for use of technology in education. In this study 9 main categories are defined for this purpose which includes: Social Network, Management & Administration tools/LMS, Online Communication, Assistive Software/Hardware, Digital technologies, Mobile apps, Online/Digital Games, Wikis and Podcasts/Streaming. Figure 2 illustrates all these categories and their sub-categories and Figure 3 shows the number of each main technology that employed in the papers. Assistive Software/Hardware is the most dominant technology used in 87 papers of the total and the second one is Management & Administration tools/LMS, utilized in 72 papers. The number of papers that employed Online Communication, Social Network and Digital technologies are 51, 44 and 35 respectively. The following is a brief description of each technology and some examples of their applications in learning.

Figure 2. Technology for learning classifications

Figure 3. Technologies' proportion used in e-learning

Social networking is a web-based services that every user can create a profile which consists of his or her social links, connections and a variety of additional services and the ability to share them with others. Wide range of social networking sites like Facebook and Twitter are adopted to use as a tool to enhance learning and education. For instance, N. D. Bowman *et al.* in (Bowman & Akcaoglu, 2014), have created a course-specific Facebook group in a mass media course and at the end of the semester the Facebook group users' grade were significantly higher than others students.

Management & Administration tools/LMS contains tools using for teaching, course management, students' administration and their progress, and even tools for plagiarism detection. It also includes learning management system (LMS) which is a system for managing administration, documentation, tracking, reporting and delivery of online or blended/hybrid educational courses. J. Yuan et al. (Yuan & Kim, 2014) have investigated about dropout problems in online courses and lack of interactions which might lead to students' isolation.

Online Communication technology is divided into two sub categories, Synchronous and Asynchronous Communication. Synchronous Communication is a form of technology that enables people to communicate in real-time and collaboration in a same time in different places. It includes audio, video and web conferencing, chat and instant messaging, application sharing, online forum and discussion (Çelik, 2013). In asynchronous environment communication and collaboration are done over a period of time via different time in different places. Asynchronous tools provide people from multiple time zones the ability of connecting together at each person's own convenience and are useful for sustaining collaborations. The most common types of these tools are e-mail, streaming audio and video, narrated slideshows, discussion boards, e-portfolios and web logs (Blogs) (Tang & Lam, 2014).

Assistive computer-based technology is a form of technology that enables users to enhance their functional capabilities with learning needs. It includes computer software and hardware that use for different learning purposes. There is a wide range of computer software in learning and there have been various classifications. Simulation software is one of them which are employed by researchers to stimulate students learning skills especially in reading and writing. For example, authors in (Liou, Yang, & Chang, 2012) developed a system called "WriteAhead" which provides different types of suggestions for non-native English students from various disciplines who are writing journal papers' abstracts and assessed its effectiveness.

Digital technologies covers a plethora of different contents that performing through internet, it contains 3 sub-categories including Shared Documents/scripts, Internet Surfing and E-books. Shared documents contain technologies such as Google Docs, Zoho Writer, SlideShare, Elgg, Clearspace and etc. Collaboration scripts help students collaborate and provide more interactions in learning activities (Gijlers, Weinberger, van Dijk, Bollen, & van Joolingen, 2013). The phrase "Internet Surfing" comprises a plethora of different Internet using activities such as using different search engines, websites, data bases, Social Bookmarking and so on. There are various research has been done about different aspects of information seeking from the Internet (Eynon & Malmberg, 2012).

Digital game-based learning (DGBL) has become very popular and widespread in recent years and is counted as a very effective tool for educational purposes (Hwang & Wu, 2012). It connects learning material with computer and can be applied in a broad spectrum of applications and subjects. This technology can facilitate the teaching and learning by simulating the real process and provide the learners with the ability to experience situations that are not easy to deal with in the real environment (Purarjomaldlangrudi & Ghapanchi, 2013).

Learning through smart phones or m-learning, is one of the recent developments that employ mobile devices in education and learning. This technology enables users to do training programs while they do not access to a computer system. J. Gikas et al. has done a research that investigated the impacts of mobile devices such as cellphones and smartphones on learning and teaching (Gikas & Grant, 2013). They included students and teachers in their research and explore how they integrated m-learning in their courses.

Wikis are collection of websites that enable multiple users to read and write any time and from anywhere which are fully editable. This ability has brought about a very convenient environment for

online collaboration. It is also a very excellent tool for online learning and educational purposes (Augar, Raitman, & Zhou, 2004). It has variety applications in the academic context, M. M. Woo et al. investigated the use of wiki to collaborate writing in primary levels in a Chinese primary school (Woo, Chu, & Li, 2013). The authors concluded that how wikis can be helpful and can provide support for students' writing skills.

In this study, podcast is an educational audio or video file that can be created, uploaded or downloaded from websites to a digital device like computer, tablet or a smart phone. Streamed files are compressed format files that can be played at the same time in destination and depend on the Internet speed, they can be stopped and started during playing. This technology has extended among universities in recent years to perform online and distance learning (Swan & Hofer, 2011).

Geographical Locations

Figure 4 provides a breakdown of the frequency of the research papers authored in different countries. It shows that United State was the most prolific, with 39% affiliated with US universities. The second country was Taiwan (9%), and it was followed by United Kingdom, The Netherlands and Canada (6%). Australia constitutes 4% and some countries including Germany, Finland and Spain has the same percentage of 3%. As it illustrates, some countries, in the "other" section, have made up 1% and 2% which are depicted in second pie chart such as China, Sweden, Norway and so one. Also bellow countries contains only one paper which have not set in the pie chart: Egypt, Macedonia, Serbia, Emirates, India, Cyprus, Romania, South Africa, Saudi Arabia, Iran, Jordan, Muscat, Croatia, Switzerland, Zambia, and Georgia. Examining e-learning technologies seems to be stronger in the US compared with other countries.
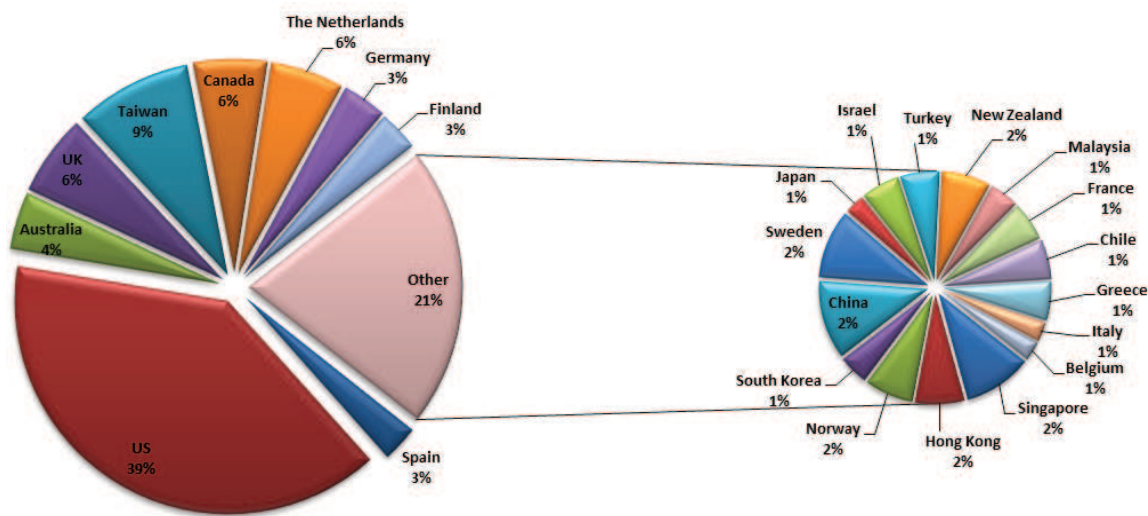

Figure 4. Geographical locations

Conclusion

Living in the information age, creates a great interest for using of various types of technologies in education. It provides many facilities for learners and enables them to enrich their learning environment. A large variety of technologies are implemented in educational systems by different organization all over the word. However, there is not many research has been done regarding currently used e-learning technologies. This study is a review of literature on educational technologies on the last three years issues

of the relevant journals. The outcomes are a categorization of main technologies, Management & Administration tools/LMS, Assistive Software/Hardware, Social Network, Online Communication, Digital technologies, Online/Digital Games, Mobile apps, Podcasts/Streaming, and wikis. This classification helps teachers and educators to make appropriate decisions in terms of educational technologies' evaluations and consequent selection without the necessary knowledge. They can have a proper assessment and selection of e-learning technologies focusing on each category and its criteria for classifying and reviewing selected studies in order to find out the application possibilities of different technologies. The results show that the most technologies used in education were Assistive Software/ Hardware and Management & Administration tools/LMS and also the geographical assessment reveals that many countries have adapted these technologies and it mostly encouraged in the US, but suprisingly Taiwan is the second country that has done a lot of research in this area. It shows that this country despite its little geographical space and population in compare with the US or other countries, has assigned 9% of the research and is considered as the second country in applying e-learning technologies.

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