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A Theoretical Analysis of Factors Influencing Students Decision to Use Learning Technologies in the Context of Institutions of Higher Education

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Abstract

This paper studies factors influencing student's decision to use technology to support their learning. The paper describes all those technological options available for students to support learning such as emails, chat rooms, video lectures, blackboard discussions and Power Point Presentations, for example. Then, the paper explains in detail student factors influencing the decision of students whether to use or not to use learning technologies for learning purposes. The paper findings suggest that the factors under study do influence students´ decisions to opt for technology support and means to learn at school. Overall, the pros are much stronger than cons of using technology for learning purposes and that there are certain strategic actions an educational institution can undertake to influence students´ decisions to use all the technological advances and options available for them at school. Note for the readers: A previous version of the paper with a focus on Factors Influencing Faculty Preferences for Educational Technologies was presented on the 27th IBIMA conference, Milan, Italy: http://www.ibima.org/ITALY2016/papers/maar.html. This version focuses on Factors Influencing Student´s Preferences for Educational Technologies.

INTRODUCTION

Themes like mobile learning, electronic learning, flexible learning, online learning and virtual learning are hot topics in the academic these days. Even more, the importance of information and communication technology (ICT) in the evolution and revolution of the modern education system is an undisputable phenomenon. Indeed, technology has helped in generating, preserving and disseminating knowledge and at the same time improving human abilities to share knowledge and experiences (Afshari et. al., 2009). Definitely, ICT helps people access, gather, analyze, present, transmit, and simulate information (See (1994). More than that ICT creates a learning environment where students deal with knowledge in an active, self-directed and constructive way (Volman & Van Eck, 2001; Webber, 2003). ICT can develop student's skills for cooperation, communication, problem solving and lifelong learning (Voogt, 2003) and such skills are much needed in the industrial world. Over the past several years the emergence and the use of educational technologies have been on the rise (Downing & Garmon, 2001). This trend has forced universities to increase substantially their investments in educational technologies, technology experts and faculty training as never before. In parallel to the changes brought about by new technologies in the field of education, researchers have become equally concerns about the actual and potential benefits of integrating such technological supports (i.e., the use of software, Online discussions and chats; Facebook, Twitters, emails, course websites etc.) into other pedagogical strategies such as case studies, research, problem solving and project management (Grasha & Yangarber-Hicks, 2000). Cuban (1999) is of the view that

students are getting used to educational and communication technologies of e-mails and Web pages and using educational technology can improve communication between the teacher and students (Flanagin, 1999) and thus, enhancing student-teacher interactions (Waldeck, Kearney & Plax, 2001). Technology also makes it much easier for students to have access to the required educational information cheaply, easily, and timely (Panici, 1998). The use of technology for education purposes also affects student outcomes such as cognitive, behavioral and affective learning (Witt & Wheeless, 2001).

As a matter of fact, technological development and increasing human dependency on technology for every activity whether are they social or professional or personal, are irreversible. Our current and future generations of university graduates regardless of their academic disciplinary backgrounds and orientations must be able to work with technology effectively. Therefore, it is essential for them to learn at school the benefits of the uses of different technologies for learning purposes, solving problems and improving work performance. This particular study is dedicated to the identification and analysis of those factors which influence students´ preferences for using particular learning technologies. The findings of the study will help the academic leadership of the institution of higher education to consider those factors while developing curriculum, pedagogical strategies and faculty development programs.

LITERATURE REVIEW

The literature review focuses on technological platforms that are available for the students of higher education to base on or choose from for learning purposes. A variety of factors ranging from the factors involving faculty, contextual and factors associated with students themselves will be reviewed before making any conclusion on this interesting issue. Figure 1 illustrates those potential factors that influence the decision of students to use or not to use technological apparatus for learning purpose.

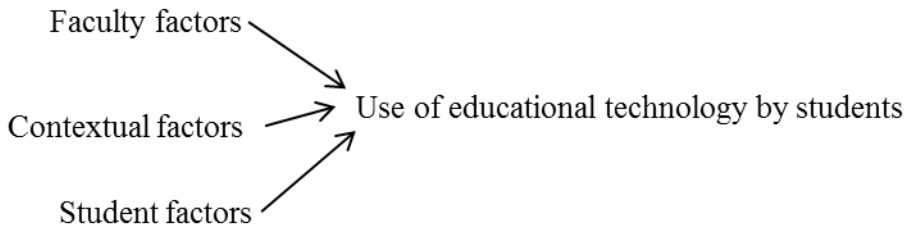

Figure 1: Factors Influencing the Decision of Students to Use Educational Technology

LEARNING TECHNOLOGIES

Defining the term learning technology (also known as instructional or educational technology) is difficult since there is a need to distinguish between educational technology as a theory and as a field of practice and to focus on either the process or the system approaches (Molerda, 2003). The learning technology is defined as solutions to instructional problems involving social as well as machine technologies in order to improve the effectiveness and efficiency of learning in the context of education (Cassidy, 1982; Gentry, 1995). The learning technology is also considered as means of media with four different focuses: media for enquiry (i.e., data modelling, spreadsheets, hypertext, etc.); media for communication (i.e., e-mail, graphics software and simulations); media for construction (i.e., robotics, CAD, control systems), and media for expression such as interactive video, animation software, music composition (Bruce &Levin, 1997). Many in the education industry view learning technology as a tool for improving the presentation of material for making lessons more fun for the learners (Cox et al.,

1999). Learning technologies are the hardware and software packages that provide a mechanism for delivering instruction and needed instructional support for teachers and students (Rice & Miller, 2001). The emergence of different educational tools and software has motivated educational institutions to integrate them into the educational strategies (Hawkins et al., 1996). Learning technologies are considered crucial for improving the quality of education in general and enhancing the level of student learning performance (Bialo & Sivin-Kachala, 1995) in particular. Technology has solved the problem of distance, time and finance and created a situation where effective and productive learning philosophies got grounds.

University faculty and students have a wide range of teaching and learning technologies available for them to use in support of the traditional methods of teaching and learning (Boose, 2001). For example, instructors may use PowerPoint presentations, or organize video conferences in order to bring guest lecturers from distant places into the classroom or simply using YouTube lectures to support class lectures. Faculty can also use other computer-based technologies such as electronic mail, Web pages, chat rooms, and electronic bulletin boards in the classroom to facilitate communication with the students (Driver, 2002). Social networks such as Facebook, Twitter and LinkedIn are also popular among the young generation to share information and communicate interactively. A number of other teaching software, online exercises, interactive televisions and computer simulations are available for faculty members to use (Seay et al., 2001). Students should be motivated and supported in order for them to participate actively in technology based learning system-

Table 1 provides a list of technology tools used in the institutions of education of all categories (Thieman, 2008) for educational purposes (teaching and learning).

Table 1: List of ICT Used as Educational Technologies

LCD Projector	Graphic Organizers	Spreadsheet
DVD/Streaming Video	Webquests	Internet Search Tools
Tape/CD player	Webpage/Class websites	Power Point
Graphics Clip/Art	Subject specific software	Desk Top Publishing
CD-ROM	MMP3/Podcasts	Web Log
Smart Board	Simulations	Email
I-Movie	Computer Games	PDA,
Photo Shop	Digital Cameras	Tablet PC,
Word Processing	Video Cameras	Smart-photo
Internet Search Tools	CD's of student work	

Factors Influencing Students´ Decision to Use Learning Technologies

The use of learning technologies is essential for the educational institutions now and in the future. Since, learning technologies are the recent inventions, adoption of which by the faculty to support their teaching demands a gradual approach and creative-conducive educational environment. Therefore, to identify and study those factors which influence the decision of the student to use technology for learning purposes. Table 2 lists those factors which can influence the decision of students to use learning technologies at school:

Table 2 List of Factors Influencing Students´ Decision to Use Learning Technology

Software competence	Problems with technology
Individual culture & behavior	Need for the technology
Reward & recognition system	Technical support and facilities
Class size	Availability of enough computers
Course/subject nature	Social pressure
Resources (time and money)	Personal interest
Student abilities	Teacher expectations

Other human factors (also considered internal factors) such as individual belief, feelings of anxiety, fears, preferences and perceptions, feelings of competence, and attitudes have also been correlated with the decision of using instructional technologies (Albion & Ertmer, 2002; Dusik, 2000). Researchers (Osika & Buteau, N/A) are of the view that if proper and early attention is given to these diverse beliefs and competencies of the faculty and students, there will be a strong likelihood that the faculty will opt for integrating instructional technologies into their teaching strategies and students will highly likely collaborate in the learning process. Figure 2 summarizes the three main categories of factors which can influence the decision of using technologies for teaching and learning purposes. However, this paper is dedicated to the in-depth analysis of those factors which are directly associated with the learners themselves (the student factors).

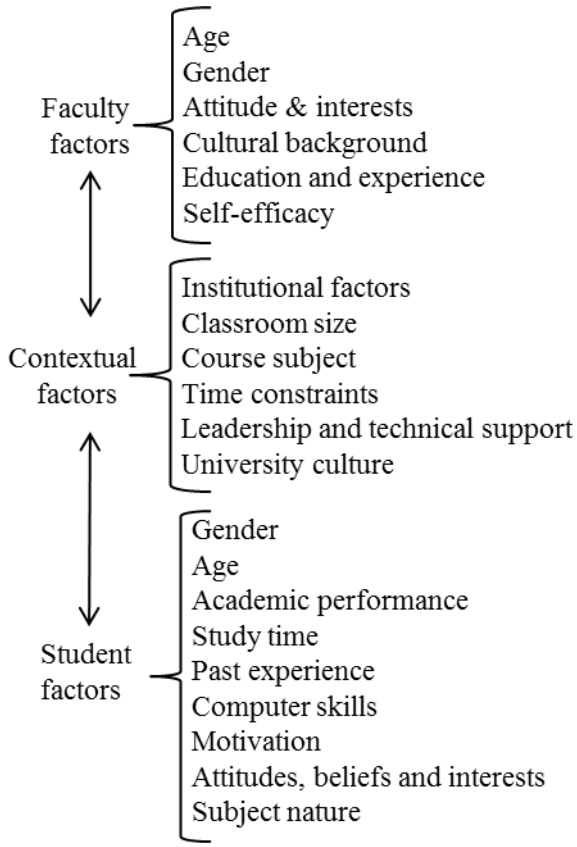

Figure 2 Factors Influencing the Decision of Using Technology in Educational Institutions

STUDENT FACTORS

There are several student related factors influencing the decision of the students to use learning technologies for learning purposes including e-reading, e-researching, performing e-

home works, e-communication (emails, receiving e-feedback), e-meeting or v-meeting (virtual meetings) with peers and professors, e-exams, e-grading, e-grade reporting and so and so forth. It is a widely held belief that the young generation is technology friendly and savvy but in practice students´ resistance to use technology for educational purposes is considered still high. Even some students complain about the use of technology as time-consuming, it adds to the administrative hurdles of the course works, technical mishaps and the changing nature of the technology. Table 3, summarizes some of the factors directly associated with the learners themselves and these factors are found to be either encouraging or discouraging the learners to use technology for learning purposes.

Table 3 Learner Factors Adopted from (Lim & Morris, 2009)

Variables	Description
Learners	Gender, age, preference in delivery format, average study time, income, past experience.
Instructional	Instructor quality, learning activities, study workload.
Motivation and involvement	Learning motivation, learning involvement.
Learning outcomes	Perceived learning, perceived learning increase, actual learning, perceived learning application.

Though there are so many factors to influence the decision of students to use learning technology, this paper will focus on few of them for further elaboration purposes. For example, one of the student factors which influence the decision of the faculty to use instructional technology is the academic performance or achievement of the student (C-H. Chen, 2008; Liu, 2007; Sandholtz et al., 1997). An educational paradigm that promotes constructivist teaching with technology provides many learning benefits for students and educational institutes encourage teachers to implement active teaching practices when using technology to promote student learning, academic achievement remains the principal focus of teachers. Li (2007), who interviewed 15 Canadian teachers about technology integration, noted that if teachers had poor students or were teaching unfamiliar subjects, technology use was not considered, even when teachers understood that students favored technology and technology was the preferred means of acquiring information.

Researchers have suggested that sex-based differences in technology use are grounded in male and female students' predispositions to favor different subjects in school (i.e., math, science, technology), and that these predispositions are shaped by family, school, and cultural factors (Kirkpatrick & Cuban, 1998). Specifically, Shashaani (1995) found that male students had not only more interest in computers when compared to females, but that they also received more encouragement to use them. Female students viewed technology more favorably than their male colleagues. At first glance this finding may appear surprising. Past research establishes an inverse relationship between computer anxiety, experience, and gender. Females typically have more anxiety and less experience with technology than males (Ayersman & Reed, 1995). Males typically have lower computer anxiety and higher computer interest than females (Schumacher & Morahon, 2001). The difference we see in perceptions of instructional technology may relate more to learning style than either computer anxiety or interest. A variety of other factors have been identified and grouped into either manipulative or non-manipulative factors (Mumtaz, 2000; Ten Brummelhuis, 1995) concerning the uses of technology by faculty. Similar factors can be associated with students or learners as well. For

example, non-manipulative factors, as some of which have already been described above, are composed of factors such as age, learner experience, computer skills and experience, trends in the education industry and availability of support and services. Manipulative factors refers to the attitudes of students, knowledge of ICT, computer skills, the school commitment and efforts to implement and support technology for learning purposes (Ten Brummelhuis, 1995). On the other hand, the value of technology for teaching and learning, conflicting ideas and confusing theories of the uses and the potential impacts of the use of technology, the changing nature of the technology and its uses, the perceived and actual unreliability of the use of technology for teaching by the teachers and for learning by the students (Cuban, 1999; Zhao, et. al., 2002) have caused misunderstanding for students when it comes to the uses of learning technologies.

The Potential Benefits of Learning Technology for Students

While comparing the pros and cons of the uses of technology for learning purposes it is found that the benefits of using technology for learning purposes outnumber the costs affiliated with it. For example, technology helps students access, gather, analyze, present, transmit and simulate information at any place, at any-time and through multiple means (See, 1994). Technology has brought revolutionary changes in the education industry and therefore, "the impact of technology is one of the most critical issues in education (Webber, 2003)". Learning technologies have improved students´ learning ability and performance by making them more active and self-directed learners and enhancing their information management competency (Volman & Van Eck, 2001). As an instrument and new ways of learning if technology is blended appropriately with the existing teaching and learning strategies and methods, it can have long lasting positive impacts on the habits, styles and efficiency of students. The use of technology by students can be instrumental in building the much needed professional competencies in the workplace such as cooperation, communication, problem solving and life-long learning (Plomp et al., 1996; Voogt, 2003). Researchers (i.e., Osguthorpe & Graham, 2003) found "That blended instruction methods improved pedagogy, increased access to knowledge, fostered social interaction, increased the amount of teacher presence during learning, improved cost effectiveness, and enhanced ease of revision". Other benefits of blended technology-learning mechanisms are effective in addressing diverse learning styles (Bielawski & Metcalf, 2003 and enhance students´ control of the pace of learning, instructional flow, selection of resources and time management (Chung & Davis, 1995). Learning technologies if integrated appropriately with individual-learning style allowing students to learn at their own pace through regular immediate feedback in order to assess their progress. Individual-learning strategies are examinations-in-general, problem examinations, term papers, homework, required readings, and thinking alone (Ulrich, 2005). The experiential-learning strategies are active learning because students take an active role in reaching the more complex educational outcomes of application, analysis, synthesis, and evaluation (Chickering, 1977). Experiential-learning strategies include: internships, management simulation, role playing, structured experiential exercises, videos, case analyses, and case studies (Ulrich, 2005). Any of these teaching and learning strategies, if supported appropriately and adequately by the use of educational technology, the purpose of education which is building competencies in our university graduates needed in the industry is possible to achieve.

CONCLUSION AND RECOMMENDATIONS

The rapid growth of ICT has brought remarkable changes in the twenty-first century, as well as affected the demands of modern societies (Buabeng-Andoh, 2012). ICT is becoming increasingly important in our daily lives and in our educational system. Therefore, there is a growing pressureon the educational institutions to use ICT to teach the skills and knowledge students need for the 21st century. Realizing the effect of ICT on the workplace and everyday

life, today's educational institutions try to restructure their educational curricula and classroom facilities, in order to bridge the existing technology gap in teaching and learning. This restructuring process requires effective adoption of technologies into existing environment in order to provide learners with knowledge of specific subject areas, to promote meaningful learning and to enhance professional productivity (Tomei, 2005). Instructional technology is found to be effective as a cognitive tool (Bruce & Levin, 2001) by encouraging helpful in classroom by encouraging inquiry, helping communication, constructing teaching products, and assisting students' self-expression. Therefore, it is critically important to pay due attention to the usefulness of the technology when discussing instruction, education, or training issues. The use of computers for teaching and learning purposes will open a new area of knowledge and offer a tool that has the potential to change some of the existing educational methods. As computer use continues to increase in society, teachers must also prepare for the use of computers within the classroom (McCannon, & Crews, 2000; Snelbecker, 1999). In summary, in order to create a conducive environment for technology-learning integration, it is important that educational institutions promote: collaborative learning; encourage using computers for creating and conduction learning activities; ask students to conduct research using computer and computer related technologies and brief students about the potential benefits and information and computer literacy (Tondeur, van Braak, Tondeur, & Valcke, 2004).

Furthermore, learning technologies encourage students to participate in learning tasks, including collecting, analyzing, and presenting information (Niederhauser & Stoddart, 2001). Existing studies (i.e., Yen & Lee, 2011) show that students using technology for classroom group discussions and report writings perform better in terms of learning achievements (academic performance) than those students who do not use technology for learning purposes. Instructors using technology to support their teaching ought to act as coaches, facilitators, mentor and guide (constructivist approach) rather than acting like traditional lecturers (instructor-centered teaching). Students should be allowed to use in-depth questioning to acquire information, work in small groups, interact and develop their verbal and social skills (Nussbaum et al., 2009).

RECOMMENDATIONS AND IMPLICTIONS

The study recommends the institutions of higher education to emphasize upon those factors which encourage and promote the use of technologies in classrooms by the faculty and students likewise such as (Gilakjani, 2013) appropriate computer-software training for the faculty and students; promote personal computer uses; developing positive teacher and student beliefs and attitudes towards computer technology. The socio-cultural context of students should be analyzed, understood and taken into considerations while blending technology for teaching and learning purposes (Park & Son, 2009; Ertmer, 199. Both teachers and students must be provided enough time to plan and implement technological resources and systems for teaching and learning purposes (Bauer & Kenton, 2005). Also, providing updated and appropriate technological services and systems such as hardware, software, computing facilities are helpful. Removing technical difficulties for students and organizing training and orientation programs for students on regular basis in order keep their computer skills levels and increase their interest in using information and communication technologies (Bielaczyc & Collins, 1999; Carvin, 1999). In general, capacity building, curriculum development, infrastructure, policy, and government support are required in order to lower student barriers and improve the effectiveness of ICT use in the classroom. Several strategies for dealing with these challenges have been suggested. Schools are encouraged to (Fu, 2013).

It is easier said than done. Designing, implementing and promoting technology blended learning with a university system demands a whole new ball game approach from diverse stakeholders of the institution. Involving faculty let alone students in such a learning environment and programs invites commitment from the academic leadership and the policy makers. It requires changes, removing structural constraints (Buchanan, 2013) and adjustments in the existing organizational system of the school or university in terms of reallocating resources, people and physical infrastructure. Changing the work habits whereby forcing to a some extent, the faculty to replace the use of traditional lecturing and textbooks with more technology based learning activities such as videos, virtual sessions, social networks, emails and Blackboard for example (Gilbert, 1996). Reducing if not eliminating the low perceived usefulness of using learning technologies by the faculty and students and at the same time ameliorating the advantages of the use of technology as a source of ease, speed, convenience and flexibility are not matters of job being done overnights. Educational institutions, faculty and students alike should go hand in hand and shoulder to shoulder in the arena of rapid changes in the technological platforms. Attitudes towards computers, computer self-efficacy, computer competency, computers attributes, Classroom size, internet services and connections, student economics are such factors which cannot be overcome so quickly. Leaders and institutions of education are responsible for creating an environment which is conducive, stable and reliable for blending technology with learning strategies, students´ needs and interests (Allen & Seaman, 2008).

LIMITATIONS AND FUTURE CONSIDERATIONS

This study is an exploratory one and therefore, is based on the literature review that exists on the issue of factors influencing the faculty decision to use educational technologies to support pedagogical strategies. The study provides a theoretical foundation and understanding of the issues facing educational institutions in implementing new educational technologies. Research methodologists appreciate the role of literature review based studies in establishing the need for further research while broadening the horizons of the researcher and preventing the researcher from conducting research that already exists (Aitchison, 1998; Khan & Law, 2015).

Future studies on the factors influencing students decision to use learning technology to support learning should consider faculty factors and contextual factors as moderating factors between the use of learning technologies as dependent variables and the use of instructional technology) as dependent variable. Other influencing factors may also be added to study in order to make the study more comprehensive and complete, such as:

1. Individual factors
2. Institutional factors
3. Education industry Factors
4. National factors
5. Global context
6. National social culture
7. National development (income level, technological infrastructure, economic infrastructure, physical infrastructure, technology education).

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