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Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

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Editorial

Technological Revolution in Education - 1

Donald G. Perrin

There are many ways to bring about change ranging from reengineering to paradigm shift and from revolution to transformation. In good times, education can grow, and especially in bad economic times including war, recession, and natural disasters, education is starved of resources. Public education has operated on the same basic paradigm for over 200 years and is past ready for reassessment, redesign and reconstruction. In the short term, renovations and "band aids" offer some benefits, but there is no master-plan to lead us to the future. Agents of change that are powerful in transforming cultures and societies often bypass education leaving it out-of-step with the constituency it serves.

Throughout history, the principal change agent has been technology intertwined with discoveries and innovations. Create for yourself a mind map with innovation at the center, draw the chains of innovation as spokes, and add branches and links where interactions and fusions occur. Branches include innovations such as energy, communications, transportation, social services, business, industry, government, education, and military. For example, energy might include: sun, wind, water, steam, electricity, gasoline, and atomic fusion. Transportation: horse, bicycle, automobile, tram, train, barge, ship, submarine, blimp, aircraft, rocket, spacecraft. Try separate branches for private and public transportation, link energy systems to transportation. Develop separate chains for print, sound and visual communications, and education. Print: brochures and books; Sound/text: telegraph, telephone; gramophone and radio. Visual: art, photography, lantern slides, filmstrips, motion pictures, television, multimedia, computers; and communication networks, Some innovations add to what is already available; others modify or replace their predecessors. The point of this exercise is that every discovery or invention leads to practical applications. Some enable us to do things not previously possible; others increase scope and/or reduce cost. As technologies become available and affordable, they may also benefit education.

Negative agents of change include war, natural disasters, and social, economic and political upheaval. Education is particularly vulnerable to destructive changes.

In 1957, Sputnik showed that U.S. science and engineering education needed improvement. In 1960, James D. Finn's envisaged a technological revolution in education and began his study of technologies education (see next page). Through the Technological Development Project of the National Education Association, he tracked development of new curricula, communication media, and teaching methods. He paid particular attention to audio, film, video, interactive multimedia and computer based devices for group and individual learning. Over the next three decades, technologies such as the overhead projector and television became standard in most classrooms, Introduction of ubiquitous computers and networks (internet) led to massive investment in computers for schools and colleges in the mid-1990s. Private industry invested in undersea cable which made the Internet global and inexpensive. Teacher training institutions trained teachers to use computers in instruction and the technological revolution envisaged by Finn became a reality.

Over-investment in undersea cable and networks created the dot-com bubble and the collapse of computer and networking companies. The attacks of 9/11/2001 on the Twin Towers of the World Trade Center refocused national priorities on war, and the global economic collapse of 2007 resulted in greatly reduced budgets for teachers and instructional resources. Tools developed for distance learning were adapted to maintain quality and numbers of students served by educational programs. The technological revolution education infrastructure and workforce were decimated and research, reengineering, and transformation were put on hold.

The second part of this editorial will be in the October issue of this Journal.

Technological Development Project of the NEA – 1961 to 1963

http://www.aect.org/About/History/tdp.htm
(updated by Donald G. Perrin)

The Technological Development Project (TDP) was conducted under the aegis of the National Education Association (NEA), although it was staffed with people from the NEA's Department of AudioVisual Instruction (DAVI), and its reports were ultimately published and distributed by DAVI. The contract[1] began in 1961. James D. Finn of the University of Southern California (USC) served as principal investigator; he remained in Los Angeles while the office and staff were in the NEA building in Washington, DC.

Finn drew in talented younger members, such as Lee Campion, Donald Perrin, and Donald Ely to work on a wide range of studies of the status of the traditional and emerging technologies in the schools. Campion headed the Washington office for a time before departing for a position with the state education department in New York, at which time Ely took over management of the Washington operations. Ely also worked on a sub-contract to the Commission on Definition and Terminology. The Commission's work done for the TDP project was coordinated with the definition project that culminated in the major definitional work issued by DAVI in 1963, *The Changing Role of the Audiovisual Process in Education: A Definition and Glossary of Related Terms*.

The contract called for a very ambitious program of study and reporting on issues ranging from the uses of AV in the schools from 1930-1960 to the future of the computer in education. The staff was hard pressed to deliver within the original one-year contract period, which was extended to February 1963.

The publication of the TDP reports was subsidized by the NEA, but DAVI served as the printing and distribution source, as determined after lengthy negotiations with the U.S. Office of Education. Eventually, DAVI produced four monographs as special supplements of AudioVisual Communication Review (AVCR) plus other documents published as TDP reports.

Key AVCR Article and Supplements

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Norberg, Kenneth (Ed.) (1962). *Perception Theory and AV Education.*

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L. Paul Saettler, *History of Instructional Technology, II: The·Technical Development of the New Media*. Occasional Paper No.2, NEA Technological Development Project, 1961

James D. Finn and Perrin, Donald G., *Teaching Machines and Programed Learning, 1962: A Survey of -the Industry*. Occasional Paper No.3, NEA Technological Development Project, 1962

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Editor's Note: Many educators ask the question, "Which delivery method works best - face-to-face, online, or hybrid?" That leads to further questions about objectives and subject matter. This study adds an important variable - comparing delivery modes for lower performing students and higher performing students. The results reinforce some of our expectations, but for some, there are surprises.

Comparing Online with Face-to-Face Teaching Delivery for Student Performance

Fletcher Lu
Canada

Abstract

This paper presents results of a quasi-experimental quantitative comparison on student performance between two groups of students: one group taught with a traditional face-to-face classroom approach and the other through a completely online recorded instructional approach. The objective of this study was to assess if online teaching delivery produces comparable student test performance as the traditional face-to-face approach. Controls placed on the study to reduce the possibility of confounding variables were that the same instructor taught both groups covering the same subject information, using the same assessment methods and delivered over the same period of time. The results of this study indicate that online teaching delivery is as effective as a traditional face-to-face approach in terms of producing comparable student test performance but only if the student is academically higher achieving. For *lower performing* students the online delivery method produced significantly poorer test performances versus the test performances of the *lower performing* traditional face-to-face students. In summary, when split equally into *higher performing* and *lower performing* students based on assignment performance, a *higher performing* student appears unaffected by the teaching delivery method in regards to their test performance. But for *lower performing* students a traditional face-to-face teaching approach tends to produce better test results than an online delivery approach.

Keywords: distance education, online learning, face-to-face learning, learning abstraction, interactive learning environments, post-secondary education

Introduction

The popularity of online delivery of courses may be attributed to the advantages it presents to education institutions and the students in terms of flexibility in scheduling, opportunity to reach remotely located students and non-traditional educational tools such as customized learning programs. However, the utility of online delivery is also predicated on the approach's effectiveness in producing comparable learning outcomes compared to the traditional face-to-face approach. Much of the early research that has been compiled by Russell (1999) had indicated that learning performance is on average comparable for online recorded lectures compared to a traditional face-to-face approach, which he called the 'no significant difference phenomenon'. However, later work by Ross and Bell (2007) has indicated that the earlier studies' results may have only related to what Weigel (2002) refers to as surface learning. Ross and Bell's (2007) work demonstrated that deeper levels of learning, requiring more abstract thinking, do show a difference in test performance between students in a face-to-face environment versus those learning through strictly online asynchronous methods. The face-to-face students in their study performed significantly better than the online students in test questions requiring application/analysis/synthesis, while more surface learning problems dealing with knowledge and comprehension showed no statistically significant difference between the two student groups.

Bloom's taxonomy of learning abstraction (Huitt, 2011) indicates that students must be able to achieve the lower levels of learning abstraction such as knowledge and comprehension before being able to demonstrate higher levels of learning such as analysis and synthesis. If online teaching does generally do a poorer job of instilling abstract learning abilities then it should generally be true irrespective of student ability, assuming that student ability is not a function of some innate facility with abstract thinking. Under such an assumption, both high and low academically performing students should perform significantly worse in abstract learning in an online learning environment than a face-to-face one. Our research explores this assumption on learning abstraction and results indicate that the high performing students *may* have some innate facility for greater abstract thought as no test performance difference for these students in a face-to-face course compared to an online version of the same course was shown. It was only with low performing students that a consistent significant difference was found in test performance among the two different teaching environments.

A poor student test performance was also shown for those frequently using an online teaching tool by Le et. al (2010), in a comparison study of students who had access to both the face-to-face form of lecture delivery and recorded online lectures. Le et. al.'s study illustrated that those using recorded lecture tools the most actually performed the poorest. They attributed the results to the type of surface learning that Ross & Bell indicated in their study. The belief is that those viewing a recorded lecture many times and/or pausing the recording many times most likely are having a difficult time understanding a concept and thus are failing to achieve the deeper level of learning needed to answer complex test questions of analysis and synthesis. This surface level of learning would also explain our study result of why poorer performing students would also do significantly poorer in a purely online learning environment instead of a face-to-face environment. In the face-to-face environment concepts that a student is having difficulty with may be interactively explored where instructors may answer clarifying questions of the student. In a recorded lecture scenario, that interactive approach is lost.

This paper presents the results of a quantitative analysis on student performance comparing a completely online teaching delivery approach against the traditional in-class teaching method. For the purposes of this study, when we refer to 'online teaching' we refer to an approach where the delivery of all lectures, assignments and learning object tools may be accessed asynchronously by the students through the internet. No face-to-face interaction occurs between the instructor and online taught students, except during testing. Students were divided into *higher performing* students and *lower performing* students for each teaching delivery method. In order to avoid skews due to students who missed assignments, the median grade on assignments was used to divide the students, with those students' assignment averages above the median being classified as *higher performing* and those below the median being classified as *lower performing*. Our results indicate that *higher performing* students had no significant difference in test performance, but the *lower performing* students' test results were significantly poorer in the online delivery compared to their *lower performing* counter-parts in the face-to-face delivery. Thus, Russell's (1999) "no significant difference phenomenon" may be better clarified as a "no significant difference phenomenon for surface learning or students of higher aptitude".

Materials and Methods

This study originated from a naturally self-selected group of undergraduate university health science students who were given the option to choose between an online statistics course and one taught in a traditional face-to-face manner. In order to mitigate the effects of self-selection, such as those discussed in Collins & Pascarella's (2003) paper, which could result in other explanations for differences in test performance, the researcher evaluated the assignment performance of the students to determine if the two groups of students had any significant

differences in their aptitude for the subject through their assignment performance. The baseline assumption is that assignment performance is a measure of their general topic competency. Table 1 shows the results of that assessment using an independent t-test measured over all five of the assignments given to the students. The same assignments were given to all students: online and face-to-face. An overall assignment mark for each student is calculated and this mark is used in the t test in the far right column. This was the mark that is used to split the students into 'higher' and 'lower' performing groups. There was no statistically significant difference in student assignment performance in both the overall mark and in nearly every assignment, indicating that the general competency of the two groups for the taught topic was comparable. The online class size was restricted by the administration to a maximum 30 in keeping with (Qui, 2010) general recommendations for the need for smaller class sizes for teaching online delivery effectiveness. The actual online class enrolment was 20 students with 72 students enrolled in the face-to-face delivery approach. For a more detailed analysis of the assignment performance differences see the 'Results' section.

Table 1
Comparing Online vs. Face-to-Face Assignment Averages

		Assn 1	Assn 2	Assn 3	Assn 4	Assn 5	Overall Assn
Overall	**T statistic**	-0.34973	-0.54380	0.00397	-0.39042	-0.66969	-0.56894
	p-value	0.36368	0.29396	0.49842	0.34858	0.25238	0.28541
Above Median	**T statistic**	1.02408	-0.52567	1.61907	-2.42238	0.50177	0.63687
	p-value	0.15570	0.30088	0.05629	0.00980	0.30917	0.26376
Below Median	**T statistic**	-0.99025	-0.47713	-0.60684	-0.03897	-0.80415	-1.03507
	p-value	0.16373	0.31782	0.27354	0.48455	0.21282	0.15315

Subjects

The course began with 20 online students and 73 face-to-face students with one dropping the class before the final exam. In order to test the hypothesis that poorer performing students' test results will be significantly worse for an online delivery approach in contrast to a face-to-face approach, we chose to sub-divide the students in each teaching delivery group into 'higher' and 'lower' performing students using their median assignment mark for each group. In keeping with Garavilia & Gredler's (2002) work, assignment performance should be a strong predictor on subsequent future performance, in this case poor performance.

Before separating the students into their 'higher' and 'lower' performing groups, we assessed the student's assignment marks to determine the comparable ability of each group. Five assignments were assigned in the course. The median assignment mark for each student was computed. Online student assignment median was 79.9% while face-to-face students had an assignment median of 82.1%. The difference was not statistically significant ($p = 0.285$).

After the students were split into 'higher' and 'lower' performing students using their median test scores in each group we had 10 *lower performing* students in the online class and 36 *lower performing* students in the face-to-face class. Similarly we have 10 *higher performing* students in the online class and 36 'higher performing' students in the face-to-face class.

Online Delivery Tools

Both the face-to-face and online courses used the same online learning tools that are listed below. The only difference was in the lecture component. In the lecture delivery, the face-to-face class had the lectures delivered in a traditional manner in a classroom delivered by the instructor using PowerPoint slides. The online course had their lectures delivered via Camtasia studio software recording where the PowerPoint slides are video recorded with the lecturer's accompanying voice capturing all slide changes and mouse movements. The PowerPoint slides were available for download to both classes.

Assigning and return of assignments as well as delivery of marks and discussions were all conducted through the internet using the system known as WebCT. Both classes had weekly one hour tutorials where the online class interacted in real time with the tutor through the software system known as Adobe Connect which allows for audio and text conversations as well as posting of documents and virtual whiteboards to write out problems and solutions. The face-to-face class' tutorial was conducted in the traditional face-to-face format using real whiteboards and documents.

Several customized web-based learning tools were created by the instructor to teach concepts such as demonstrating probabilities with virtual die (figure 1) and choosing & applying statistical test techniques for medical/health studies (figure 2). Sample screen captures of the learning objects are given in figures 1 and 2.

All the custom made online tools were made available to both classes.

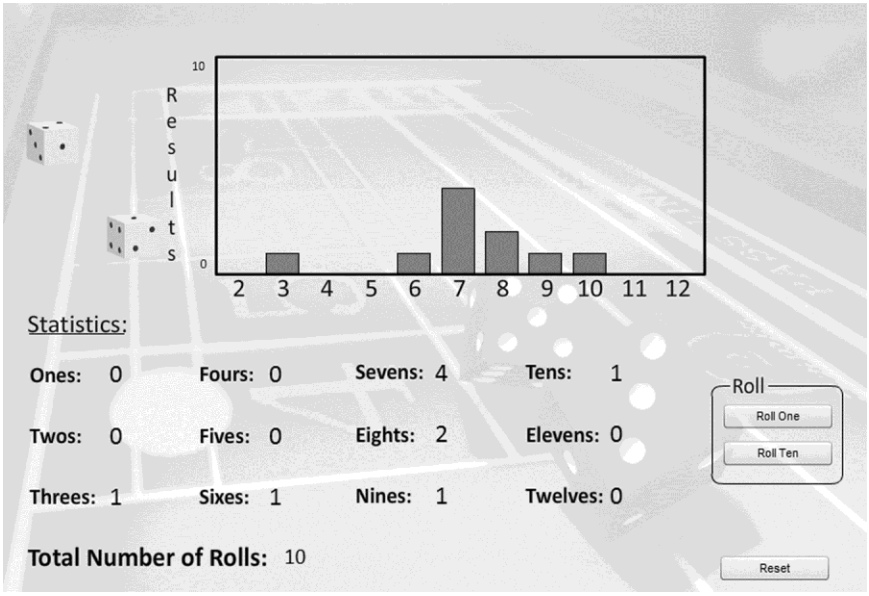

Figure 1: Probabilities with virtual die.
Learning object custom developed to illustrate probability distributions allowing from the roll one or two virtual die over many rolls.

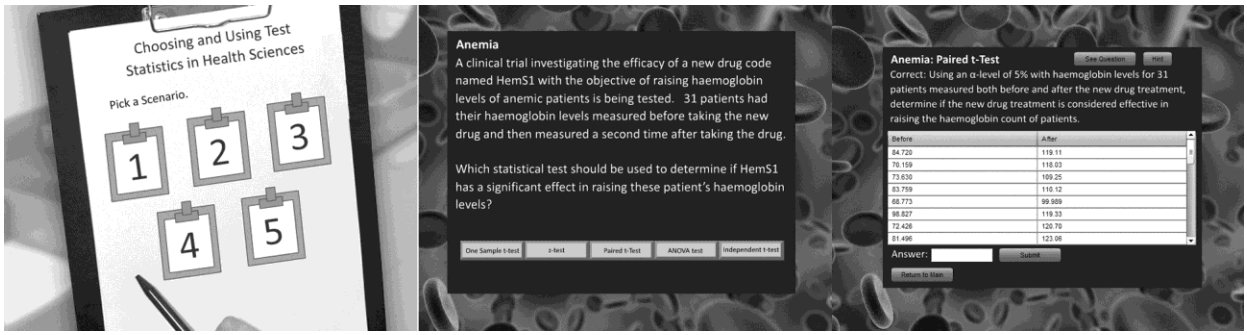

Figure 2: Health statistics scenario screen captures.
Students use this application to learn how to apply statistics tests to health science situations.

Assessments

The course employed two forms of assessment: written assignments and a closed book final exam. The assignments were delivered through WebCT and written submissions were handed in by students through WebCT for both the online and face-to-face students. The closed book final exam was administered on campus with both groups of students writing in the same room.

Results

An independent t-test is used to analyze the data and is presented in tables 1 to 4. The t statistics for each column is derived from the difference between the online students subtracted from the face-to-face students, so a negative t value indicates that the online students were performing worse, while a positive t value indicates that the face-to-face students were performing worse.

Table 1 in the 'Materials and Methods' section has six data columns analyzing the performance on the five assignments given during the course. The first five columns represent the t statistic and corresponding p values comparing student performance on all five of the assignments given. The sixth column of table 1 compares the overall mean mark on assignments for the students in each group. The rows of table 1 are grouped into three major groups, a comparison of all the online students against all the face-to-face students, a comparison of the *higher performing* online students to the *higher performing* face-to-face students and a comparison of the *lower performing* online students to the *lower performing* face-to-face students. Using a 5% rejection level, for the overall comparison of the online students to the face-to-face students, there was no significant difference on any of the assignments. The same is generally true for the *higher performing* students except for assignment 4 where the negative t value of -2.42238 indicates that the *higher performing* face-to-face students performed better than their *higher performing* online counterparts. It is also important to note that the actual t values for these students across the five assignments varies with three positive and two negative values, which indicates that we cannot draw any consistent pattern from the assignment 4 result. In contrast, the *lower performing* student group has very consistent negative t statistics across all five assignments. None of them, however, reach a 5% significance rejection level. But, the consistency is a strong indicator that there is a tendency for *lower performing* students to perform worse in an online environment than a face-to-face one.

Table 2
Comparing Online vs. Face-to-Face Final for All Students

	Final MC	Final SA	Final CA	Final Overall
T statistic	-0.79131	-0.54556	-3.26326	-2.35343
p-value	0.21542	0.29336	0.00078	0.01039

Table 3
Comparing Online vs. Face-to-Face Final for Above Median Students

	Final MC	Final SA	Final CA	Final Overall
T statistic	0.75158	1.22908	-1.56989	-0.62539
p-value	0.22815	0.11279	0.06180	0.26747

Table 4
Comparing Online vs. Face-to-Face Final for Below Median Students

	Final MC	Final SA	Final CA	Final Overall
T statistic	-1.55517	-1.93865	-3.43444	-2.80967
p-value	0.06354	0.02949	0.00065	0.00369

Tables 2 to 4 present the independent t test results and their corresponding p value that compare the student performances on the final exam for the course. Table 2 presents exam results that support some of the past conclusions of both Russell (1999)'s "no significant difference" and Ross and Bell's (2007) learning abstraction difference. The first to third columns compare the results of each of three components that made up the final exam. The last column of the tables compares the overall exam marks. The exam components were: a Multiple Choice section (MC), a Short Answer section (SA) and a Computational Analysis section (CA). The first two columns of Table 2 show that for less abstract questions such as those presented in the MC and SA questions, there is no significant difference in performance just as Russell found. But supporting Ross and Bell's analyses, we see that for the more abstract learning questions presented in the CA questions, there was a very significant difference between online and face-to-face student performance ($p=0.000779$). This significant difference was also reflected in the overall final exam marks of the students, which had the CA section make up 42% of the overall final exam mark, resulting in a significant difference between the online and face-to-face students ($p=0.010389$).

Table 3 compares the *higher performing* students' final exam results. Table 4 compares the *lower performing* students' final exam results. The independent t tests from table 3 indicate that *higher performing* students show no significant difference in their test performances between the online approach and the face-to-face approach, if one uses a 5% rejection level. Table 4, in contrast, for the *lower performing* students shows that not only do the online students overall perform

significantly worse (t = -2.80967, p=0.003686) than their face-to-face counterparts, but that the online students performed worse consistently in all three sections of the exam (with negative t statistics in every section). This differs markedly from the *higher performing* students where the online students performed better in the Multiple Choice and Short Answer sections, but the face-to-face students did better in the Computational Analysis section.

Discussion & Conclusions

Our paper supports the Ross & Bell (2007) finding that as learning abstraction levels increase, student performance decreases in an online teaching environment versus a traditional face-to-face teaching environment is generally true. However, as our table 3 results indicate, this may be somewhat of a threshold level rather than some gradual progression for 'higher' performing students. Like Ross & Bell, we broke down the components of our final exam to analyze student performance with Multiple Choice (MC) exams requiring mostly recall and recognition thinking and thus a lower level of learning abstraction than the Short Answer (SA) questions which require more analysis and comprehension, while the Computational Analysis (CA) questions require the greatest level of abstract thinking/learning. Our table 3 results had online *higher performing* students producing better marks than their face-to-face counterparts in MC and SA questions. It was only in the CA questions that the online students performed worse.

Instead it was only for *lower performing* students, shown in table 4, where a consistent gradual worsening of test performance was demonstrated with each successively more abstract test type and that the online students were always consistently under-performing compared to their *lower performing* face-to-face counterparts.

What may be drawn from this study is that for students who are generally poor performing students, online courses with low amounts of synchronous interaction would generally produce a worse test performance than if such a student took the same course in a traditional face-to-face format. Also, if one is a poorer performing student, as the level of abstract thinking required for the course increases, the student's test performance in the online class degrades compared to their potential performance in a face-to-face version of the class. For generally *higher performing* students, our study was not able to show any such consistency in test result degradation as abstraction increased.

In this study we have not studied the potential reasons that poorer performing students do worse in an online environment while their *higher performing* students do not show such difference. There are a number of possible explanations which the researcher would like to explore. Face-to-face classes generally provide more structure as a regular class meeting time must be coordinated. This increased structure may force greater discipline that aids poorer performing students in their learning habits. Young's (1996) analysis indicated that those with poor self-regulated learning strategy ability tended to do poorer in an environment where the student had controls on the teaching delivery such as in an online environment. Thus, *lower performing* students may be poorer in self-regulated learning strategy.

The face-to-face environment also provides students with the opportunity to interact with the instructor during the actual lecture to bring up questions for clarification and elaboration on topics at the moment of the presentation of a topic. It could be that receiving the clarification at the moment when a topic is learned, especially one that requires a great deal of abstract thinking, helps avoid confusions that would not be otherwise easily clarified after the fact during, for instance, a tutorial. Why this would affect *lower performing* students more than *higher performing* ones, may be due to a greater ability to follow up, note and/or remember confusing points that they bring up during tutorials or other times outside of lecture times.

From a practical stand-point, for students and educators, our study would indicate that offering online courses is a valid option for educating students that would produce comparable test performance but only for a segment of the student body that is generally *higher performing*. The traditional face-to-face format for educating is most acutely useful for educating those students generally struggling academically or those courses that require a heightened level of abstract thought. For educators, especially those involved in allocation of resources and curriculum design, it would indicate that online delivery is best kept for those courses not requiring high levels of abstract thought. For students, the saying 'know thy self' in terms of one's own scholastic aptitude may serve best in determining if a particular student should take a given online course.

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Editor's Note: Young people have led the introduction, acceptance and use of computers for a wide variety of purposes including networked communications and learning. Studies are now validating how different features and strategies contribute to overall effectiveness for learning from a student point-of-view.

Assessing Students' Attitude towards the Use of Computers in the Classroom

Waleed Eyadat
Jordan

Abstract

The primary purpose of this study was to investigate students' attitudes toward the use of computers in the classroom at "New Horizon" school. The study utilized a qualitative design including interviews and classroom observations. The study participants were a focus group consisting of eight students, two fifth graders and six eighth graders, who were either enrolled in or had taken an introductory computer class as a mandatory part of the school's curriculum. Students were selected by the teacher and their participation was voluntary. Of the eight students who participated in this study, five were females and three were males, ranging from 10-13 years of age who were enrolled in the class of "an introduction to a computer bias education" offered by the school, including two teachers and the director of technology at the school. The results of the study, based on interview analyses, indicated that students generally had positive attitudes toward technology and toward learning via technology. The results of the study showed that, for this sample of students, neither gender nor grade level impacted student's attitude toward technology or their attitude toward learning using technology. The study ended by providing a number of field suggestions one of which states that data does not provide conclusive evidence that students' attitudes toward subject specific learning are impacted by their technology based learning experiences.

Keywords: technology used in education, classroom, attitudes, Jordan.

Introduction and Theoretical Framework

Globalization and the digital information age are reshaping the way we live, learn, work, and play; and this trend is likely to continue (Goodman, 2002). Some of the effects are the rapid accumulation of knowledge and the sharing of information in nanoseconds (Anderson & Falsa, 2002). People are being able to stay in contact from nearly anywhere on the globe and around the clock, and new innovations in technology are arising at a fast pace (Hyatt, 2003). Through e-Mail, the World Wide Web, and multimedia technology, the Internet has become a pervasive part of the learning process in education (Brown, 2002).

Today communication media and networks are breaking down the walls of a classroom, allowing students to view the world beyond where they live and learn. Technologies indeed open many opportunities for learning (Cashman, 2004; Mehlinger & Powers, 2002). The United States Census Bureau (2001) has reported that nearly two-thirds (65%) of all children aged 3 to17 years had access to a computer and the Internet at home in 2000 (up from 55% in 1999), while 30% of children used the internet at home (up from 19% in 1998).

With the advent of computer-based interactive multimedia, education has become more exciting for students of all ages (Boling, 1999). In the classroom, computers and computer-related technologies have a profound influence on the way teachers instruct and students learn (Cashman, 2004). Studies have indeed shown that the use of computers in schools can have a beneficial effect, not only on the students' achievement, but also on their motivation to learn, on the

atmosphere in the classroom, and on the teachers' willingness to experiment with a new and innovative instructional approaches (Gulek, 2003; Guthrie & Wigfield, 2000; Schacter, 2001; Schofield & Davidson, 2002).

According to the US Census Bureau (2003), 78% of online youths aged 12-17 say that they believe the Internet helps them with school work, and 79% of college students agree that Internet use had a positive impact on their college academic experience. More specifically, 87% of parents believe that the Internet helps their children in school and 94% of youth ages 12-17 who have Internet access say they use it for school research (U.S Census Bureau, 2004).

Adebowale, Adedwoura, and Bada (2008) state that many primary studies have been performed to reveal the effects of positive attitude towards computers. High computer self-efficacy and a lower computer anxiety level can be important factors in helping students learn computer skills and use computers. Sam, Othman, and Nordin (2005) conclude that monitoring the users and attitudes towards computer should be a continuing process if the computer is to be used for teaching and learning. Timothy and Teo (2006) state that computer attitudes do not only play an influential role in determining the extent to which students accept computer as a learning tools but also as a learning tool using it for further study and vocational purposes. Ajzen and Fishben (1977) argue that by understanding an individual's attitude toward an object, one can predict his/her overall pattern of response to the object. A positive relationship has been shown to exist between the experience level with the computer and a favorable attitude toward it. If the computer-anxious user has a positive attitude toward computers; he or she can expect to reduce anxiety through continued experience with them (Holt & Crocker, 2000).

In the past decade, elementary and middle schools have made large investments in implementing technology in the classroom (Cuban, 2010). It has been hypothesized that technology improves student achievement in all areas of study, especially math and science (School Reform and classroom practice, 2010). With the implementation of school-wide programs, it was also believed that students' attitudes toward technology as a useful learning tool would improve (Alexiou-Ray, Wilson, Wright, & Peirano, 2003). Therefore, this study intends to explore students' attitudes toward technology-based instruction and subject specific learning. Attitudes and feelings need to be examined as important factors in assessing the effectiveness of technology oriented teaching.

Research Questions

1. To what extent does the use of technology in the classroom impact students' attitudes toward technology-based instruction as evidenced by student and teacher accounts of their experience?
2. How do student and teacher interpretations of technology-based learning suggest the impact of such programs on student attitudes toward subject specific learning?

Methods and Procedures

Study Participants

This qualitative study analyzes students attitudes toward the technology-based instruction plan implemented at New Horizon School. The director of technology will be interviewed in order to get a full picture of the nature of the program and how the teachers utilize it in their classroom practices. One group consisted of eight students purposively chosen by the teacher from their respective classes will be interviewed so as to examine their attitudes toward the technology-based learning experience. Conducting in-depth interviews increases the ability of the researcher to understand the totality of the program's impact on students' attitudes. It allows for analysis which more clearly reveals the depth of an inherently complex relationship between student and

technological environment. Such understanding would be overlooked if data were otherwise reduced to simple quantifiable categories. Therefore, in-depth interviews are the most appropriate approach to this study given its purpose and its subject matter.

Subjects for the study were a focus group consisting of eight students, two fifth graders and six eighth graders, who were either enrolled in or had taken an introductory computer class as a mandatory part of the school's curriculum. Students were selected by the teacher and their participation was voluntary. Of the eight students who participated in this study, five were females and three were males, ranging from 10-13 years of age. The director of technology at the school also participated. Permission to conduct the study was obtained from the Director of technology, the Principal of the school, and the student parents.

Procedures

A preliminary meeting with the director of educational technology of the school was held to discuss student's participation in this pilot study. The students were asked to participate in this study and they were informed that this study was on attitude towards technology in the classroom. All of the students were willing to participate voluntarily. Three days after the first meeting, students were asked to sign a consent form if they wished to participate. To ensure participants' cooperation, they were also briefed about the intent of the study and confidentiality of their identity and their responses. Two in-depth interviews of thirty minutes each were conducted. Data from these interviews were then transcribed, selective coded, and within case analysis was conducted. The overlying themes were then subdivided through the process of axial coding. The resulting themes are presented as a heuristic of students' attitude towards technology based learning. The interview was administered by the investigator to the students during normal school periods.

Study context

New Horizon is a private, elementary school established in 1995, which now has over 200 junior kindergartens through eight grade students during the regular school year and a staff of 25. Students come from many different cultures and ethnic backgrounds, New Horizon offers a challenging languages arts program, Islamic studies, Qur'an and Arabic programs as compulsory courses for all students. Furthermore, students have been introduced to the basic of keyboarding; MS Word, MS PowerPoint, MS Excel, Internet and e-Mail.

A full-scale technological program has been operated there for several years. This technological program includes a mandatory computer skills class for all fifth graders. Most of middle school students use computers for classroom work, assignments, and even for Internet search and research. Technology also includes Microsoft applications and interactive educational software. Technology instruction at New Horizon School consists of a three year sequence of district technology based instruction followed by a patchwork of teacher-led applications such as completion technology through a program called "Accelerated Reader" that teachers rely on to assess he students' reading levels. In fourth grade, students attend computer lab once a week and in the fifth and sixth grade they attend a computer class twice a week. In these classes, the students are introduced to applications of the Microsoft Office suite, including word, Excel, FrontPage, as well as instructed in how to use Internet explorer to navigate the internet. In fifth-grade they are required to learn how to types. Before the introduction of technological facilities, the school operated under a traditional program from Kindergarten to 8th grade. Approximately 200 students are enrolled in the school.

Data Sources

The following guiding questions directed the investigator's collection of research data. The interview protocol was administrated to students and the director of technology at the school campus, and they were allowed sufficient time to respond to all protocol questions , the question

included items related to what students like best about Microsoft application, what they wish were different about it, and what is the most important thing you learn from Microsoft application. Other questions included items related to the idea if the things that they learn from the computer class helped them in class assignments and whether the availability of computers and the internet at home is useful to them. Teachers were also asked about the aspects of the Microsoft application they find most useful and how it impacted their teaching and classroom practices, their view of students' reaction and interaction with the technology program, and the feedback they received from parents regarding the program.

Findings

The interview data showed that students generally had positive attitudes toward technology and toward learning using technology. The findings do not show that, for this sample of students, neither gender nor grade level impacted either students' attitude toward technology or their attitude toward learning using technology in a classroom setting. The data do not provide conclusive evidence that students' attitudes toward domain specific learning are impacted by their technology based learning experiences.

Findings Related to Research Question One

Theme (1) Enthusiasm and Self Efficacy for computer use

The evidence that students have a positive attitude toward technology based instruction comes from their overall enthusiasm for their computer class and from the sense of self-efficacy that it seems to produce in them. In several instances the teacher suggests that positive attitudes arise from a sense of self-efficacy. For instance, she says, "…they love PowerPoint. They get a huge kick out of that one. I mean just you know being able to use pictures and text and all the animation effects and sound effects you know they get a huge thrill out of that (line 64)."

The teacher paces a great deal of importance on the role of prior knowledge in developing confidence and self-efficacy. They role of self efficacy is important to be stressed as a modality of advancing knowledge and learning.(Schunk,2004),or as she says,

> "…for some students it all depends on how much they've been exposed to" (line 159).

Theme (2): Past Experience in Computer use

Positive attitudes toward technology were also related to their experiences such as early exposure, prior knowledge, concrete abilities, and specific achievements. As their computer teacher commented,

> "…even they figure it out on their own before I get to them so because they—I mean they're not hesitant to try new things and click and all of that…. They don't have that sort of reservation or fear—they just keep clicking but because of that they learn very fast" (line 107).

Additionally, there is evidence that students take the use of technology as a very personal matter. This reflects both an internalization of the learning process and high levels of self-efficacy (Schunk, 2004). Several of the students related their experience in the classroom to experiences at home with their parents and siblings. One girl's comments are particularly revealing, "I like learning how to make graphs and charts because my mom she's not really a technology person, so I show her how to do everything, and also it's really fun making PowerPoint presentations (line 435)."

Theme (3): Confidence and Anxiety about computer use

The notion of "lack of fear" and the children taking initiative was repeated several times through the interview suggesting students have a sense of confidence which translates into a positive attitude toward the technology. This clearly demonstrates the girl's confidence in her ability to successfully apply the new skills that she acquired in class to a specific task. This ability to transfer knowledge from one situation to the next has important implication for subject specific learning.

Findings Related to Research Question Two

Theme (3): Motivation to attain computer skills

By applying the skills they have learned in their computer course, students are able to transfer their knowledge to new and different tasks. In doing so, they learn the benefits of their newly gained technological skills and are motivated to learn more. The teacher also confirms this:

> "I have for instance a student that she's not as confident using it as some of her classmates because she doesn't have it at home and initially when she started she was just very hesitant… But the more she's using she has been using it here, the more confident she is and sometimes she just comes in and says 'Can I use the computer Ms. [instructor's name]?' like just to do a graph or whatever." line 157

Nevertheless, it was somewhat difficult gauging the extent to which students' attitudes toward domain specific learning from the data that was gathered. This can be partially explained by the structural separation of their other coursework from their designated computer class. However, in those instances in which students did use technology for completing their assignments, they did express a mild enthusiasm for it. One student, for example, commented that,

> "Um, I think it's way easier to do current events on the computer because um our teacher—we have to do it on a specific place, like Iraq or Turkey or something—so it's easier if you go to like cnn.com or latimes.com and you type in Iraq or Turkey instead of going and searching for newspapers about it. *It's easier* [emphasis, line 551]."

Some of this enthusiasm should however be tempered by a copy-cat effect in the interview process, as each student attempted to outdo the next.

Discussion and Implications

This study investigated the impact of technology based instruction on students' attitudes. In this study, attitude is understood as a system of a person's recognition, feelings, and action tendencies with respect to the various objects in his world (Kreck, Crutchfield, & Ballachey, 1937). Technology is the application of scientific knowledge to human concern and objective. It includes a body of engineering methods and tools, related but distinct from the tools and methods of science (Clark, 2004).

As finding revealed, students generally had positive attitudes toward their experiences with technology. In addition, the data suggest that a technology based learning environment (their computer class) improved their attitude toward the technology itself. Less apparent, was the extent to which technology played a major role in their subject specific learning. This pilot study would lend support to the notion that discrete use of technology based instruction does not easily transfer to subject specific environments (Conlon & Simpson, 2003). Yet, further confirmation of such a thesis necessitates a more thorough comparison of this data with experiences of students who had experienced a more integrated technology based experience. Furthermore, when the students in this study enter secondary school (New Horizon is K-8), they will be placed with students from other schools who have received different levels of exposure technology-based instruction. A study of how students negotiate this blending of abilities point to another avenue of worthwhile research.

In this study, the teacher points to a number of structural constraints which limit her ability to implement a more comprehensive technology program. Among these constraints, are a low budget, a "busy" curriculum, inexperienced teachers, and technological support staff (she does not have assistants)? These constraints work to prevent improvements in the overall quality of educational technology at the school such as subject specific technology based curriculum development or even greater incorporation of the existing technologies to existing subject specific curriculum. A focus on subject specific learning reflects a belief that educational technology should be used as tool for empowering students to create knowledge in subject specific learning environments and not merely be taught as another subject.

It is precisely these empowering opportunities which fail to materialize with inadequate or misallocation of resources. In the case of New Horizon School, without more information about specific resource allotments, and given that students generally saw the information they learned in their computer class to be relevant to their other coursework, one would expect a greater level of subject specific technology based instruction would multiply these positive attitudinal impacts. Furthermore, it appears as if their educational technology program could benefit from using existing resources in more social environments, collaborative student projects, or other cross curricular uses.

There was also a discrepancy between the teacher's perception of the students' experiences with technology at home and the students' own accounts of when and how they use computers for their coursework. For example, the teacher mentioned that her students have a mixed set of prior experiences and exposure (line 59) while all the focus group students said they had access to the internet at home (line 498). In such a case, the teachers' comments might be more valid if students are reluctant to admit that they do not have a computer at home due to possible class implications. Another example of such a disjuncture regards the importance of the computer lab itself as the site of learning related to technology. One student's comments are particularly revealing:

> Normally, I only use the computer at home. The only time I use a computer here is if our teacher asks us to go to the computer lab to research something during class or if I forget something…. (610)

In contrast, the teacher's comments focus more on prior experience in the home rather than on possible current experience in the home. Unfortunately, while compelling, questions related to the actual and ideal site(s) of technology-based learning cannot be discussed here yet represent a fascinating avenue of further research, especially as they may suggest the need for developing curriculum consistent with students' innovative multi-sited learning processes.

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APPENDIX A

Reflection

> Overall, I found this entire process to be both exhilarating and sobering. It was exhilarating because of the excitement that I experienced meeting with the school's technology instructor and a group of bright young students. But it was also sobering to see yet another instance of educational theory being so far from educational practice. Especially in the area of educational technology, we are so far from being able to tap the enormous educational resource which the technology presents.
>
> Another exciting aspect of this qualitative research project was the opportunity to examine my role as researcher and to see how research design and can play such a large role in the results that one obtains. Of course, hindsight is 20/20 and looking back it's easy to see how changing the questions I asked could have had a tremendous impact on my eventual outcomes. Some specific changes I would make in the instrument I used are as follows:
>
> I should have also interviewed subject specific teachers.
>
> I should have had the instructor differentiate between students based not just on their prior experience but also between their level of achievement in technology based courses and other subjects.
>
> I should have asked them a question about how they solve problems with the technology or what do they do after they "just get mad" (line 577)

I see these as both missed opportunities and opportunities to learn for future research. I really enjoyed the qualitative approach because it allowed me to get a more complete picture of how the students and the teacher felt about their educational technology experience. The most revealing (and painstaking) part of the process was the transcription and data analysis. In it, I could see meaningful and value-laden are the comments that we (as people) make. Finally, despite sometimes dragging my feet through it, the rewriting process was helpful because it allowed me to rethink how all the parts of this project would eventually come together.

Transcript of Instructor Interview[1]

Investigator:

The time right now is 12:10 and I am going to take thirty minutes out of your time to ask you a few questions so we can find out about the program. The first questions I really want to start with because from my meeting with the kids they mentioned you are using Microsoft Applications. . .

Instructor:

Yes

Investigator:

Which aspects of Microsoft Applications do you find the best, to be most useful and why?

Instructor:

Uh, basically, I like that fact that, um, uh, for their features and their functionality. And that for the most part they're pretty easy to use. And um, the reason we went I mean they are comparable with software out there on the market but we decided to go with Microsoft products because we know that that's what the kids will probably most likely will be using when they leave our school and go to high school and then of course later in the in the real world. That Microsoft applications have sort of become the, the industry

[1] Coded terms are (CAPITALIZED) in parentheses. The TEXT they refer to is also capitalized. Tentative relationships are indicated with small case letters. Where there are no parentheses the capitalized words refer to the entire passage.

standard and we wanted to expose the kids to something that they will be using later on but also because you know they are pretty fairly easy to use. And they're cheap to get (laughter) for the schools that's always very cost effective, uh, Microsoft offers good licensing pricing for the school and um in terms of the features, they're very comparable like say for instance if you take Microsoft Word versus Word Perfect you know they have very similar features I happen to prefer Microsoft Word. So I mean, we're getting all the functionality we need, and we're also exposing the kids to programs that they will be using later on.

Investigator:

Alright, it seems to me that you really are very familiar with the Microsoft Application. So how would you describe the student reaction to this program that you are using?

Instructor:

Actually, you know by the time that I get them I we have computer instruction that starts in fourth grade—we used to offer starting at a younger age but unfortunately with our schools curriculum it's very packed because they get additional instruction in you know Islamic studies and Arabic and Quranic studies so for the lower they already have a pretty packed schedule plus all the core subjects and music and drama—that is was really, there was really no time in their schedule for sort of um a structured computer curriculum or computer instruction. They do have computers in their classrooms and they use educational software and they use it for research under the guidance of their classroom teacher and last year we got a new program called "Accelerated Reader" that the teachers use it very heavily to assess the reading skills of the students but they don't say come to my computer lab for me to teach them computers—um this is grades K through 3rd grade. So I start getting them in fourth grade and from fourth to sixth grade they come regularly to the computer lab. The fourth graders come only once a week. Fifth and sixth graders come twice a week. And that's where I teach them in a sort of more systemic way how to use Word and how to use Publisher or PowerPoint. And what I find that is by the time—some of them are already familiar with some of the Microsoft Applications—you know they've already used the Internet Explorer to browse the web. They may have even used Word to—you know although we don't make that a requirement at this school because we don't teach them typing until fifth grade we don't require typing of them—because we feel that if it's not part of the curriculum it's not fair for us to require that of them. But you know some of them optionally have used Microsoft Word before to type their products and everything. So some of them have already been exposed, uh, a lot of them haven't. prior knowledge um I mean the only that they would have really have been exposed before they come to me, maybe it's, well definitely, Internet Explorer but then usually Word. But you know then I introduce them to PowerPoint—they are enthusiasm. They get a huge kick out of that one. I mean just you know being able to use pictures and text and all the animation effects and sound effects, you know they get a huge thrill out of that. And um Publisher also, uh, I find that Publisher it's—it has a higher learner curve for them than Microsoft Word. Word is very straight forward. You just have an open document and you start typing whereas in Publisher you get into what kind of document–whether it's a brochure or you know a whatever like an invitation card. So that you know it's not as intuitive to them as Microsoft Word is—you know that one I actually you have to sort of take—even though once they start typing all the features are word processing features—you know how to bold, how to justify, how to change color—how to add WordArt—those they've already learned in the Microsoft Word. So that part they know but it's just creating a new page, having to create a text box—they don't have that concept in Microsoft Word you can just start typing that usually really gets them as soon as they open a Microsoft Publisher, they want to start typing and nothing happens and I keep telling them—guys this is a little bit different, you have to actually insert a text box before you do that or to actually add a picture, they have to put a picture frame first before they can insert a picture whereas in Microsoft Word you can just go ahead and insert a picture without having to do a frame. So that's has a higher learning curve, um, but usually they get that—you know I just have to go over that with them more. And then the other one I do with them is um Front Page. And again, initially they you know set up the whole concept about you know adding links you know it's little bit unclear to them.

Investigator:

So how do they react to that?

Instructor:

Uh, but once, yeah, I mean it comes again the nice thing about Microsoft is the features are the same. You know like they see the same icons at the top—you know file, edit, tools, you know what I mean? And all the little icons for bolding and formatting is so that already is is familiar to them. But then you know with Front Page you know the idea of adding links and changing the background and things like that you know it takes them a little while to do—I mean kids these days are so smart and they're I think having been exposed to them at a very young age they don't have—the main thing that I think helps them learn new skills is that lack of fear. Yeah I think that for a lot of older generations you know because it wasn't part of their sort of reality they're very hesitant—cause like say I have some older teachers—it takes them a while—I mean there is just this fear, apprehension dealing with anything new whereas with kids because they were exposed to it at a young age, even if they don't know something, you know they just ask. You know—how do I do this—or you know sometimes because in a computer class the dynamics is a little bit different I can't always help all of them at once. I mean I do what I do I start my instruction with the using the projector and I show them some things but almost every time when they get to do it, they have questions so I have to go to each of them individually and while I am doing that the other one who are waiting even they figure it out on their own before I get to them so because they—I mean they're not hesitant to try new things and click and all of that whereas I find with older people they're just afraid that they may break something (laughter). Kids don't have that—I mean just by the nature of being kids—they're inquisitive and they don't have that element of fear. You know with the older teachers—it's so funny—sometimes like something pops onto the screen and its either OK or CANCEL and they don't touch anything until they call me. Even though what they see on the screen is pretty clear—CANCEL/OK—but they're afraid that if they click on something it something may happen to the computer whereas with the younger kids while they sometimes are the opposite they just click on too much. They don't have that sort of reservation or fear—they just keep clicking but because of that they learn very fast.

Investigator:

Now go back to the same program, do you feel that it has impacted some students more than others and which ones and why?

Instructor:

Impact them in what way? Like motivate them to learn better?

Investigator:

Yeah

Instructor:

Uh, it does like say with word processing. Yeah, I mean usually when I start my lesson um when I start teaching them something I try to talk about the benefits of why they are learning this. You know. I mean we're not trying to torture them by giving them all this new stuff—that there's a real reason why they're learning this stuff. So I tell them, with word processing the reason they need to learn it because it makes their job so much easier when they have to write a report that they don't have to like in the old days they had to rewrite the whole thing again. So that kind of helps a little bit you know once they understand there's a benefit.

Investigator:

Do you feel this I mean has that impacted some students more than others?

Instructor:

Some of the, well, it does. And again I think it's a matter of the individual abilities of the child. For the ones who get it fast and they're comfortable—it's great for them. They they're confident. They got on the computer. It actually boosts you know their productivity. You know. . .

Investigator:

Do you think that's because of whether they have a computer at home or not?

Instructor:

That actually, that is a factor. Yeah. While the ones that don't have computer before, I mean, haven't used it before, don't have it at home. I have, I have for instance a student that she's not as confident using it as some of her classmates because she doesn't have it at home and initially when she started she was just very hesitant and you know and like typing was you know she was like "Ms. [instructor's name], I can't type anymore." I said, "yes you can." She just didn't have the confidence and also because she didn't get to practice it at home because she didn't have a computer at home. But the more she's using she has been using it here, the more confident she is and sometimes she just comes in and says "Can I use the computer Ms. [instructor's name]?" like just to do a graph or whatever. But you know for some students it all depends on how much they've been exposed to. And then it's like anything else—some kids get things get things faster, some kids don't. The one who get it faster are going to use it more. The ones who are a little slower get frustrated. When they get frustrated it's sort of, they shut down a little bit, they don't want to go anymore because you know like something as simple as how to start a new line. If they don't know they have to hit enter they feel stuck. Where somebody else is a lit more confident you knooooooow they just they will ask me or some thing else you know it's just a reflection of where their ability levels are to begin with.

Investigator:

You know the interesting thing you mentioned about students and um from what I see the gender, male and female, do you feel there is a difference in their reaction to. . .

Instructor:

The way boys and girls um?

Investigator:

Yeah. Do you see any difference in the way they are trying to learn with the program you are offering?

Instructor:

(Hesitation) Boys I think tend to be a little bit more confident and I think they just—I mean not that they know it (laughter)—but they just. .

Investigator:

Because they're boys (boyish laughter)…

Instructor:

Because they're boys they have a more you know they're more of a risk taker…

Investigator:

Ah-hah.

Instructor:

I think that's just generally. You know ever if they don't know it, then they say they know it. Whereas girls I think are more conscientious and you know and if they don't know it, they're pretty honest about it. And you know, you know but with boys even if they don't know it, they sort of want to act tough and say they do. But generally, with most of my students, the girls are just as good as the boys and the only factors that I've seen in their lack of confidence is between the ones who don't have it at home or haven't had exposure to it versus those who have. Not boys and girls. I mean this one kid I was mentioning to you that was kind of very hesitant was happened to be a girl but I think could have just as easily been a boy if they hadn't had the prior exposure, didn't have the computer at home, they wouldn't have had felt as confident with it. But I mean in terms of their ability and their you know doing things on the computer, actually girls are just, you know, get the work done and are focused but I think you know that just generally goes to the nature of the boys. Boys are just full of energy and enthusiasm and they don't have as much patience to…they don't

have as much attention to details as sometimes—I mean I don't want to you know stereotype anybody—but you know I think some of the trends that you see like in any other classroom, you would see that in the computer lab too.

Investigator:

How do you see the role of technology in the classroom changing in the future?

Instructor:

Well, probably we will have not these huge monitors…

Investigator:

You have about thirty computers?

Instructor:

We have twenty-two, mine is twenty-three…um, you know we have, unfortunately because we don't have a huge budget for technology, we can't always be at the cutting edge of technology. So I mean I can only get maybe five or six—five maximum—new computers per year. And generally what I do I put the new ones here in the computer lab because they get the most usage out of the highest number of people on campus and then I sort of cycle them through to different classrooms. You know, depending on who uses it for what purpose but generally I would say we are a year or so behind in terms of you know the kind of technology we can get for the school. But I mean ideally it would really be nice to go wireless. We actually tried that uh but, this was about a year or so ago, with a couple of our laptops but …

Investigator:

Then what happened?

Instructor:

… but it wasn't as reliable. The connection wasn't as—I mean I'm sure now it's different. I think because I have it for my home and it works as if it is, you know you've wired the whole place. But, but for the school you know you have to be more. . . you can't always delve into new technologies right away because, first of all, you don't have the budget. Then the training is involved. You know what I mean? You don't have as quick a turn around time, because you can't just introduce something new and then you have to start training everybody and there's a learning curve that needs to be climbed and all of that. But, I mean, it would be real nice that if we had more laptops, more LCD projectors in each classroom. Because right now we have this one multimedia card that the teachers use. Uh, there's the concept of whiteboard—I don't know if you're familiar with it or not—that as the teacher is writing that could be transferred so that they don't have to redo their work. You know all of those are nice things…

Investigator:

You mentioned to me that the teachers might use it—what teachers are you talking about? Teachers who…(inaudible)?

Instructor:

No. All the teachers. No all the teachers they say for instance some of their lessons are based on are web based. You know like they show. Like, say, I don't know, if they're in their Islamic studies class they're teaching their kids about the steps of the pilgrimage to Mecca. Well, there are wonderful website where it show visually the pilgrims going through like at IslamicCity.org or going through the different steps of Hajj. So they would borrow the projector and laptop and you know when they're talking to the kids they kind of have a visual for them to see.

Investigator:

Oh I see.

Instructor:

So they use that a lot in their instruction. They also use, some of our teachers, we just got a digital camcorder for the school. They use that to tape the students, especially, because we teach Arabic as a foreign language, to tape them while they're having sort of a presentation of skit so they can have the kids look at themselves or even for the parents to see. You know, because that's something you can't duplicate and the kids need a little bit extra assistance so that they can hear themselves so they use that quite a lot in some of the classrooms.

Investigator:

So, in what ways has this program that you are using influenced the way you teach this subject or other subjects if there is any?

Instructor:

Um…well you know I know my, my particular area is teaching computer skills but say for the teachers that use regulars subjects like history or math or whatever, to have the ability to incorporate technology into it, I think it just makes it a lot more interesting for the students. I mean I'll give you an example. Like before they used to have the students do a paper on say China, ok. They can still do the same thing with the students but when they ask them to, as part of their report, to create a PowerPoint presentation, that's something, that's when I come and help…

Investigator:

Do you mean help the teacher?

Instructor:

Exactly. …learn how to use the PowerPoint and while they are learning how to use the Power—while they're learning about their subject, also learning the technology skills and they're just again, it's more interesting to them. When they have to have, when they have a PowerPoint presentation to go along with what they're saying. You know instead of having it on the you know 8 ½ by 11 paper when they can actually show their classmates the picture of whatever, like say if they're doing Egypt, a picture of pyramids, you know it just makes it a lot more interesting. And also, then technology I think is great for sort of building other skills like presentation skills, like speaking skills. You know like say something like a PowerPoint—what we do is when they create their PowerPoint they have to stand in front of the class and then teach it to the class, and give their presentation to the class. So not only are they learning PowerPoint and they're learning about that particular topic that they researched, but they're developing their public speaking skills and their presentation skills.

Investigator:

Are there any subjects which you feel are better taught without the use of technology?

Instructor:

Without the use of technology? (laughter) Handwriting skills (laughter)… But honestly, I think sometimes, even though I'm the technology director of the school, you know I think there is a time and place for technology and I think it's good for the kids not to be exposed to it at too young an age because sometimes they get too dependent on it at the expense of learning skills that they need to learn. So, for instance, as great as Microsoft Word is, as wonderful as it is in terms of making the kids more productive and efficient with their time, if they get introduced to it too young, before learning their handwriting skills and their spelling skills, you know they're not going to develop those skills. I mean, yes they know how to use the spell checker but the spell checker it doesn't always work. I mean, there are words that could be spelled correctly but used incorrectly in a sentence like t-h-e-r-e versus t-h-e-i-r. I mean the students, if they don't know the difference, if they haven't learned the difference before, you know and the spell checker flags it okay, then they're not going to develop that skill. So there are certain areas that I think they need not to be pushed too fast into technology until they master certain basic concepts. You know Microsoft is great…

Investigator:

What sort of feedback have you received from parents regarding the program you are using?

Instructor:

Well, they've generally been very positive. Like you experience with the kids. Although most of the kids have computers at home, a lot of the kids their parents know how to use them and actually even if they didn't. Actually when I first started working here, some of the parents were very pleased because they didn't know how to use some of this stuff like say how to generate graphs or how to do PowerPoint and then they get a big thrill out of it that their kids know how to use it and were showing their parents how to use it. So generally it's been very positive. And we also use the technology aside from the students, we use the technology in other ways at the school like for generating report cards, for progress reports we send to the parents, we even post the grades online so the parents can check their grades online and keep track of what the students are doing, what assignments they're missing. So but sometimes with some parents, there is still that resistance you know against technology. And just one example that I'm giving you about posting the students grades online. We wanted to be able for the parents to have at all times know exactly what's going on with their kids' grades. They know which assignments they're missing and our teachers at the middle school level they're required to submit the kids' grades every two weeks. So the parents, so when the report card comes, there is no surprise. They know exactly what the kids are getting in the class. And you find that with some parents, they are kind of old fashioned, they still want to have (inaudible) or they are not as confident with using the computer and even them I've given them the instructions, told them how to use, they still, they don't want to go to the computer and log on and check it online. They want the teacher to have to…

Investigator:

You have mentioned something very interesting which we do at school when we check our grade you through the school website—that's what they do, the parents have to have a password…

Instructor:

Yes. What happened is this is a new service which we started actually last year and we started it included both the lower and the middle school. And the idea behind it is each teacher

Transcript of Student Interviews

Q: Again my name is Waleed, and I really appreciate you guys being here. Today we are going to talk about computer, so we will have a lot of fun talking about computer, I am going to ask you question and I would like to get your answer for that, and if you do not understand my question please stop me and I will repeat it for you. You Know; you are using the computer here at school and I know I am going to refer to you as an a, b, c subjects and as you know you are using Microsoft application. So the first questions is what do you like best about the program that you are using which is the Microsoft application?

Student C: Microsoft application it's very easy to use like Microsoft word were you can type stuff, Excel you can make graphs. Publisher you can make cards and all these kind of documents and PowerPoint you can make a PowerPoint presentations. So Microsoft has all these kinds of programs you can use and its right at your fingertips.

Student A: Well, it is good because they give you like many things to do like if you want to bold something you can bold it. So if you just writing by hand you can also type it. You know fix your all your grammar mistake and your spelling mistakes.

Q: So you will save a lot of time.

Student A: yes

Q: Ok, that is what you mean. Do you wish if there was any different in the program that you're using? Or you are happy with the way it is?

Student B: I am happy the way it is now.

Q: Oh, you are happy with it, and the reason why you are happy with it because it saves you time, that is what you just said. And what else?

Student B: it is not very complicated, like Microsoft XP and stuff, like it is easy for anyone to use, all the grades in our school can use it--anyone

Q: And what do you think?

Student D: I think the same it is not complicated at all, it is very easy to understand, and it is very strait-forward

Student E: Yap, I think the same but I do not like viruses and stuff.

Q: Oh, you do not like viruses?

Student E: Yap

Q: So when the computer get virus, does that makes you angry?

Student E: Yes then my dad has to come and fix it.

Q: That takes a lot of time for him to fix.

Student E: yes

Q: OK; you know there are a lot of program for antivirus that your dad can buy.

Student E: Yes, he has lots of program. But one still comes but when there is a virus he turns the computer off.

Q: All right all right …Now you have mentioned to me that you are using the Microsoft application such as PowerPoint, Microsoft word, and what have you. So what are the most important things you have learned from it? Is there is any specific things you learned from it? Like when you use the PowerPoint or Microsoft word?

Student H: I, Sometimes I can learn like how to spell something if I make a mistake and you can learn how to make something bigger or smaller. Also I think it is very easy to use.

Q: It is very easy to use. Okay.

Student B: I like learning how to make graphs and charts because my mom she's not really a technology person, so I show her how to do everything, and also it's really fun making PowerPoint presentations I use like Microsoft publisher at home when I making birthday card or some thing, so ya.

Q: Ok, you mention that you are using it at home. So how many of you have a computer at home? Wow all of you. So what do you use it for?

Student E: Well; I normally play games on it.

Q: That is all. You never have done your assignments using the computer?

Yes, game and PowerPoint, that is all

Student B:

I used it like if I want to look for a vocabulary word. I also like going and getting a research if I have a paper due. I also likes to work to different things on it.

Q: All right.

Student H: Yes, I used Microsoft word for essays that I have to do and research reports and I also can get pictures off of there for my report, I also use it for the same reason she said, because if I want to get my vocabulary word meaning it's harder to look in the dictionary so I just go to dictionary.com.

Q: So it helps find the meaning of the word that you are looking for. So most likely you use it for your assignment.

Student H: Yes.

Q: OK.

Student F: With our English and history teachers everything must be typed, so like Word helps us typing everything that needs to be typed. And also getting the vocabulary off the internet since you he doesn't let us use the dictionary. So you can go to the internet and get it.

Q: So what you mean when you are typing you just go the tool box and check your spelling. Which means to you a lot faster. Ok?

Student A: I use it for like—I have the same teacher as her—we have to type everything and then I also use it to listen to music.

Q: Listen to music. That is amazing. Ok. Interesting.

Student G: Everything now it's like digital so like the picture we take my dad really likes to store all of his pictures in there and like you can make a slide show and stuff like that.

Student H: I use it for just the same like I get vocab words off it so I can save time, and not use the dictionary and writing research reports and stuff like that.

Q: Let say like if your math teacher give you an assignment and you are trying to get help. Do you ever go to the computer (Because as you know the computer has Microsoft application has a calculator? Have you ever used it?

Student B: Yes because our teacher took our calculators away I couldn't divide something—I needed to get into decimals so I could use the calculator on the computer

Q: And the reason why you haven't used it was because you didn't know there was a calculator or?

Student B: No I knew there was a calculator but I just do stuff by hand—I'm used to doing it by hand.

Q: Now, how many of you have access to the internet? (students raise hands) All of you! Interesting, interesting. Do you guys get access to email? Anybody? Who has an email address? 1, 2, 3, 4, 5, 6. . .

Student B: No, I use my brother's.

Q: You do or you don't?

Student E: Cause from the virus I had to get a new computer.

Q: Okay because of the security reason, your dad gave you a password and supervises you when you are on the internet?

Student E: Yes.

Q: All right, right. So, what do you use it for [the internet]? I mean you just use it to send an email and chat with your friends? What do you use it for?

Student H: Yeah I use it for um I like emails and also I also they like have a lot of things you can like download from the computer so I also download like screensavers and like these smiley things

Q: All right.

Student A: some of our assignments are required using the internet so we do our homework sometimes using the internet and sometimes chat online with my friends—yeah, email and stuff like that.

Q: You mentioned to me something, you said some of your assignments required using the internet, such as?

Student A: and like current events if you don't get the newspaper, you go on the internet and you get articles off the internet and you write summaries—who, what, when, where, why about the article. . .

Student E: we also have vocab. There's a specific website that our teacher requires us to go to on—it's called dictionary.cambridge.com. That's where we get our vocab words, definitions

Q: what about you?

Student H: the same thing just getting articles for current events or preparing the—yeah vocab words also and if I just want to be updated on news or anything

Q: alright, alright, all right. Now,

Teacher: I think she has her hand up.

Student H: I use it for vocab also and articles and like if I don't know something I go on the Internet. I go to Google and I type it in and I also learn a lot from it

Q: Interesting

Student B: Um I think it's way easier to do current events on the computer because um our teacher—we have to do it on a specific place, like Iraq or Turkey or something—so it's easier if you go to like cnn.com or latimes.com and you type in Iraq or Turkey instead of going and searching for newspapers about it. It's easier.

Q: So, my understanding is that you're using the computer for multiple subjects and multiple assignments. Let's say you are stuck on the computer for some reason, if you are at school you ask your teacher to help you and when you are at home you ask your parents. But when you get stuck on the computer, how do you feel about it? Do you feel angry or how do you feel?

Student B: Sometimes if there's like a virus and problems keep on coming up, I get like really mad and I try to let my brother help me fix it. And so uh I try to uh I stay out of the push-up I mean pop-ups so um then sometimes I get really mad.

Q: You get really mad?

Student A: like when viruses do come and like my computer won't work for like a whole week, I get really apprehensive for it to start working and it's like I get mad so like I go to my mom's work or like the library or something, but I have to use the computer. I just can't live without a computer.

Q: You cannot live without a computer? Well. . .

Student B: Sometimes it says there's a problem with Microsoft word or the website that I'm using and it says END NOW and if I just say to ignore it, it still closes, and I have to restart it and then it does the same thing and I get really *really* mad

Student C: Yeah for me, when I try to go on the internet, go to a website for usually my computer's very fast but then sometimes it's just very slow, so when that happens I just get really impatient. Then I just get out of control and then like I just cancel the browser and open it again and then hit start and if it doesn't work, I just get really mad then I just shut off my computer, then turn it on, and start all over again.

Q: Okay. Alright. Anybody else? Now the other questions I want to ask you—You talked to me a little bit about the internet but I want to go back to the program that you are using. Did you have a hard time, did you experience any hard time the first time you started using the Microsoft application?

Student F: Um, the first time I started using Microsoft I didn't know how to make it bold or make it bigger or smaller. So I kept on trying and pressing stuff and then I just learned because it was really easy.

Student B: The first time I tried using excel when I was doing the charts, a bunch of these words kept appearing up and they were like two of the same number and there were different kinds of graphs and I didn't know how to choose them or how to get number on them but then I. . .

Q: How does it make you feel?

Student B: Well, I felt made but then I just kept experimenting around and then I found out how to. . .

Q: get out?

Student B: yeah.

Q: Okay. So how many times do you use the computer at school?

Student C: Normally, I only use the computer at home. The only time I use a computer here is if our teacher asks us to go to the computer lab to research something during class or if I forget something to type

or something if I want to type or if I want to start something that deals with typing I'll just go ask Ms. ***** and then I'll just go to use these computers.

Q: Most likely, you use it when you want to type something. Like what do you mean by typing something?

Student C: Homework.

Q: Homework. Like what?

Student C: Like maybe we would use the computer like since we have vocab every week mostly every week, I'll go look in the definitions and I'll write down the words and the definitions and a sentence. And if I want to use graph or I want to do a current event I would go like look for the article. I would go on BBC.com BBC News, I go there, I find my stuff, and then I open the Windows, Windows Word, Microsoft Word, and then I just start typing my current event and then I print it out and just save it for when it's due.

Student H: Uh sometimes when, uh I use it probably two times in school, the computer, a week. Because sometimes my printer isn't worker or there's no ink left or there's no paper. Or um just my computer's really messed up so it's good to use it.

Q: So you're using it for convenience.

Student H. Yeah.

Q: Not for assignments.

Student H: Sometimes I use it for assignments. Like my science fair project.

Q: Science like?

Student H: Yeah. We have a science fair project and we have to print out graphs. And we also have to have a research paper, so I research it online.

Q: So you know how to use Excel very well?

Student E: I think it's good that we have computers at our school because like if my computer is not working or the printer's not working, we can just come to the school and do what we need to and print it out

Student A: Like the main reason I ever have to use a computer as school is because I usually forget to do my homework at home I usually end up doing it at school so I don't like get like points off.

Q: (inaudible)

When we were in fifth and sixth grade, um, we had computer lab every week to learn how to use it, but now since we're older, we don't go to class. There's actually a requirement for it. But now the only time I use the computer at school is for yearbook—we have to organize pictures—they're on a CD and we put them on Publisher and we organize them and we make pages

Q: So you really, you guys, you would rather type something in the computer than write it down?

Students: yes, yes,

Q: It's just because it's faster or because of other factors?

Student B: No, it's just I really like it because sometimes with writing when you—it's harder to erase something—it's like you just backspace it and also like during the paragraphs if you forget to indent like if you make a mistake you can't fix, you have to erase the whole thing but if you do it on the computer, it's just easier.

Q: So from what I'm hearing you saying is—you preferred doing everything on the computer than doing it handwriting?

Student B: I'm more organized that way. Like sometimes our handwriting is messy or it gets smeared, but on the computer it looks better.

Student E: I think it's really good that we could use it because like if for writing sometimes it could get messy. If we do it on the computer, we can like make it decorated or get a picture and make it bigger.

Q: So now the question for all of you? What assistance do you guys get from the school when you're using the computer?

Student D: When I came to this school I didn't know much about the computer so I really learned how to like make stuff bold and how to make it bigger and smaller and I learned to like which websites to use and I use the websites that are actually true and not like biased.

Q: So the teacher's very helpful?

Student G: When I came to school I was bunny hopping and I didn't know how to type that good and also um all I really knew how to use was like word and I didn't even know there was like Excel or Publisher. I didn't know there was any other kind of programs than word so I learned how to type. We have—for the first trimester—we use this program called MavisBeacon and it just helps us learn how to type faster. And then we also do activities on Microsoft Publisher and we learn how to make the fonts bigger and smaller and yeah.

Q: So now you feel very comfortable around the computer?

Student C: The training I got from the teacher was like I remember one time we did like we used to do projects like we had to find which roller coaster was the fastest and which was the highest and we had to make a graph and then I would get help from the teacher by she would show us how to make the graph. She would show us like what websites to get the rollercoasters from and which um, what's it called, like how to make the graph—where to put the data, how to put the data, how to categorize it, how to input it

Student C: the training I get is uh I learn how to do the graphs and that really works. At first, I didn't know how to get the information—I mean put the information on the graphs and then also on Word, I didn't know how to make it like two columns, more than one column and I didn't know how to format the pictures and I learned all of that

Q: so before the training how did you feel about all this stuff you just told me about?

Student C: I wasn't very comfortable

Q: And now you feel very comfortable?

Student C: Yeah.

Q: Subject H?

Student H: Before I didn't know how to type. I just do like the bunny hop thing and that's really all because my dad sort of taught me when I was five years old. He's like a computer technician.

Student A: As subject E said, like she's the bunny hopper of whatever, like you know, I wasn't able to type fast when I came to the school, the teacher started teaching us how to type fast and now I can just type really fast—I don't know how many words per minute but just really fast.

Q: So you type fast and you feel comfortable?

Student A: Yeah

Q: Subject D

Student D: I learned how to type fast. I used to type very slow. I learned how to use Microsoft Excel, Microsoft Publisher, and Microsoft PowerPoint.

Q: So there is a lot of difference between before and now?

Student D: Yeah

Editor's Note: How do you predict the success of faculty members assigned to teach online? To what extent can teaching and learning be enhanced by technology? What kind and level of training and instructional support will be needed to support technology based learning in the classroom and online?

The Relationship of Age, Gender, Teaching Experience, and Personality Style with the Level of Technology Implementation of University Faculty

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Abstract

The purpose of this quantitative, correlational study was to investigate possible relationships existing between instructors' level of technology implementation as measured by the Levels of Technology Implementation (LoTi) questionnaire and the variables of age, gender, and personality style (measured by the NEO-Five Factor Inventory), as well as to provide practitioners a more informed understanding of the learning needs of university faculty. There was no correlation between faculty gender and technology implementation. A positive correlation was identified between faculty age and years of teaching experience with the level of implementation, as well as the personality style, openness, and a higher level of technology implementation. A primary goal of this research effort was to provide practitioners and future researchers with a more informed understanding of how to accommodate the learning needs of university faculty

Keywords: university faculty, educational technology, andragogy, adult learning, technology implementation, technology

Purpose of the Study

Standards and expectations in the field of education are continually increasing throughout the United States (Imig & Imig, 2006). In addition, dependence on technology by both educators and the corporate sector, continues to grow to greater proportions and reliance (Prosperio & Gioa, 2007). Universities, therefore, in order to keep abreast of the continual evolution of technological advances, are charged to find ways to both motivate and train faculty on the implementation of instructional technologies for course instruction within the university classroom. A central question for this study focused on whether or not instructors at the university level are taking advantage of the advancements in technology and are integrating instructional technology into their classroom practices. Specifically, this study examined the relationship between age, gender, personality styles and the level of technology implementation of university faculty at a small liberal arts university located in the Midwest.

Numerous studies have focused on K-12 classroom use of technology in the teaching and learning process (Bebell, Russell, & O'Dwyer, 2004; Benson, Farnsworth, Bahr, Lewis, & Shaha, 2004; Hernandez-Ramos, 2005), as well as the integration of technology in teacher education programs (Valdez, McNabb, Foertsch, Anderson, Hawkes, & Raack, 2001). In contrast, university faculty outside the discipline of education are not applying technological applications to their instructional practices in the classroom (Ching, Levin, & Parisi, 2004; Marx, 2005; Selwyn, 2007). Technology budget cuts across the past several years have had a significant effect on the ability of universities to stay current with technology advancements in such areas as assessment, campus web portals, safety and security, wireless tools, and instructional technologies (Green, 2001; 2002; 2004; 2006). Additionally, there has been rapid advancement of new technologies, which in itself, has certainly contributed to further reluctance by faculty in embracing such

practices. Regardless of the barriers of funding, lack of training time, and the lack of confidence, universities should continue to strive to meet faculty technology needs and embrace what technology has to offer in respect to student participation, motivation, and achievement (Lowerison, Sclater, Schmid, & Abrami, 2005), as well as provide opportunities to experience and analyze how educational technology might impact student performance. Further, the increasing presence and use of technology in public schools, funded in part by $44 billion from the American Recovery and Reinvestment Act (ARRA) of 2009 ("Follow the Money," 2009), is an additional motivational factor for universities to correspondingly increase funding for usage of technology in teaching and learning.

Through effective professional development and access to new technologies, universities can provide educators the opportunity to experience and analyze the possible consequence educational technology has on student performance and achievement outcomes in not only the classroom but in future work environments. Valdez, et al. (2000) reiterated the importance of educators gaining technological skills particularly since technology is credited with the productivity of the current workforce.

The theoretical background for this research study was Knowles' (1980) Andragogical model concerning how adult learning differs from the way in which children learn. Knowles explained four differences between pedagogy, the art and science of teaching children, and andragogy: (a) adults' self-concepts, unlike children's self-concepts, evolve from dependence to self-directedness; (b) adults have a rich accumulation of experiences that is a wide resource for new learning; (c) adult readiness to learn is based upon developmental tasks of their social roles; and (d) adults have matured from learning skills for postponed application to the direct and immediate application of new knowledge (p. 44-45). In addition, due to their wide array of experiences, adults have more to contribute concerning the learning of other adults, have more experiences within which or to which to relate new learning, and have a number of fixed thoughts or habits which tend to cause them to be less open to new ideas and experiences.

Warburton, Chen, and Bradburn (2002) stated university instructors are often reluctant to use technology in their courses, particularly when integrating technology for meaningful student-centered teaching and learning. Ching, Levin, and Parisi (2004) explained "basic research on teaching in the learning spaces on university campuses is rare, and existing literature on the use of technology in higher education tends to focus on implementation without regard for the content being taught" (p. 221). In addition, Selwyn (2007) reiterated university faculty and students seldom integrate computer technology for academic use.

The purpose of this quantitative, correlational study was to investigate possible relationships existing between instructors' level of technology implementation and the variables of age, gender, and personality style, as well as to provide practitioners a more informed understanding of the learning needs of university faculty. A primary goal of this research effort was to provide practitioners and future researchers with a more informed understanding of how to accommodate the learning needs of university faculty resulting from a more comprehensive analysis of the relationships of age, gender, and personality styles with technology use in university classrooms. Thus, this study will contribute to both the knowledge and literature in the fields of adult learning and professional development.

Problem Statement, Questions, and Hypotheses

This study determined how the independent variables of age, gender, and personality style correlated with university instructors' application of technology in their instructional practices (Benson & Mekolichick, 2007; Lowerison, Sclater, Schmid, & Abrami, 2005; Marx, 2005), specifically, how these variables directly impacted the training of university faculty in the

implementation of technology (Brinkerhoff, 2006). The researcher identified relationships between the various independent variables and the level of technology use for future applications of this knowledge to provide a framework that might be used to create professional development that addresses the real needs of university faculty. In addition, this study contributes to the body of literature in the area of adult learning and may assist colleges and universities in the effective implementation of technology into curriculum and classroom interactions throughout all disciplines. Though there is a wide body of research concerning the implementation of technology in K-12 education, few studies have analyzed if, when, and by whom technology is being integrated at the university level (Bebell, et al., 2004; Brinkerhoff, 2006; and Hernandez-Ramos, 2005).

The findings from the data analyses of the variables of age, gender, and personality style and the relationship to levels of technology implementation allowed the researcher to examine the following questions and statistically accept or reject related research hypotheses:

1. What is the correlation between faculty age (independent variable) and the level of technology implementation (dependent variable) of university faculty in their courses?
2. What is the difference between gender (independent variables) and the level of technology implementation (dependent variable) of university faculty in their courses?
3. What is the difference between faculty members' personality style (independent variable) and the mean level of technology implementation (dependent variable) of university faculty in their courses?
4. Post hoc research question: What is the correlation between the years of teaching experience (independent variable) and the level of technology implementation (dependent variable) of university faculty? Four hypotheses were developed based on these research questions.

Methodology

Instrumentation

Through the use of two cross-sectional, self-administered questionnaires, the Levels of Technology Implementation (LoTi) Questionnaire, designed by C.M. Moersch (1995), and the NEO-Five Factor Inventory data were collected at one point in time using two separate methods. The LoTi was administered online, while the NEO-FFI was a manually administered questionnaire. The method by which the surveys were administered was chosen by convenience. The LoTi was provided online, making data collection and administration less time consuming and labor intensive. Since the NEO-FFI survey instrument was available only in hard copy format, the researcher supplied hard copies to the participants. In addition to the surveys for identifying personality styles and levels of technology implementation, demographic data for age and gender were also gathered as part of the LoTi survey and the NEO-FFI.

Levels of Technology Implementation (LoTi)

The LoTi Questionnaire for higher education faculty, based upon the Levels of Technology Implementation Framework, ascertains the current role of classroom technology use in three key areas: (a) level of technology implementation, (b) comfort and skill level in personal computer use (PCU), and (c) current instructional practices (CIP) (National Business Education Alliance, 2006). For the purpose of this particular research study, only the level of technology implementation was analyzed in comparison to faculty age, gender, and personality styles.

The National Business Education Alliance (2006) stated the LoTi survey was developed to align professional development planning with a nationwide effort to sharpen educator skill sets as defined by the Partnership for the 21st Century Skills. The skill sets include (a) proficiency with

technology use (digital technologies), (b) student influences on instructional practices, (c) using technology for complex thinking projects, (d) locating resources and assistance to increase existing classroom technology use, and (e) overcoming challenges to beginning classroom technology use (NBEA, 2006). The LoTi Questionnaire takes approximately 15 minutes to administer and contains 50 questions based on a Likert-type scale. The survey was administered with the ability to gather data and reports through an administrative site safeguarded by a password. The LoTi data summary provided a list of the surveys taken, with scores for each of the three areas: LoTi, PCU, and CIP. In addition, the LoTi profiler allowed the researcher to create custom profiles for the entire organization or for individual faculty members. The data were downloaded into the SPSS statistical software for further statistical analysis, as well as comparison to the independent variables of age, gender, and personality style.

The LoTi questionnaire is aligned with various state and national standards, including the Texas STaR Chart, Florida STaR Chart, the International Society for Technology in Education (ISTE), National Educational Technology Standards (NETS), and Technology Standards for School Administrators (TSSA) (NBEA, 2006). In the winter of 2005, the LoTi survey, currently named the Levels of Technology Implementation (LoTi) Questionnaire, was validated through a research study by Stoltzfus (2006) at Temple University in Philadelphia, Pennsylvania. The results indicated that each of the domains embedded in the LoTi survey (LoTi Levels, CIP, and PCU) achieved content validity. According to Creswell (2003), content validity is achieved when an instrument measures what it was designed to measure. In this instance, the LoTi survey measures technology implementation. In addition, the three domains included in the survey, PCU (Personal Computer Use), CIP (Current Instructional Practices), and the LoTi (Levels of Technology Implementation – Level 0) emerged as statistically reliable and empirically valid (Stoltzfus, 2006).

NEO-Five Factor Inventory

For comparison with the LoTi, the NEO-FFI Personality Inventory was used in this study to identify the personality style of each faculty member. The NEO-FFI Personality Inventory was designed to measure the five major domains of normal adult personality. The inventory allows for group administration for adults ages 17 and older and provides 35 scores to include 30 facets in the five major domains of personality: (a) Neuroticism (anxiety, anger, hostility, depression, self-consciousness, impulsiveness, vulnerability), (b) Extraversion (warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotions), (c) Openness (fantasy, aesthetics, feelings, actions, ideas, values), (d) Agreeableness (trust, straight-forwardness, altruism, compliance, modesty, tender-mindedness), and (e) Conscientiousness (competence, order, dutifulness, achievement striving, self-discipline, deliberation) (Costa & McCrae, 1992). The NEO-FFI offers only domain scores, not facet scores.

The 60-item survey used a five-point Likert scale and took approximately 10-15 minutes to administer. In addition, the NEO-FFI form S, with a correlation of .77 - .92, allowed faculty to self-report. Internal consistency values range from .68 - .86 with strong consensual validity between self, peer, and spouse reports of the test. In addition, construct, convergent and divergent validity evidence has been collected by Costa, McCrae, and colleagues (Costa & McCrae, 1992).

Population and Sample

The population was comprised of all university faculty teaching courses in an undergraduate and/or graduate program in an institution of higher education. The sample was one of convenience, consisting of 65 full-time faculty members currently teaching courses at a small liberal arts university located in the Midwest. Faculty participants ranged in ages between 27 and 73 and were mixed in both gender and ethnicity. The sample of 65 faculty members contained all faculties ranked as full-time to include 35 males and 19 females. A single-stage sampling

procedure was used as the researcher had access to university faculty at one particular institution and accessed the sample directly (Creswell, 2003). In addition, the sample was one of convenience in that the researcher evaluated an existing group chosen for their role at this particular university. Each participant, identified with a unique identification number, was administered both the NEO-FFI and the LoTi in order to provide a true comparison.

Results

Descriptive and inferential statistical analyses of each of the variables: age, gender and personality style evaluated the level of technology implementation of the participating faculty.

The analysis of the relationship between the age of faculty members and the level of technology implementation in the university classroom was explored in order to answer the question: Is there a correlation between faculty age (independent variable) and the level of technology implementation (dependent variable) of university faculty in their courses? Descriptive data are represented in Table 1.

Table 1
Faculty Age, Descriptive Statistics

	N	Mean	SD	Median	Mode	Variance
Age	*54*	50.93	11.927	54	59	142.259

The median of 54 provides the mid-point of the distribution. The mean for the group (M = 50.93) (SD = 11.927) is slightly lower than the median and the mode is above the median at 59 years of age.

For the inferential statistical analysis a Pearson Correlation was used to identify the degree and the direction of the linear relationship between the level of technology implementation and the age of the faculty members. In this particular study, this method was used to determine if there was a relationship between age of instructors and level of technology implementation. Accordingly, the researcher was able to analyze the direction of the relationship (positive or negative correlation) and the degree of the relationship.

The null hypothesis stated that there is no correlation between the age of the faculty member and their level of technology implementation in the university classroom. The alternative hypothesis stated that there was a positive correlation between the age of the faculty member and the level of technology implementation in the university classroom. Findings from the calculated Pearson Coefficient demonstrated that r =.235, indicating that the variable of age was significant, thus, leading this researcher to reject the null hypothesis. Additionally, there is statistical support showing a positive correlation between age and the level of technology implementation of university faculty members. The probability value (p = .043) was less than .05 significance level; therefore, the null hypothesis was rejected in favor of the alternative hypothesis. A positive relationship was identified, and data indicated as age increased the level of technology implementation tended to also increase. A visual representation of this data is listed in Table 2.

Table 2
Pearson Correlation for Age and LoTi

	N	**Pearson Correlation**	**Significance (1-tailed)**
Age & LoTi	54	.235	.043

Descriptive Analysis of Gender and LoTi

An analysis of any difference between faculty gender and the level of technology implementation in the university classroom was completed through both descriptive and inferential statistics, in order to answer the question: Is there a difference between gender (independent variables) and the level of technology implementation (dependent variable) of university faculty in their courses?

Of the 54 participants in the study, 35 were male and 19 were female. The male mean (M = 3.14) is slightly higher than the mean of the females (M = 2.95). The median for both groups was three. The variance of the males (2.538) demonstrated that the scores were more spread out than were the scores of the females (1.942). The standard deviation for males was SD= 1.593 and females SD = 1.393. Table 3 represents this data.

Table 3
Faculty Gender

Gender	N	Mean	Median	SD	Variance
Male	35	3.14	3.00	1.593	2.538
Female	19	2.95	3.00	1.393	1.942

The boxplot in Figure 1 visually represents the range covered by the middle 50% of the distribution allowing one to quickly compare both genders. From this boxplot it is clear that the mean of the males (M = 3.14) was only slightly higher than the mean of the females (M = 2.95). The span or range of the scores was also greater for the males, ranging from levels one to seven, whereas the female scores ranged from one to five. Although the mean of the males was greater than the mean of the females, there was no statistically significant difference between the two groups.

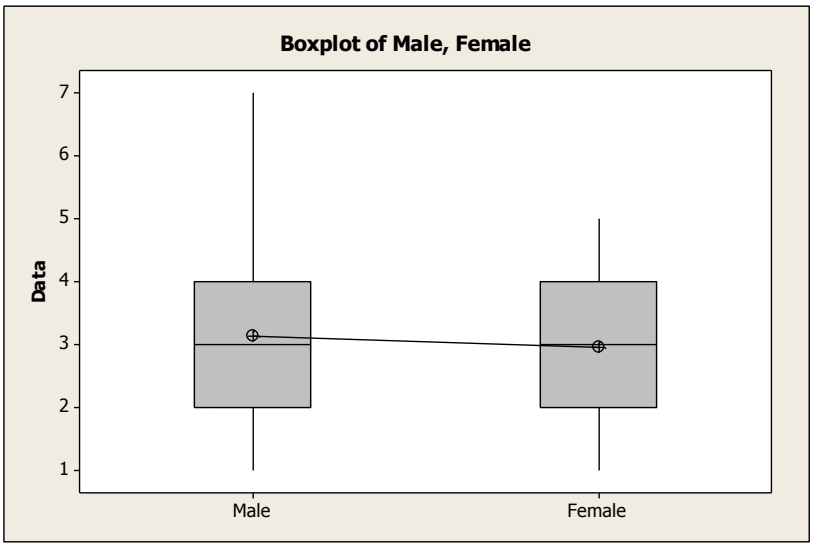

Figure 1. Boxplot of Gender and LoTi

In terms of inferential statistical methods, a *t*-test on two independent samples was applied. This test was chosen to compare the nominal independent variable (gender) with the interval dependent variable (level of technology implementation).

According to the results of the *t*-test for two independent samples, one would fail to reject the null hypothesis for the *t* value was *t* = .449 while the significance level was *sig*. = 0.717. This demonstrated that there was no significant difference between the variables of gender and level of technology implementation.

The identification of any correlation between faculty personality types, as illustrated by the results of the NEO-FFI and the level of technology implementation, was analyzed through both descriptive and inferential statistics in order to answer the question: Is there a correlation between faculty member's personality style (independent variable) and the level of technology implementation (dependent variable) of university faculty in their courses?

Table 4
Personality Style and LoTi

	Mean	Median	SD	Variance
N- Neurotic	15.17	14	7.808	60.972
O- Openness	28.93	29	6.584	43.353
E- Extrovert	31.63	32.50	7.577	57.407
A-Agreeable	35.63	36.50	5.770	33.294
C- Conscientious	36.19	36	7.313	53.474

The mean of the Neurotic personality style was the lowest of the five personalities with a mean of *M* = 15.17 (SD = 7.808). Openness, the second lowest mean at 28.93 (SD = 6.584) was higher than the Neurotic personality by 12.76. The third highest, or middle score of the five, was the Extrovert personality (*M* = 31.63) (SD = 7.577) followed by Agreeable (*M* = 35.63) (SD =5.770), and the highest mean being the Conscientious personality style (*M* = 36.19) (SD = 7.313). The average squared distance of the mean, variance, for each personality style, indicated whether the scores were clustered together or more spread apart. The personality style with the greatest variance was Neurotic (s^2 = 60.972) followed by Extrovert (s^2 = 57.407) and then Conscientious (s^2 = 53.474). The more concentrated scores were found in the personality styles of Openness (s^2= 43.353) and Agreeable (s^2 = 33.294). Of the five personality styles, Openness was the only style with a significant correlation to levels of technology implementation. Table 4 presents this data.

The inferential statistical method used was an analysis of variance. Through this statistical method, the researcher was able to determine if any of the five personality styles had a significant difference between personality style and the mean LoTi score.

Table 5
ANOVA of Personality Style and LoTi

	Sum Sq	Df	Mean Sq	F ratio	Sig of F
N- Neurotic	190.096	6	31.683	.490	.813
E- Extrovert	218.070	6	36.345	.605	.725
O- Openness	704.300	6	117.383	3.462	.006
A-Agreeable	271.788	6	45.298	1.426	.225
C- Conscientious	529.011	6	88.168	1.798	.120

The results of the ANOVA, displayed in Table 5, provided evidence that there was a statistically significant correlation between the personality style of Openness (sig. = 0 .006) and a higher level of technology implementation. Though not statistically significant, the next personality style was Conscientious (sig. = 0 .120), then Agreeable (sig. = 0.225), followed by Extrovert (sig. = 0.725), and finally Neurotic (sig. = 0.813).

A post hoc hypothesis was added to the research design in order to explore a potential relationship between LoTi, age, and years of teaching experience, addressing the question, What is the correlation between faculty years of teaching experience and the level of technology implementation of university faculty in their courses? Descriptive data is represented in Table 6.

Table 6
Years of Teaching Experience

	N	Mean	SD	Median	Variance
Years of Experience	*54*	19.41	12.73	16	162.13

The median of 16 provided the mid-point of the distribution. The mean for the group (M = 19.41) (SD = 12.73) is slightly higher than the median of 16 years of teaching experience.

For the inferential statistical analysis, a Pearson Correlation was used to identify the degree and the direction of the linear relationship between the level of technology implementation and the years of teaching experience of the faculty. In this particular study, this method was used to determine if there was a relationship between experience and level of technology implementation.

The calculated Pearson Coefficient demonstrated that r =.365, indicating that the variable of age was significant, thus, leading this researcher to reject the null hypothesis. Additionally, there was statistical support of a positive correlation between years of teaching experience and the level of technology implementation of university faculty members. The probability value (p = .003) was less than .05 significance level; therefore, the null hypothesis was rejected in favor of the alternative hypothesis. A positive relationship was identified, and data also indicated that as years of experience increased, the level of technology implementation tended to also increase. See figure 2.

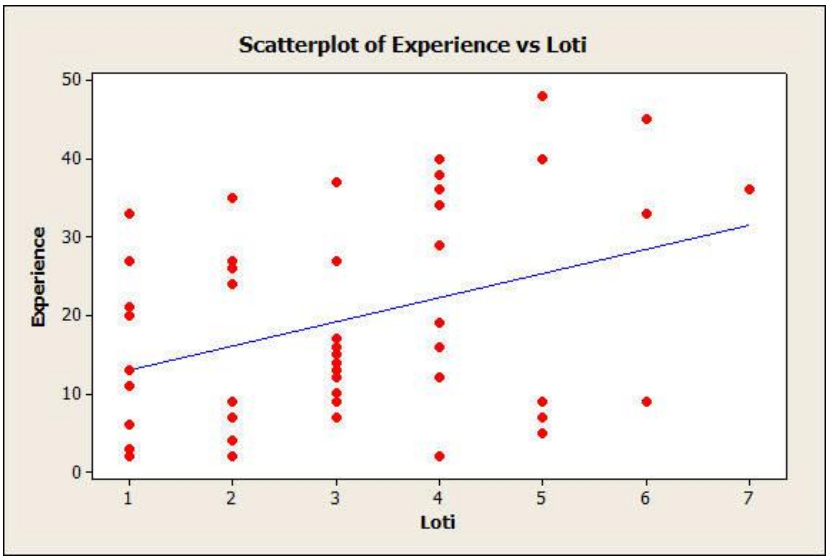

Figure 2. Scatterplot of LoTi and Years of Teaching Experience

Discussion and Interpretation of Findings

Fifty-four faculty members took part in the two surveys administered. The median age of the faculty members was 54. The mean (M = 50.93) was slightly lower than the median and the mode was above the median at 59 years of age. A Pearson Correlation was used to discern a possible relationship between a faculty members' age and levels of technology implementation. Findings demonstrated that r =.235, thus indicating the variable of age was significant. Additionally, there was statistical support showing a positive correlation between age and the level of technology implementation of university faculty members. The probability value p = .043 was less than .05 significance level. Data indicated that as age increased, the level of technology implementation tended to also increase.

These findings indicated age does play a factor in the implementation of technology into the university classroom. Since correlational or relationship studies only identify if a correlation exists and do not allow for identification of the reason(s) or cause(s) of the correlation, further study will need to be performed to identify reasons this may exist. It is an assumption of the researcher that experienced faculty members are more comfortable or knowledgeable in their content area and teaching methods and that they can spend more time and thought in designing learning experiences which implement technology for teaching and learning versus using technology for presentation purposes only. Again, this assumption will warrant further study.

The findings indicated older faculty members tend to have a higher level of technology implementation, in contradiction to the analysis of Adams (2003), where it was demonstrated that male faculty members from ages 18 to 34 years of age displayed a higher level of technology implementation. The current study indicated as faculty age they tended to more effectively implement technology into the teaching and learning process.

The second research question for this study focused on any existence of a relationship between gender and the level of technology implementation of university faculty in their courses. A t-test of two independent samples found there was no significant relationship between gender and the level of technology. Of the 54 participants in the study, 35 were male and 19 were female. The male mean (M = 3.14) was slightly higher than the mean of the females (M = 2.95), but the median for both groups was three. The span, or range of the scores, was also greater for the males, ranging from levels one to seven, whereas the female scores ranged from one to five, although the there was no statistically significant difference between the two groups.

This finding conflicts with Adams (2003), who identified that male faculty members from 18 to 34 years of age displayed a higher level of technology implementation, but female teachers with less teaching experience were more inclined to integrate technology into the teaching and learning process. A previous study by Spotts, Bowman, and Mertz (1997) analyzed gender differences concerning the use of technology by university faculty. It was identified that there was no significant difference found between the male and female participants and their level of technology implementation. The current study supported the study of Spotts, et al. stating there was no significant difference between male and female faculty members and their level of technology implementation. It was also indicated by the researchers that males tended to rate their knowledge and experience with technology higher than their counterparts. With the current study showing males slightly higher in technology implementation than their female counterparts, it is important to emphasize that the LoTi survey was a self-reported survey, which may produce different results than observed levels of technology implementation.

The final research question asked the following: What is the correlation between faculty members' personality style and the level of technology implementation of university faculty in their courses? Through the application of an ANOVA a significant correlation between the personality style of Openness was indicated with the significance level of s = .006. This finding

demonstrated the personality style Openness directly related to the level at which faculty members implemented technology. These findings can assist the design of professional development programs in focusing on personality and its link to technology implementation.

According to John and Srivastava (1999) Openness is the label for an individual's willingness to experience, thus a description of one who has a wide variety of interests or experiences and who is imaginative and insightful. Costa and McCrae (1992) found that of the five personality styles, Openness consistently associated with years of education. Though the significance is minor, it would warrant further study to include the variable of years of education with the level of technology implementation and personality style. With an understanding that Openness significantly correlates to the level of technology implementation, further research concerning personality styles and technology may help to enhance professional development practices for university faculty members.

Upon the completion of the data analysis, a post hoc research question and hypotheses were considered: What is the relationship between years of college level teaching experience and the level of technology implementation of university faculty? The null hypothesis stated there was no correlation between years of college level teaching experience and the level of technology implementation of university faculty. The alternative hypothesis stated there was a positive correlation between the years of college level teaching experience and the level of technology implementation of university faculty.

Data indicated the median years of teaching experience was 16. In order to analyze the correlation between years of teaching experience and level of technology implementation, a Pearson Correlation was used. Findings demonstrated that r =.365, indicating the variable of years of teaching experience was significant, thus, leading this researcher to reject the null hypothesis. Additionally, there was statistical support showing a positive correlation between years of teaching experience and the level of technology implementation of university faculty members. The probability value (p = .003) was less than .05 significance level; therefore, the null hypothesis was rejected in favor of the alternative hypothesis. Data also indicated as years of experience increased, the level of technology implementation also increased.

These findings contradicted the Adams (2003) study in which it was indicated those with 0 to 3 years of teaching experience demonstrated the highest level of technology integration. Adams did, however, state that those with more than twenty years of experience did "demonstrate a greater degree of technology integration" (p. 295) than those with 10 to 19 years of experience, but not significantly.

Knowles, (1980, 1994), presented several principles of andragogy, thus validating that adults want learning to be relevant, practical, and self-directed. In addition adults prefer learning to be student centered rather than teacher centered and finally adults are typically intrinsically motivated. In turn, Valdez, et al. (2000) reported that technology provides for learner-control, motivation, and a connection to the real world confirming that technology enhances or lends itself to principles of the Andragogical Model (Knowles, 1980, 1994).

Conclusion

Technology is ever increasing in society and within institutions of learning, from elementary to higher education. It is recommended that further studies take place that identify the cause and effect of how technology is being used in the classroom and what true implementation means to students and faculty members alike and that specifically, focus upon ways in which faculty implement technology to determine how various factors such as age and personality can enhance the training of faculty may be of great use to institutions of higher education.

Throughout this study, various issues were identified which warrant further investigation. To enhance the findings a similar study can be conducted using faculty from various types of institutions of higher education, to include community colleges, private colleges, and state universities, and compare the types of professional development opportunities at each institution and how these opportunities may affect the outcome. In addition a similar mixed study may be completed using quantitative data, as well as qualitative data, to include interviews, observations, and focus groups. This may assist researchers in identifying causes for the findings. Finally, since it was identified that age does have an impact on technology implementation, further investigation into the reasons why and how technology training can improve implementation for younger faculty members.

Technology is a vital component in the educational process. In order for technology to be effectively implemented into the teaching and learning process, institutions of higher education must first understand of the characteristics of faculty members implementing technology, as well as the characteristics of those who are not. This information can assist administrators in designing effective professional development programs to meet the needs of faculty members, who are adult learners.

Given the indication that age, years of teaching experience, and personality style correlates with technology implementation, researchers can begin to understand why some faculty members choose to integrate technology and why some shy away from implementation in the teaching and learning process. Once this difference is identified, programs can be designed to meet the individual needs of university faculty members to assist in the creation of technology enriched learning environments.

Finally, this study provides a foundation for further studies concerning the learning needs of university faculty from across all disciplines and can impact how faculty are being trained to implement technology, in the end, positively affecting the learning experiences of college students across the nation.

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Editor' Note: Virtual teams speed design and development. They simplify scheduling, eliminate the need to assemble in one geographic location, and enable experts to be selected from a global pool. It minimizes travel cost; it accelerates time-to-market. It is important for both academia and business to make effective use of cross-cultural virtual teams and broadband technologies used to link team members to each other.

Cross-Cultural Virtual Teams: Environment, Interaction, and Academia

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USA

Abstract

Due to the lack of face-to-face interaction, virtual teams in both academia and in business pose a unique challenge to cooperation and ultimately task completion. Injecting varying cultures into this environment adds potential difficulties that threaten effectiveness of team accomplishments. This article examines the state of research of virtual teams in a cross-cultural context, synthesizes the literature, and suggests paths for additional research as international e-collaboration increases in prominence.

Keywords: Virtual teams, cross-cultural communication, interaction, e-collaboration, international, e-teams, teamwork, workplace, collaborative learning, social theory, collective efficacy.

Thesis

Innovation requires both diverse and versatile thinking, and technology permits teams of geographically dispersed and culturally unique people to work together toward building new, original products. However, these teams face challenges unlike many other groups operating as a single unit; hence, special considerations must be made in support of their efforts. One such concern involves the premium on verbal communication. In a traditional environment, verbal and nonverbal cues play equal roles in transferring a message; however, communicating electronically eliminates many, if not all, nonverbal signals. With virtual teams gaining prevalence, particularly those crossing national boundaries, higher education must take on a role in preparing tomorrow's workforce for this new paradigm.

Problem Statement

Definitions

Several terms require explanation in order to better understand this topic. *Virtual teams* consist of people whose work and communication functions through various technologies and often whose locations or times are separate (Gibbs, 2009; Rico, Alcover, Sanchez-Manzanares, & Gil, 2009; Symons & Stenzel, 2007). The term *globals* refers to individuals or companies who routinely partner or conduct business with others outside of their national boundaries (Freeman & Knight, 2007). *Transnational education* may be interpreted in the same manner only referring to an educational context (Pelech & Macpherson, 2009). *Collective efficacy* defines the degree to which a group believes in the sum total of the abilities of each member (Hardin, Fuller, & Davison, 2007).

Current Interest

Computer and network technology has stimulated the globalization of business and education to grow exponentially over the last few decades, and with it has come a need for people to increase their understanding and awareness of how other cultures operate (Pelech & Macpherson, 2009). Virtual teams in both contexts allow people to work together closely without the monetary and

time expense of travel (Adya, Nath, Malik, & Sridhar, 2007). In this respect, the use and research of virtual teams opens opportunities for intercultural collaboration that have the potential for improving global policymaking, knowledge-sharing, and innovation that would otherwise be unlikely (Cogburn & Levinson, 2008; Freeman & Knight, 2007; Larsson, Boud, Madeleine Abrandt Dahlgren, Walters, & Sork, 2005). Additionally, virtual teams help to bridge cultural gaps in an environment largely free of politics and mediated through technology, permitting the easing of language barriers (Elron & Vigoda-Gadot, 2006; Shachaf, 2005).

Significance to the Communications Field

Although communication is paramount to any group activity, its role and subsequent efficacy becomes even more important to those working virtually. Technology forms the primary, and often only, means by which team members share knowledge (Barkhi, Amiri, & James, 2006; Thissen, Page, Bharathi, & Austin, 2007). Further, the patterns of communication that take place completely through technology, completely without technology, and those that are hybrid each present unique scenarios that require further study (Rico et al., 2009; Tavčar, Žavbi, Verlinden, & Duhovnik, 2005; Webster & Wong, 2008). Cultural disparity among global virtual teams also deserves serious consideration due to the barriers inherent for communicating between distinct societies (Campbell, 2008; Shachaf, 2005).

Controversies Within the Literature

The most notable controversy within the literature stems from the argument over the effect of social presence on global virtual team effectiveness. Barkhi, Amiri, and James (2006) state that physically collocated teams demonstrate greater levels of effective communication and a higher degree of trust amongst members than those teams whose members are distributed. A number of studies concur asserting that rapport and the ease of information transfer provide distinct, important advantages for collocated teams (Birch & McDonald, 2007; Merriman, Schmidt, & Dunlap-Hinkler, 2007; Rico et al., 2009; Starke-Meyerring & Andrews, 2006; Webster & Wong, 2008). Conversely, other research indicates that geographic diversity has little effect on team performance potentially increasing the quality of outcomes due to a wider range of ideas and the ability to focus on tasks over politics. (Elron & Vigoda-Gadot, 2006; Hardin et al., 2007; Lu, Watson-Manheim, Chudoba, & Wynn, 2006; Swigger et al., 2009; Thissen et al., 2007)

Constituents With Special Interest

Major interest in the effectiveness of cross-cultural virtual teams comes from both industry and education. As the workplace, particularly within software development, becomes increasingly global, industry has pushed offshoring as an effective cost-saving method (Gibbs, 2009; Milewski et al., 2008). This draw of talent from various locations throughout the world allows for better competition and for more dynamic adaptation to changing needs (Casey & Richardson, 2008; Moe & Scaronmite, 2008). Academically, technology has opened new avenues for collaboration among universities in both the classroom and for research. This has proven especially useful in knowledge sharing with lesser-developed nations (Larsson et al., 2005; Pelech & Macpherson, 2009; Starke-Meyerring & Andrews, 2006). Universities also have reacted to the growth of global virtual teams within industry by integrating similar coursework into curricula in order to prepare students for the unique challenges presented by the virtual work model (Adya et al., 2007; Birch & McDonald, 2007).

Summary of the Literature

As technology allows greater flexibility for industry and workers around the world, cross-cultural virtual teams will play a larger role toward innovating new products with unprecedented diversity of input. Virtual teams work within a context that significantly differs from traditional teams; therefore, the setup of environmental components around these teams should support these

differences. Within this setting, personal interactions rely more heavily on words communicated than a balance between verbal and nonverbal cues. Universities can support these new conditions by preparing students in a wide range of technical, interpersonal, and cultural skills.

Environment of Cross-Cultural Virtual Teams

Factors of the environment in which global virtual teams are expected to function directly affect the quality of the output produced. Employees in this context tend to produce more innovative solutions, share knowledge more effectively among their peers, and possess the flexibility desired by many workers. In spite of this upside, virtual teams force workers to find deeper meaning in communication modes that often rely only on spoken or written words. Additionally, the gaps between place and time among team members create both advantages and disadvantages for the group as a whole. As a result, technology implemented in this situation should help to break down the problems presented and facilitate the connections necessary for success.

Virtual teams offer advantages not only of broad-based expertise but also the opportunity for greater innovation and job satisfaction. Technology provides unprecedented ability to communicate across cultural boundaries with the benefit of simulating future work environments (Campbell, 2008; Starke-Meyerring & Andrews, 2006). Virtual teams provide a broader base of expertise than local resources may provide (Huang & Trauth, 2007; Webster & Wong, 2008). Although face-to-face meetings foster higher social communication, the quality of virtual communication may result in thinking at a higher level (Birch & McDonald, 2007; Thissen et al., 2007). Virtual teamwork naturally resists interpersonal politics and influence gaining; therefore, this lack of politics frees virtual teams to focus on task completion and more work-related socialization (Elron & Vigoda-Gadot, 2006). Virtual teams expressed higher satisfaction with project results for a number of reasons including access to the best resources, freedom to manage tasks, and better work/home balance (Webster & Wong, 2008).

Working in an environment in which nonverbal cues inherently are missing complicates work that requires a high degree of reliance on other team members. Although technology breaks down communication barriers, it still has limitations that must be overcome by the individual participants (Campbell, 2008). Communication styles particular to a culture compound issues of language difference (Huang & Trauth, 2007). Virtual environments prevent non-verbal cues from having an effect on communication, and asynchronous discussion loses immediate response crucial to maintaining motivation and momentum (Birch & McDonald, 2007; Huang & Trauth, 2007; Webster & Wong, 2008). Working on a virtual team increases solitude and is much less structured than traditional work necessitating increased specificity of the process taken (Workman, 2007). With all of these challenges, motivation for successfully completing a project must exist in order for communication to be effective (Barkhi et al., 2006; Casey & Richardson, 2008).

The theories applicable to cross-cultural virtual teams focus on the ability of the people to share ideas in unencumbered, message-rich conditions. Social exchange theory places communication in the context of knowledge sharing as a result of a receiving a reward for actions or behaviors (Kanzler, 2010). Applying social presence theory argues that the greater the personal nature of a conversation the greater chance of the messages being effectively received (Paretti, McNair, & Holloway-Attaway, 2007; Shachaf, 2005). Sociotechnical systems theory balances the role of social structures and rewards with the technology used to expedite the processes involved (Bostrom, Gupta, & Thomas, 2009). Social identity theory explains knowledge acquisition as dependent on active and passive social involvement (Workman, 2007). Media richness theory proposes that technologies used to communicate vary based on their ability to simulate face-to-face contact, particularly in the context of completing a task (Barkhi et al., 2006; Paretti et al.,

2007; Shachaf, 2005). Boundary permeability theory takes cultural identity and corresponding norms in regards to the rules for communicating within a group (Workman, 2007).

Geographic and temporal gaps among team members provide both negative and positive effects on groups, somewhat undermining their potential use in today's global marketplace. Social presence among collocated teams proves a significance benefit over virtual team unity, fostering greater trust and lowering the likelihood of irresolvable conflict (Barkhi et al., 2006; Gibbs, 2009; Merriman et al., 2007; Rico et al., 2009; Starke-Meyerring & Andrews, 2006). Increased distance among team members leads to the inability to synchronize the workday, reducing the amount of live communication and the ability to share information expediently (Milewski et al., 2008; Webster & Wong, 2008). One solution to overcome temporal differences is to create bridge sites, pairing physical locations whose work hours overlap enough to allow effective, real-time communication (Milewski et al., 2008). Conversely, other studies argue against the detriment of widespread geographic locations. Geographic diversity has not proven detrimental to virtual teamwork; however, using a large variety of communication technologies across projects reduces performance (Lu et al., 2006). Virtual teams that have members concentrated in only a few, nearby locations may risk the formation of subgroups that may undermine the overall group cohesion (Starke-Meyerring & Andrews, 2006). The physical distance between group participants has little effect on cohesiveness; whereas, culture, attitudes, and individual characteristics proved to have more impact (Swigger et al., 2009).

Technology supporting global virtual teams must allow all members equal access to express ideas in a format and language most comfortable for each person. The technology used by a virtual team must allow communication to move as smoothly and easily as if members sat face-to-face (Thissen et al., 2007). Synchronous technologies permit high interactivity whereas asynchronous technologies promote greater flexibility, and in the global virtual team setting, the two may not necessarily interact well (Cogburn & Levinson, 2008). Various cultures use communication tools differently, often creating unforeseen barriers (Paretti et al., 2007). E-mail helps to ease communication gaps found between cultures within a virtual team, increasing productivity by allowing non-native speakers more time to consider word choice and meaning (Shachaf, 2005).

Personal Interaction Amongst Cross-Cultural Virtual Teams

Virtual or otherwise, teams must contain members capable of respecting a wide range of ideas and perspectives while working toward a common goal. Overcoming cultural differences, whether social or technological, proves a difficult first step for a new virtual team. Working together to improve team dynamics helps to equalize members and fosters an environment prepared for success. Further, building trust early helps to overcome the conflict bound to affect any team, particularly one with limited contact. Executive leadership can encourage virtual team production by limiting its role to an advisory capacity, outlining final goals and allowing the team to flourish independently.

Cultural variations include not only social differences but also those of technology; however, these disparities must be embraced and overcome for teams to succeed. Teams can overcome language and culture barriers with a willingness to learn from others and an ability to adapt to new situations (Freeman & Knight, 2007; Symons & Stenzel, 2007). Global teams must also overcome technological differences in culture, in particular censorship, poor infrastructure, and obsolete equipment (Elron & Vigoda-Gadot, 2006; Freeman & Knight, 2007; Humes & Reilly, 2008). Care must be taken in combining team members from cultures who are individualist with those who are collectivist (Hardin et al., 2007). In one example, the Chinese characteristically resist speaking up in situations thus affecting the ability to communicate problems or ideas to fellow team members (Huang & Trauth, 2007). Taken holistically, diverse cultural backgrounds

can increase problem-solving ability by expanding the perspectives of the whole (Hardin et al., 2007; Humes & Reilly, 2008; Milewski et al., 2008).

Various arguments contend for and against virtual team effectiveness; however, agreement exists that virtual teams must work diligently to foster positive group dynamics. Two opposing forces affect the virtual team: it encourages rapid cohesion by forcing dissimilar people into a common situation; however, too much synergy potentially can hinder inventiveness (Elron & Vigoda-Gadot, 2006; Gibbs, 2009; Humes & Reilly, 2008). Global virtual teams who focus more heavily on the means of their work than the end product perform better both qualitatively and quantitatively (Workman, 2007). Virtual teams lack the ability to observe their colleagues in action (Thissen et al., 2007). Furthermore, people located more than 50 feet apart demonstrate less than a 10 percent chance of working together more than once a week; therefore, virtual teams require special consideration upon construction to ensure maximum communication flow (Monalisa et al., 2008). Students find that the quality of communication with other team members both inside and outside the project has a direct effect on the quality of the project's results (Delvin, Drummond, & Hatch, 2008).

Establishing trust among team members facilitates communication and permits more effective conflict resolution. The level of trust amongst team members directly correlates with the effectiveness of communications within the group (Moe & Scaronmite, 2008). Building trust helps to eliminate the fears associated with relying on others for task completion (Monalisa et al., 2008). Task-oriented communication early in a project leads to a higher level of trust for fellow team members as the project progresses (Cogburn & Levinson, 2008; Rico et al., 2009). Virtual teams must constantly re-evaluate their interactions because of the tensions formed by multiple interpretations of roles and values within the varied contexts (Gibbs, 2009).

Management in a virtual environment has proven more beneficial as a guide toward overall goals versus providing rigid, constant oversight. Leaders must shift to a more facilitative model from authoritarian for virtual teams to succeed (Symons & Stenzel, 2007). Centralized decision making and production can adversely impact innovation within an organization (Bajwa et al., 2008). However, formally defined project expectations and structures alleviate communication dysfunction (Barkhi et al., 2006). Overall, managers must learn to adapt to the virtual workforce at the risk of marginalizing modern workers (Merriman et al., 2007)..

Role of Academia in Support of Cross-Cultural Virtual Teams

Academia not only supports industry by teaching students the importance of global cooperation through virtual teams, but also it benefits by infusing new trends into its own programs. Universities increasingly use virtual teams to teach hard technology and soft interpersonal skills to students, thus preparing them for employment in a globalized marketplace. In addition, intercultural focus in a program helps to eliminate prejudices regarding the ability for other cultures to contribute to a project. Programs also have the opportunity to develop new interest in information technology by stressing its role in international communication.

Utilizing virtual teams throughout coursework allows students to gain valuable technology and interpersonal skills that global-aware employers desire in new workers. ICT education programs through virtual development courses produce more globally prepared and culturally aware graduates (Adya et al., 2007; Adya, Nath, Sridhar, & Malik, 2008; Freeman & Knight, 2007). Working with offshore developers introduces levels of differences in familiarity with business practices, education and experience, and the ability to replace workers as turnover occurs (Levina & Vaast, 2008). Cross-site design work in an educational setting often presents logistic problems; however, industry often expects students to have the ability to work in teams with those not just in-house (Delvin et al., 2008). In the academic context, the act of facilitating

provides counsel for students and stimulates discussion versus the traditional thought of merely providing resources as a detached observer; therefore, students learn self-sufficiency and leadership that employers seek (Law & Nguyen-Ngoc, 2009).

Development of an awareness and respect of the differences among global cultures expands the educational experience and breaks down communication barriers that serve to inhibit teamwork. Adding a global element to a software design course adds culture awareness to the skills learned beyond those of organization, communication, and time/project management (Swigger et al., 2009). The concept of transnational education forces educators into expanding cultural awareness while simultaneously imparting their expertise into a global learning setting (Law & Nguyen-Ngoc, 2009). Americans on average downplay the differences between cultures; consequently, the lack of nonverbal cues in a virtual environment exacerbates communication difficulties (Paretti et al., 2007).

Integrating international teamwork elements into an academic ICT program may breathe new life into curricula that have become stale during the past decade of technological ups and downs. Academic programs have rarely included the additional skills necessary to succeed in a global virtual environment such as team dynamics and cultural awareness (Adya et al., 2008; Paretti et al., 2007). Advances in technology have uncovered how institutions lack preparedness for coping with new models of education (Pelech & Macpherson, 2009). Teachers in this new environment not only must remain academically and technically proficient, but also they must strive to gain better understanding of global issues, in particular issues of culture (Pelech & Macpherson, 2009). Constructionist educational theory applies to the global collaborative context by building social and teamwork skills as part of a course outcome (Birch & McDonald, 2007). Adding the global element to software development majors may increase interest in ICT programs that in recent years have been waning (Adya et al., 2008).

Critical Evaluation

Literature Critique

The literature on global virtual teams covers the pertinent issues from several angles. A primary theme throughout the research concerns whether virtual teams offer the same level of communication effectiveness as those physically located together. Despite this argument, the literature tends to agree that virtual teams have a role in advancing global business through cultural cooperation. A potential string of bias occurs through the number of corporate entities represented in related articles (Lu et al., 2006; Milewski et al., 2008; Monalisa et al., 2008; Symons & Stenzel, 2007; Thissen et al., 2007). Researchers working for a business entity with a stake in the research findings may compromise the quality of the results (Geuna & Nesta, 2006).

The literature tends to lack studies of virtual teamwork among the more subtly different western cultures of the United States, Canada, Western Europe, Australia, and New Zealand. Understandably, interest has centered on higher contrasts between western cultures and South Africa (Cogburn & Levinson, 2008), Kazakhstan (Freeman & Knight, 2007), Israel (Elron & Vigoda-Gadot, 2006), Hong Kong (Hardin et al., 2007), China (Huang & Trauth, 2007; Kanzler, 2010), Turkey (Swigger et al., 2009), and Latvia (Moe & Scaronmite, 2008). Paretti and McNair (2007), Campbell (2008), and Casey and Richardson (2008) represent the few who have performed research within the context of western cultures between the U.S. and Sweden, New Zealand, and Ireland, respectively.

Future Research

As noted above, the literature focused heavily on highlighting the process of working in a cross-cultural virtual environment with those societies that differ from western culture to a high degree.

However, studying the work environment between cultures perceived to have significantly more in common may prove revealing as to how it affects virtual team performance. Furthermore, as Swigger et al. (2009) observes, additional research is required to determine effects of leadership and dominance of one culture over another in a virtual setting that may help or hinder efforts.

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Editor's Note: Distance learning online provides many advantages for students, teachers, and institutions of higher learning. This study from Kenya attempts to resolve the questions that lead an increasing number of students to distance learning programs in areas where on-campus programs are available.

Motivational Factors for Pursuing Distance Learning: A Case Study of UNISA Students at KCA University.

Wycliffe Misuko Nyaribo
Kenya

Abstract

Distance learning is becoming the preferred mode of study for many students. Institutions of higher learning have also taken it seriously and most of them are now offering distance learning.

This article attempts to find motivational factors that influence students to study through distance learning. Further, the researcher tries to ascertain areas needing improvement in delivery and areas where distance learning students are not satisfied. This case study was conducted using University of South Africa (UNISA) students studying at KCA University, Kenya, a licensee.

The sample used in this study included one hundred and ten undergraduate students of UNISA who are undertaking distance learning. Motivational factors that were considered are flexibility, availability, personal commitments sponsors' decision, image and reputation, cost and desire for foreign degree. An analysis of the responses indicated that flexibility, availability, personal commitment, and institutional reputation are positive motivators for distance learning.

Student concerns and areas that needed improvement included, timely communication, feedback on assignments, prescribed text books and timely delivery of study materials,

The articles concluded that these factors can be considered for other institutions intending to start distance learning and can be used as a basis for improving service delivery to distance learners**.**

Keywords: Licensee, UNISA, KCA University, distance learning, motivational factors.

Introduction.

Distance learning has been defined and redefined over the years. In 1990, Moore described distance education as "all arrangements for providing instruction through print or electronic communications media to persons engaged in planned learning in a place or time different from that of the instructor or instructors" (p. xv). Later, Moore and Kearsley (1997) refined the definition to specify that the learning is planned and includes "organizational and administrative arrangements" (p. 2). Most definitions specify that distance education is teaching and learning that occurs asynchronously – the learner(s) and instructor separated by time and space – using a variety of technical media to support the teaching and learning (Keegan, 1996; Eastmond, 1998; Locatis & Weisburg, 1997). Keegan (1990) defined distance education as a system characterized by.

1. Separation of instructor and student in most of the instruction process;
2. The influence of educational organization;
3. Provision of student assessment;
4. Use of education media to deliver course content;
5. Two way communication between instructor and student.

The demand for distance learning has been moving upward in most countries and the number of institutions offering distance learning is increasing.

The number of student s pursuing distance learning in developing and developed countries is increasing tremendously all over the world. In the United States, for example, over 3.5 million college students took at least one online course in 2006 (Allen and Seaman 2007)

Despite this phenomenal growth in enrollment of students pursuing distance learning, there has been no research done to find out what motivates students to pursue distance learning and abandon traditional methods of leaning.

Two studies prior to 2002 and two conducted after 2002 considered factors identified by faculty members as influencing their participation or non-participation in electronic learning, e-learning and distance learning courses (Beggs 2000; Betts,1998; Gannon–cook, 2003; Schifter, 2004). However, these studies did not address factors that motivate students to pursue distance learning.

University of South Africa (UNISA) has been offering distance education since 1946. On 15 February 1946, UNISA established a Division of External Studies. This transformed UNISA which was previously regarded as an examining body into a teaching university that became the pioneer of tertiary distance education.

Guided by their vision "toward the African University in the service of humanity", UNISA has been driven to finding answers to Africa's education and developmental problems and has been in the forefront in offering distance learning in Africa as well in the world. This is evidenced by the partnership agreements it has with various institutions worldwide including KCA University.

With the intention to expand university education to more people, KCA University, then the Kenya College of Accountancy situated in Nairobi, signed a Memorandum of Agreement in the year 2000 with the University of South Africa (UNISA) to offer UNISA courses through distance learning. Since then, KCA University has been offering courses to students pursuing their studies through distance learning and the number has been increasing. With growing numbers, the question is: what is motivating students to study through distance learning in Kenya? And worldwide?

As one of the biggest licensees in East Africa, KCA University has been offering most of the undergraduate as well as postgraduate programmes offered by UNISA. KCA University is the administrative centre for UNISA which recruits students for UNISA programmes and administers examinations on behalf of UNISA.

Unlike the conventional method of learning where there is a physical interaction between students and lecturers, the interaction is limited in distance learning. One of the most important aspects of distance learning is to ascertain what motivates students to pursue distance learning despite its various challenges.

Literature Review

Distance Education, which most people perceive as recent, spans back as long as a century ago. In the United States, the history of distance education began with the delivery of course materials by mail. This was made possible by development of cheap and reliable mail services which allowed students to correspond with their instructors. One of the earliest documented home study courses offered in the United States was in shorthand which was the genesis of distance learning.

The other generation of distance learning is the open universities which started to emerge in the 1970s. These universities used correspondence instruction, apart from broadcast and recorded media, whereby programmes would be distributed by radio, television and audio tapes.

In 1883 the academic respectability of correspondence teaching was recognized when the state of New York authorized the Chautauqua Institute to award degrees through this distance education. In 1890 the Colliery Engineer School of mines based in Wilkes-Barre, Pennsylvania begun to advertise a home study course on mines safety that became very popular. Later the school became an international correspondence school.

Brey's (1991) report of U.S. postsecondary distance learning programs predicted that the decade of the 1990's would see such phenomenal growth in distance education programs that most people in the United States would be served by at least one program. The prediction came true through the number distance learning institutions that emerged and the number of students who enrolled to undertake their studies by learning at a distance. In 1994, 80% of community colleges in the United States offered some form of distance education program, and that percentage and the extent of their involvement has continued to increase.

Another generation of distance learning emerged in the 1990s. This was possible with the emergency of information technology where distance learning was based on computer conferencing networks and computer based multimedia work station. One of the largest institutions of distance learning situated in Africa is University of South Africa with an annual registration of over 250,000 students from all over the world.

In sub-Sahara Africa, despite the fact that internet access is low as compared to other developed and developing countries, still there are a large number of students pursuing online distance learning. It is estimated that in Sub Sahara Africa 1 in 250 people have access to internet as against the global average 1-15 (UNESCO institute for statistics, 2007). This ratio is too high and this is affecting the students who would like to study through online distance learning. This is likely to change and the number of students will increase in the future due to the fact that internet costs have reduced drastically and the undersea cable will also drastically reduce internet costs.

In the mode of distance learning practiced by University of South Africa (UNISA), instructional materials, known as study guides with written assignments, are sent to students by mail. The University of South Africa is one of the world's ten mega universities. (Daniel, 1998). UNISA teaches over 100,000 students throughout the world through distance learning.

With the continuous revolution of information technology, it is likely to have more students enrolling since it makes learning easier and convenient for students. In this twenty first century the landscape of distance learning is more likely to change and more people will be pursuing distance education.

Institutions offering this mode of study are increasing day-by-day due to ever growing demand. Distance learning is being adopted by most educational institutions as a mode of providing education to a wide range of people. Most institutions offering distance learning are not limited to a specific area of study. Distance learning institutions have taken into consideration the varied needs of the customer and are offering courses in all levels from certificates and diplomas to degrees and post graduate studies. There are many reasons for the growth of distance education but none is as compelling as the hunger for learning felt by those who have been denied it for generations (Dhnarajan, 2001, p.6).

The majority of contemporary distance education students now study part time while working full time and this has clearly lead to increase in demand because of the greater flexibility and mobility within their courses (Jafari, McGee & Carmean, 2006).

The increase has also been necessitated by the rapid advancement in technology. Jochems, Merrienboer and Koper (2004) propose that technological changes have been so extensive that traditional approaches to distance education are no longer adequate and fail to meet the needs of new distance learners. Moore (2000) has also related the advent of interactive media and

flexibility has also brought about a new generation of distance faculty when he looks at what motivates faculties to develop distance learning.

Because learners study on their own in distance learning, there is a need to develop supporting systems to enable students continue with their studies (Simpson, 2000). Learning through distance learning and television has become popular (Curtin, 1996) because it provides flexibility and convenient time schedule (Hegarty, 1996).

In research done by Randy (1999) where he was investigating distance learning for MBA programmes in Hong Kong, he realized that students favor taking their MBA through distance learning because it eases the requirement of attending classes in person.

The uniqueness of distance learning poses some challenges for distance learners. According to Winne (2003), apart from the positive aspects related to distance education, distance education is more than just delivering the necessary information to students. What the student do with the information once it has been delivered is the student's own responsibility. To be successful, students must manage themselves effectively. From this perspective, the researcher will try to discover the various motivator factors and the level of importance they play in students making a choice to study in distance learning.

Motivation can be regarded as the inner desire or drive that prompts an action. It is important to understand what motivates or what has been the motivation for students to pursue distance learning despite the fact that the courses they are pursuing can be offered through traditional classroom set up. This is the main point for this investigation. This research will assist institutions of higher learning that offer distance learning, or intending to offer distance learning, to understand these motivators and address them effectively. These institutions will also be in a position to tailor make their distance learning programmes to appropriately meet the needs of their students.

Finally the institutions will be able to get information on areas that they are not performing well in serving the students and make necessary improvements.

Purpose of study

The number of students studying through distance learning is increasing tremendously worldwide. More and more students are enrolling to study at a distance. Since the introduction of distance learning by KCA University through UNISA, the number of students continues to increase despite the various challenges faced by distance learners.

The current study was undertaken by the researcher primarily to find out what are the factors that motivate students to study through distance learning when same courses are offered through the traditional mode of study where there is physical contact with the lecturers. Further, the researcher will try to find out challenges students face while studying through distance learning.

The various factors that the researcher will try to find out to what extent they motivate the students to study through distance learning include.

- Flexibility of the courses
- Availability of the course
- Personal commitments
- Sponsors decisions
- Reputation and image of the institution
- Cost implications
- Desire to get a foreign degree

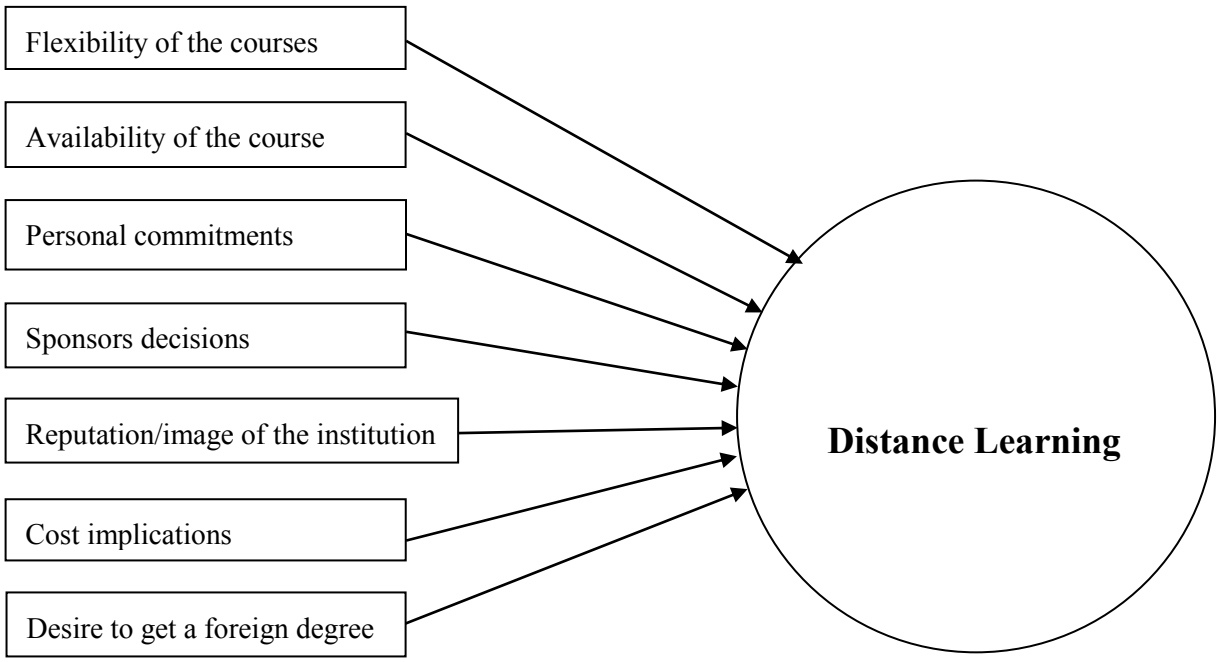


Figure 1. Motivators of distance learning

The above factors were arrived at by the researcher by having an informal interaction with the students undertaking UNISA distance learning at KCA University, a UNISA administrative center.

The researcher posed a question to more than fifty students as to what motivated them to pursue distance learning programmes although the same programmes are offered by the local Kenyan universities. The researcher then wanted to find out to what extent these factors motivated the student in making choice to study through distance learning

Flexibility of the Course

People have various commitments which include work, family and community activities. Therefore it is not easy to find time to commit to traditional classroom schedules. Students who juggle multiple responsibilities find it easy to study through distance learning, Most students enrolling for distance education prefer it because of its flexibility since one does not need to physically attend classes on a daily basis in the university.

Distance learning best suits those people who are not able to attend classes or a regular basis. Through this mode of study, the study materials can be exchanged between the learner and tutor through regular correspondence or via the internet. The flexibility aspect of distance learning is one of the major reasons why many people consider this form of study. This allows people who enroll in distance learning to learn during lunch breaks, evenings, and weekends or anywhere with internet access. Students can pursue degree courses as well as professional courses.

This type of learning helps students fulfill their career objectives while working. This is the flexibility most people are looking for. Flexibility may be in terms of the units one has to take as well the numbers of years one has to take to complete the programme. Distance learning has been known to be flexible regarding the number of units learners can take per semester or in a year. Some of the students may be in remote areas where learning facilities may be unavailable. These students can immensely benefit from distance learning.

Availability of the Course

Most distance learning institutions have a variety of courses. Many students prefer to join distance learning institutions because the courses they want to pursue are available. In recent years, the choice of courses has expanded to cover practically every subject and a wide range of qualifications.

Personal Commitments

Commitment is one of the reasons why students enroll to study through distance learning. Most people have commitments that do not allow them sufficient time to attending regular classes and to study through traditional mode. Most adult distance learners opt to study distance learning because they can more easily fit it into their schedules. It gives the learners an opportunity to balance a range of commitments including family, work and business.

Sponsors decisions

With the continuously changing business environment, there is need for organizations to improve the knowledge and skills of their employees. Organizations realize the importance of increasing employee knowledge and skills to get a competitive advantage. They sponsor their employees to pursue various courses to improve their skills through distance learning. Since these organizations are the sponsors they may dictate the institution from which to study and the course that they would like their employees to pursue.

Apart from organizational support, some students are sponsored by their relatives and parents. In this study, the researcher will look at the sponsor's decision from two perspectives: responsible for paying the fees for the student and sponsor for building organizational knowledge and skills.

Reputation and image of institution

Institutions of higher learning are ranked worldwide for their good image and reputation. Reputation is based on past actions of the organization and how the public perceive these actions in terms of quality of products and services compared to their competitors. The institution's image is the impression made on the minds of the public about the organization (Barich and Kotler, 1991.

Reputation and good image of an organization builds public loyalty since it is perceived that it will offer quality services. The two principal components that come into play when image of an organization is mentioned are the functional and the emotional (Kennedy, 1977). The functional component is related to tangible characteristics which can be measured while the emotional component is concerned with the psychological dimensions that are manifested in feelings and attitudes.

Cost implication

Cost has been considered as a motivator factor for consideration in selecting a course of study as well as an institution of study. Institutions charge different fees for different programmes. With competition increasing in institutions of higher learning, the pricing strategy has become a common phenomenon in higher institutions. One of the factors that most students consider is the cost of getting a degree from an institution

The introduction of Information Communication Technology (ICT) has made distance learning become more exciting. In developing countries the use ICT involves cost that students must bear.

Both learners and trainers can choose applications which are more appropriate and flexible in time, in place personalized ,reusable, adopted to specific domains and more cost efficient (Fisser, 2001; Pelliccione, 2001). Unlike other institutions where students have face to face interaction with lecturers, distance learning is considered to be cost effective since overhead costs are relatively low.

Desire for Foreign Degree

There has been a desire for students to acquire foreign degrees in most developing countries. This is due to the fact that most developing countries have sufficient institutions of higher learning and the notion that foreign degrees in some way superior. Demand for higher education leads students to pursue the option of getting foreign degree. The African continent has been one of the highest exporters of students to developed countries to pursue various degree programmes.

One favorite destination for African students is the United Kingdom. It has been argued that the colonial link between the United Kingdom and African countries has contributed to this. Also, United Kingdom Universities aggressively market their program to portray that they are the number one destinations for higher educations. Local representatives are appointed in some countries to be the link between the institutions and participate in marketing activities. According to publications by ukuniversities.ac.uk the number of international students has increased by over 60% in the last five years

In the 1960s and 1970s there was a significant flow of international students - around 9 per cent (Hughes, 1998).

Methodology

The motivator factors were arrived at by the researcher after having an interview with students studying through distance learning on the factors that motivated them to pursue their studies through distance learning.

The interviews were unstructured and informal. The researcher wanted to find out to what extent these factors influenced students decision making to study through distance learning. Interaction with students enabled the researcher to develop the instrument and structure the questions.

Sample

The study sample comprised of University of South Africa (UNISA) students pursuing their studies through distance learning at KCA University, which is a UNISA licensee in Kenya.

A sample sizes of one hundred and ten students was selected to represent students pursuing courses in Bachelor of Commerce, Arts, Science, and Bachelor of laws. The researcher used convenient sampling to select the sample since most of the students are distance learners who rarely come to KCA University. The respondents were both male and female aged between 21 and 60 years.

Survey instrument

The researcher used a carefully structured questionnaire having both closed and open ended questions

A four point opinion Likert scale was used where the respondents were asked to choose the most appropriate response by circling the number from 1 to 4 where 1 is strongly disagree and 4 is strongly agree on factors they considered were motivators to pursue distance learning.

The second part of the questionnaire asked respondents to list some of the areas where they felt the institutions needed to improve on the delivery of student's services

Data Analysis

Since this research was explorative in nature, data analysis was restricted to the use of descriptive statistics such as percentages as found in Kirsten and Rogers (2002).

Findings

Respondents we asked to rate the following motivators as factors they considered in studying in distance education: flexibility of the courses, availability of the course, personal commitments, sponsors decisions, reputation and image of the institution, cost of study and desire to get a foreign degree. A four point opinion scale was used with strongly agree at one end and strongly disagree at the other end

Likewise respondents were asked to indicate area that the university needs to improve on in delivery of their services to the students.

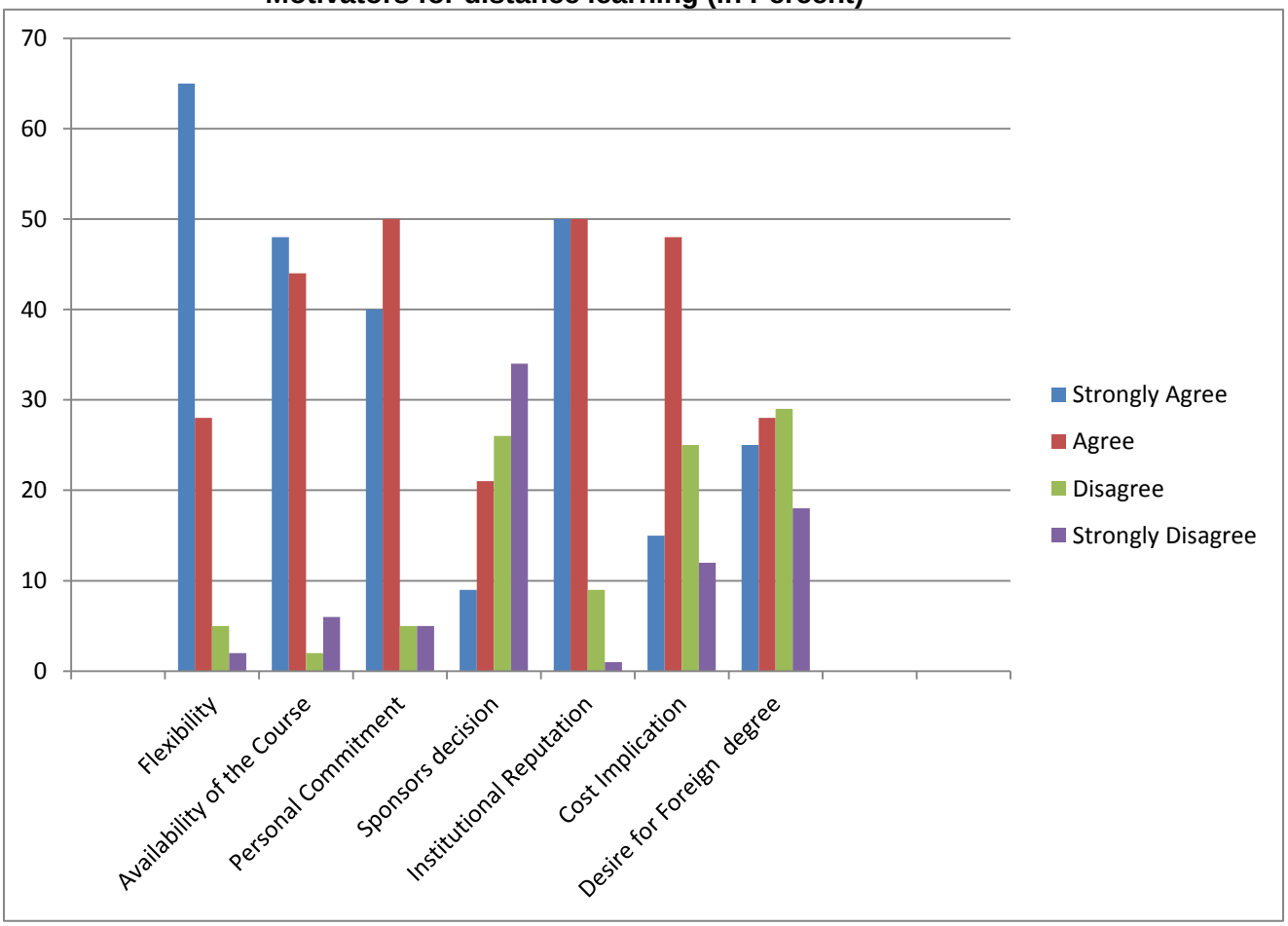
Table 1
Response analysis frequency

MOTIVATORS	Strongly Agree	Agree	Disagree	Strongly Disagree	TOTAL
Flexibility	71	31	5	2	110
Availability of the course	53	48	2	7	110
Personal commitment	44	54	6	6	110
Sponsors decision	10	24	29	37	110
Institution reputation	50	51	9	1	110
Cost implication	16	53	28	13	110
Desire for foreign degree	27	31	33	20	110

Table 2
Percentages of response analysis

MOTIVATORS	Strongly Agree %	Agree %	Disagree %	Strongly Disagree %	Total %
Flexibility	65	28	5	2	100
Availability of the Course	48	44	2	6	100
Personal Commitment	40	50	5	5	100
Sponsors decision	9	21	26	34	100
Institutional Reputation	50	50	9	1	100
Cost Implication	15	48	25	12	100
Desire for Foreign degree	25	28	29	18	100

Graph 1
Motivators for distance learning (in Percent)



The respondents were asked to rate flexibility as a motivator factor they consider to study through distance learning. Majority of the respondents 71(65%) strongly agreed, 31(28%) agreed while 5(5%) disagreed and 2 (2%) strongly disagreed that flexibility is a factor they considered in studying through distance learning

Majority of the respondents were of the opinion that flexibility of the program is a major factor they considered in studying through distance learning.

Of all the 110(100%) students who considered availability of the course as a motivator factor they consider, 53 (48%) strongly agreed as a factor, 48 (44%) agreed, 2 (2%) disagreed while 7 (6%) strongly disagree. The majority of the respondents were of the opinion that availability of their interested course of study is a reason why the considered studying through distance learning

Of the total 110 (100%) respondents 44 (40%) strongly agreed that personal commitment is a factor they consider in studying through distance, 54 (50%) agreed that personal commitment is a factor they consider while 6 (5%) disagree as well as 6 (5%) strongly disagree. The majority of the respondents were of the opinion that personal commitment was a reason to study through distance learning.

Of the total 110 (100%) respondents 10(9%) strongly agreed that the sponsors decision is a motivator factor for studying through distance learning. 24(21%) agreed that sponsors decision is a motivator while29 (26%) disagreed and 37 (34%) strongly disagreed. The respondent's decision to study through distance learning was never influenced by the sponsor's decision.

Out of the total 110 (100%) respondents 50(45%) strongly agreed that institution reputation affect their decision making in studying through distance learning. 50 (45%) agreed that institutional reputation is a factor they considered in making a decision to study through distance learning. 9(8%) disagreed on institutional reputation as a factor to consider while 1 (2%) strongly disagreed. The majority of the respondents were of the opinion that University of South Africa reputation is a factor they considered to study through distance learning.

The respondents were asked to rate cost implication as a factor they considered in studying through distance learning. Out of the total 110 (100%), 16(15%) strongly agreed it as a factor, 53 (48%) agreed as a factor while 28 ((25%) disagreed and 13 (12%) strongly disagreed. Most of the respondents were of the opinion that cost was a factor they considered to study through distance learning.

Out of the total 110 (100%) respondents 27 (25%) strongly agreed that a desire for foreign degree was a motivator factor for studying through distance learning. 31(28%) agreed while 32 (29%) disagreed and 20(18%) strongly disagreed. The majority of the respondents were of the opinion that desire for foreign degree was never a motivator factor for choosing to study through distance learning.

Areas of concerns

The respondents were asked to state areas that according to them need to be improved by UNISA in the provision of their services.

The respondents highlighted the following broad areas

Timely communication

Most of the students felt that communication from UNISA was not timely and it takes a long to get responses from UNISA.

Some of the respondents indicated that their inquiries are never responded to. Because of the physical distance involved and lack of physical contact with the service providers there is need to have effective and efficient communication for distance learning to be effective.

Delivery of study materials

There were concerns by the respondents on the delivery of the study materials. Most students were of the opinion that they rarely get study material when they have been indicated out of stock in the initial dispatch. Some respondents indicated that they get study material that were indicated out of stock too late some mentioning few weeks to the main examination.

This affects the students in submission of assignments on time which ultimately affects their performance. Study materials are very critical for students studying through distance learning. Its therefore important that students get their all their study materials on time to enable them prepare adequately for examinations otherwise it will affect their performance

Giving feedback on assignments

Another area the respondents pointed out as a challenge is the feedback on assignments. One of the respondents indicated that they he received his assignment after he had sat for the main examinations. He went ahead and said “it does not make sense to receive feedback on assignment after you have already sat for the final examination”.

Assignments feedback should be timely to help students in their revision. Normally people learn when given feedback on their performance. Feedback is also important in self-evaluation.

Including prescribed material in the study packages

Most of the students raised the concern on prescribed text books. They indicated that the prescribed books are not available in their native country and whenever they want to buy they find at times some books are out of stock from the bookshops.

They pointed out that this disadvantages them with their colleagues who are residents native country where they can easily access prescribed books. Some of the respondents pointed out that they were willing to buy the books if included in the study materials.

Simplify registration process

Majority of the respondent were of the opinion that the registration process is complicated, and felt there was need to simplify the process

Cost of the course is too high

Some of the respondents were of the opinion that fees charged by Unisa were somehow high**.** In terms of fees some respondents raised concerns a bout the annual increment of fees.

Solutions of assignments to be posted online

Respondents were of the opinion that answers for assignments be posted in my Unisa so that they are able to access since it takes long for the students to receive the feedback

Conclusions

Majority of the respondents were of the opinion that flexibility of the program was a major factor they considered in studying through distance learning.

Majority of the respondents were of the opinion that availability of their interested course of study is a reason why the considered studying through distance learning.

Majority of the respondents were of the opinion that personal commitment was a reason to study through distance learning.

The respondent's decision to study through distance learning was never influenced by the sponsor's decision.

Majority of the respondents were of the opinion that University of South Africa's reputation is a factor they considered to study through distance learning.

Most of the respondents were of the opinion that cost was a factor they considered to study through distance learning.

Majority of the respondents were of the opinion that desire for foreign degree was never a motivator factor they considered for making a choice to study through distance learning.

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Editor's Note: This study explores student knowledge and participation in legal and ethical use of computers and computer networks in Jordan.

University Students and Ethics of Computer Technology Usage: Human Resource Development

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Jordan

Abstract

The primary purpose of this study was to determine the level of students' awareness about computer technology ethics at the Hashemite University in Jordan. A total of 180 university students participated in the study by completing the researchers-designed questionnaire named the Computer Technology Ethics Questionnaire (CTEQ). Results indicated that university students showed medium level of awareness about computer technology ethics. Additionally, results indicated that there were no significant differences in participants' level of awareness based on the demographics of gender and academic level. Ethical violations included hacking into a computer system for illegal purposes, taking on different personal identity on the internet, illegal use and distribution of copyrighted materials; invasion of privacy, hate speech, and plagiarism. The study ended by suggesting a number of practical and theoretical recommendations for a number of stakeholders.

Keywords: Computer technology, ethics, university students, and Jordan.
University Students and Ethics of Computer Technology Usage: Human Resource Development

Introduction

The fast advancements in information technology especially related to internet use have raised many concerns among the educational community as to its proper use by university students. Students rely on computers and the internet almost daily to perform a wide variety of tasks including creating reports, sending emails, and searching the web. Considering the level of harm students may cause with a computer connected to an internet, it is crucial to have code of ethics to keep them safe and to safely police the internet (Forester & Morrison, 1994).

There are indications in the literature implying lack of awareness among students toward technology use with regard to ethical and unethical behaviors (Ashworth, Bannister, & Thorne, 1997; Paterson, Taylor, & Usick, 2003; Spinello, 2006). A major responsibility of the education system is to prepare students at certain levels of ethics and moral values, which will be transferred to their future jobs. Crystal, Geide, and Salpeter (2000) emphasized the importance of teaching students computer ethics in order to minimize the growth of technology crimes and unethical behaviors (e.g., harassing emails, plagiarism, and the illegal distribution of copyrighted materials) that could be easily used in their future jobs.

Ethics in general can be defined as "the study and evaluation of human conduct in the light of moral principles" (Newton, 2004, p. 230). DeGeorge (2006) defines ethics as "a systematic attempt to make sense of our individual and social moral experience, in such a way as to determine the rules that ought to govern human conduct, the values worth pursuing, and the character traits deserving development in life" (p 19). In specific, computer ethics are the moral guidelines that govern the use of computers, networks, and information systems (Shelly, Cashman, Gunter, & Gunter, 2004). Five areas of computer ethics are frequently discussed in the literature: (a) unauthorized use of computers; (b) hardware, software and information theft; (c) information privacy; (d) copyright; and (e) the existence of objectionable materials on the internet

(ISTE, 2004; Johnson, 2001; Pence, 2000; Quinn, 2004; Spinello, 2006; Woodbury, 2003). Berkowitz's (2000) mentioned seven computer ethics including hacking; copyright protection; hate speech; privacy; computer addition; plagiarism; and personal identity.

Other researchers (Shelly, Cashman, Gunter, & Gunter, 2004) emphasized the importance of the ten commandments of computer ethics. These commandments guide the individual users to base computer related operations on strong ethical values as follow:

1. Students will not use a computer to harm other people.
2. Students will not interfere with others' computer work.
3. Students will not look at others' computer files.
4. Students will not use a computer to steal.
5. Students will not use a computer to lie.
6. Students will not copy or use software without paying for it.
7. Students will not use others' computer resources without permission.
8. Students will not use others' work.
9. Students will think about the social impact of the programs he or she creates.
10. Students always will use a computer in a way that shows respect and consideration for other people.

In discussing the above mentioned computer ethics, Borck (1988) explains that "illegal copying of software is morally similar to shoplifting" (p. 127). Issues such as intellectual property and copyright are important in academic settings because it encompasses plagiarism. Intellectual property focuses on who owns information, which can be in the form of a published paper or music file in digital formatting. This type of intellectual property can be copied and duplicated in seconds at no cost, without crediting the proper source, which is one example of an ethical violation (Chiang & Assane, 2008; Harris, 1998; Liebowitz, 2006; Weckert & Adeney, 1997). The issue of privacy violations refers to cases in which a person breaks into personal computers of individuals and access private information (Ross, 2005).

With regard to research studies focusing on computer ethics, a handful of studies were located that are related to the subject at hand. A study by Slater (1991) on a sample of 300 university students admitted using computers for some form of unethical use including software piracy. For example, students in this study indicated they would purchase one copy of a program and make copies for other students. Wood, Behling, and Ang (1999) surveyed 464 Australian, first year university students and found that 53% of respondents had used copied software. Chiang and Assane (2002) also discovered that the majority of people violated copyright issues were college students. The study also indicated that the main two factors behind such action were their financial limitations and their technical ability to use Peer-to-Peer (P2P) software.

A study by Taylor (2004) on a sample of university students indicated that students believe piracy was a nameless crime and does not hurt anyone. A study by Gupta, Gould, and Pola (2004) found that college students' perceived software piracy as an acceptable form of behavior. Shang, Chen, and Chen (2008) found that students who pay for the use of P2P programs feel less guilty about piracy even if sharing on the P2P system breaks copyright laws. They also came to the generally shared conclusion that piracy was rationalized by students and was not considered to be a problem to them. A study involved a sample of university students in Japan; Jung (2009) found that software piracy and plagiarism yielded a perception that both were relatively harmless.

Statement of the Problem

University students use the computer technology on daily basis to perform a wide range of school and non-school activities. There are computer ethical guidelines that govern students' use of such technology, which is the gatekeeper from committing computer crimes. Research indicates lack of students' understanding of computer ethics, which have left them making decisions based on almost no knowledge about responsible use (Moor, 2003). Moreover, ethical and moral use of computers is an area of research that has been largely ignored. Therefore, the primary purpose of this study was to determine the awareness levels of university students in Jordan regarding computer technology ethics.

Research Objectives

The following research objectives were pursued in this study:

1. To determine the level of awareness about computer technology ethics among students at the Hashemite University.
2. To determine the differences in students' awareness related to computer technology ethics based on gender and academic level.

Importance of the Study

The present research is extremely important for a number of reasons. First, the present study provides ethical guidelines for a responsible use of computer technology by university students. Through exposure to these ethics, students' awareness may be increased. Second, faculty members may understand the importance of computer technology ethics and further steps may be taken on their parts to emphasize ethical issues throughout the curriculum. Third, the outcomes of this study may benefit university administrators, in that, efforts may be undertaken to frequently assess computer technology ethics and proactive steps can be set in place to prevent ethical violations.

Methodology

Population and Sample

The population of the study included all the Hashemite University undergraduate students who were enrolled in the technology education classes offered by the Faculty of Educational Sciences during the academic years 2009-2010. A random sample of 210 students was chosen for the study. A total of 180 students completed the survey with a response rate of 89%. The sample distribution was 64 males (35.6%) and 116 females (64.4%). With regard to students' academic level, there were 55 students (30.6%) in their first year, 45 students (25.0%) in the second year, 29 students (16.1%) in the third year, and 51 students (38.3%) in the fourth year.

Instrumentation

The items used in the instrument were developed by the researchers after a thorough review of the literature related to computer technology and ethics. A demographics section was included to provide a description of the sample regarding gender and academic level. The face and content validity of the instrument was evaluated by an expert panel comprised of 12 university faculty members from various public universities in Jordan who have expertise in the area of educational technology. The instrument was field tested with 22 students whom were not included in the final sample of the study. Changes indicated by the validation panel and the field test were incorporated in the instrument development. The final instrument was named the Computer Technology Ethics Questionnaire (CTEQ) and is comprised of 13 items. These items were rated using a 5-point Likert-type scale with the following anchors: 1 = highly ethical, 2 = ethical, 3 =

neutral, 4 = unethical and 5 = highly unethical. An internal consistency coefficient for the 13 items in the instrument was found to be 0.80.

Data collection

After gaining permission from class instructors, the researchers distributed the instruments to the study sample during classroom sessions. The researchers explained to participants the purpose of the study and encouraged them to read the statements carefully before ticking the appropriate choice. The participants were insured confidentiality and anonymity. Later, completed questionnaires were collected by the researchers from classroom instructors.

Data Analysis

Procedures for statistical analysis are discussed by objective. Objective one was to determine the level of awareness about computer technology ethics among students at the Hashemite University. Descriptive statistics including means and standard deviations were used to achieve this objective. Objective two was to determine the differences in students' awareness related to computer technology ethics based on gender and academic level. In the case for gender, independent sample t-test was used where as one-way analysis of variance (ANOVA) was used to determine differences based on academic level.

Results

The data collected from all participants were coded, entered to the SPSS spreadsheets, and analyzed using software package SPSS version 11.5. Descriptive statistics for all variables in this study were examined using SPSS frequencies. The minimum and maximum values of each item were examined for the accuracy of data entry by inspecting out of range values. An examination of these values did not detect any out of range values. Missing subjects were not detected either. Results of the study are addressed by each objective.

Results Pertaining to Objective One

Objective one was to determine the level of awareness about computer technology ethics among students at the Hashemite University. Descriptive statistics including means and standard deviations were used to achieve this objective. Analysis of the first question data involved the tabulation of awareness about computer technology ethics mean. The total mean score was calculated based on student responses to each item in the selected scale using the 5-point Likert type scale. So, the levels of awareness about computer technology ethics were interpreted using the following categories: below 3 = Low awareness level, 3-4 = Medium awareness level, above 4 = High awareness level. As can be observed in Table 1, the mean for overall computer technology ethics was 3.65. This result indicates that Students at the Hashemite University rated the awareness about computer technology ethics as Medium awareness level. Further, the lowest mean of computer technology ethics was 3.48 and the highest mean was 3.74. This result reveals that items of computer technology ethics have had medium level.

Table 1
Responses on Computer Technology Ethics Questionnaire Ordered by Means

Items	Mean	Std.Deviation
1. Hacking into a computer system to obtain passwords, change grades, corrupt files, and download programs.	3.74	.71
2. Taking on different identity on the internet for fun or profit (e.g., credit cards).	3.73	.53
3. Downloading and distributing copyrighted materials to other people over the internet.	3.70	.61
4. Copying an entire article from the internet and turning it in as your assignment.	3.70	.59
5. Spreading the wrong information about other people by means of the Internet.	3.69	.69
6. Sharing music or movies files with others on the internet.	3.69	.67
7. Obtaining another person's private files by means of the internet.	3.67	.60
8. Borrowing a video program or software from a friend and copying it.	3.65	.55
9. Forwarding an email send to me by others to whomever I like.	3.64	.68
10. Reading someone else's email message without their permission.	3.61	.48
11. Collecting and sharing information about other people over the internet without their prior consent.	3.61	.63
12. Stealing funds electronically.	3.57	.62
13. Sending files infected with viruses over the internet.	3.48	.73
Total	3.65	.40

Results Pertaining to Objective Two

Research question two concerns the differences in students' awareness related to computer technology ethics based on gender and academic level. T-tests for independent samples were used to examine the gender variable. As shown in Table 2, there were no significant differences among university students at the Hashemite University in their levels of computer technology ethics that are attributed to their gender (?< .05).

Table 2
The Differences between University Students Males and Females on their Levels of Awareness of Computer Technology Ethics

Dimension	Gender	N	Means	S.D.	T	*P*
Computer Technology Ethics	M	64	3.62	41	-.75*	45
	F	116	3.67	40		

On the other hand, one-way analysis of variance (ANOVA) was utilized to identify whether the variances of the four level groups of academic level of university students at the Hashemite University were equal or significantly different. Table 3 shows that there were no significant differences among the four academic standing level groups on their levels of awareness of computer technology ethics.

Table 3
The Differences among the Four Level Groups of Academic Level on the Awareness of Computer Technology Ethics.

	Sum of Squares		df	*F*	*p*
Computer Technology Ethics	Between Groups	.217	3		
	Within Groups	29.730	176	.428	.733
	Total	29.947	179		

Discussion and Recommendations

The majority of people who have engaged in computer technology unethical acts such as copyright violations and digital piracy have been university students (Chiang & Assane, 2008; Liebowitz, 2006). This has led private industries to pressure higher education institutions to monitor these acts closely because it will have profound impact on students, universities, and the private industry (Chiang & Assane, 2002). With higher education institutions have the responsibility to graduate ethically-based students to contribute to the larger society, the primary purpose of this study was to assess levels of university students' awareness about computer technology ethics in the faculty of educational sciences at the Hashemite University in Jordan. A sample of 180 students participated in the study by responding to 13-items Computer Technology Ethics Questionnaire (CTEQ). The CTEQ was developed by the researchers and found to be valid and reliable measure of computer technology ethics.

As indicated in the results section, the mean value of the students' response on the CTEQ questionnaire was 3.65, signifying a medium level of students' awareness regarding computer technology ethics. This result indicates that university students have not reached an acceptable level of awareness of computer technology ethics. Ethical violations related to hacking into a computer system for illegal purposes, taking on different personal identity on the internet, illegal use and distribution of copyrighted materials; invasion of privacy, hate speech, and plagiarism should be regarded as highly unethical by university students.

There are many acts such as the Higher Education Act of 1965 informs students that unauthorized distribution of copyrighted material may subject them to civil and criminal liabilities (Higher Education Act, 2008). When students know that there is a legal aspect associated with unethical acts, they are more likely to define it as unacceptable behavior and subsequently are more likely to avoid the behavior (Krie & Cronan, 2000). Therefore it is important increase students' awareness of ethical issues in computer ethics (Moskal, King, & Miller, 2003).

Further, the findings of this study speculated that university students were quite ethical in those behaviors associated with hacking, personal and information privacy, and personal property. These findings signal an improvement in ethics in these areas over previously published studies conducted during the last decade. For example, previous studies (Chiang & Assane, 2002; Gupta, Gould, & Pola, 2004; Jung, 2009; Shang, Chen, & Chen, 2008; Slater, 1991; Taylor, 2004) indicated that university students perceived copy right violations and software piracy as an acceptable form of behavior. Another strand of results regarding demographic variables reveals that gender and academic level had no effect on students' awareness of computer technology

ethics. This result is justified by the fact that both male and female university students are treated equally at home, society, and the educational system. Further, students at various academic levels starting from their beginning year at the university may not be gradually exposed to computer technology ethics.

Based on the above findings, a number of practical and theoretical recommendations are suggested for the field of study. From the practical stand point, it is important to do the following: (a) teach students about essential ethical behaviors associated with computer technology usage beginning in their first semester until graduation to prevent cybercrimes and to better prepare them for the world of work; (b) hold regular seminars and workshops for faculty members and staff members in the university to train them on the proper prevention of cybercrimes and to set a good example of ethical behaviors in the classrooms; (c) the university administration should incorporate learning about computer ethics and morality in almost every university course and/or add a required course on computer ethics to all university students; and (d) and joint information partnerships should be formed with local businesses, attorneys, and judges to inform students about the laws associated with unethical behaviors and the legal liabilities associated with it.

From the theoretical standpoint, the following line of research is suggested for the future: (a) more research is needed to refine the instrument at hand by adding more items and defining its dimensions through exploratory and confirmatory factor analyses; (b) the study should be replicated with all public and private universities in Jordan; (c) more studies should be conducted to determine faculty members' awareness of ethical issues; and (d) future research should establish qualitative line of research on computer technology ethics through observations, computer tracking systems, focus groups, and personal interviews.

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Editor's Note: The ease of adding links, graphics, videos, interactive multimedia and simulations to online learning facilitate a host of learning opportunities for online students.

Multimedia and Distant Learning

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Keywords: multimedia, pedagogy, cognitive load.

Introduction

Unlike the correspondence courses that pre-date the World Wide Web, today's online educational environment provides a variety of multimedia formats that enhance the learning environment. The fundamental definition of multimedia learning is that curriculum is a process that does not separate what is learned from how it is learned (Backer, Patricia). Programs that were once print-centric have had to make room for Web design and multimedia courses (George-Palilonis, Filak, Vincent, 2009). Students learn in a variety of different manners howbeit auditory, visual, or tactile that the correct combination of multimedia objects blended into the course material can provide a course presentation that enriches the learning experience and assists the student to achieve course objectives. Kumar (2004) citing (Bagui,1998) states, "Multimedia is the use of text, graphics, animation, pictures, videos, and sound to present information." In addition, multimedia formats include social networking sites, wikis, digital photos and videos all harnessed by the instructor and students to promote active student learning in a connected environment. This is the basis for WEB 2.0, the emerging, 2nd generational social networking forums and open source information derivation that promotes learner-centered knowledge acquisition and dissemination. Simonson (p. 244) citing Maloney (2007) states, "What we can see in the Web's evolution is a new focus on innovation, creation, and collaboration, and an emphasis on collective knowledge over static information delivery, knowledge management over content management, and social interaction over isolated surfing." "Exposure to current, authentic information that supports inquiry-based and constructivist learning, improve student test performance, and develop broader forms of social, cultural, and intellectual capacity (Macgregor Kim S., Lou, Yiping, 2004, p. 161)."

Technological improvements have made significant strides since the dawn of the personal computer in the early 1980s. Broadband access, wireless communication, miniaturization of hardware, improved and more powerful micro-chips and operating systems, workstations, notebooks, laptops, netbooks, tablet PCs, and smart phones have all made it possible to communicate, receive and process information at the student's discretion from any location at any time. Online course designers need not worry as much about band-width and the amount of data being transmitted as in prior times, freeing them to concentrate on the design and presentation of the course material itself.

By definition, the distant learner is not present in the classroom with the instructor during the presentation of the course material. The distant learner most often accesses the course content an asynchronous environment. Since this is the case, online course by nature are student-centered and not instructor – centered.

The advent of Information Communication Technologies (ICT) has had a revolutionary impact on the sources and expression of learning and on educational delivery systems (Brown, 2011). This has resulted in paradigm shifts in education emphasis:

from linear to hypermedia learning

from instruction to construction and discovery

from teacher-centered to e-learner-centered education

from absorbing material to learning how to navigate and how to learn

from school to lifelong learning

from one-size-fits-all to customized learning, and

from the teacher as transmitter to the teacher as facilitator

A certain body of studies concluded the inclusion of multimedia alone does not guarantee education success on behalf of the student. In fact, the indiscriminate use of multimedia in course design can negatively impact learning outcomes. There are other mitigating factors the educational designers must consider when designing distant learning courses. Student learning styles, cognitive load and prior knowledge all play a part in the way multimedia effect the learning outcomes of the students. Prior knowledge and self-regulation strategies have a direct bearing on students' ability to use hypermedia (Interactivity and information gathering on the Internet). "Prior-knowledge is generally understood to be the factual (declarative) and practical (procedural) knowledge that a person possesses in a given domain (Muller-Kalthoff, Thiemo, Moller, Jens, 2006)." The conclusion of the Muller-Kalthoff et al. study confirms the notion that prior knowledge had a direct correlation to positive learning outcomes by students.

By definition e-learning must be student –centered based on a constructivist teaching philosophy where the instructor becomes more of a facilitator than a teacher. In this scenario the student learns through discovery rather than information assimilation although that is part of the discovery process. Evidence shows in the constructivist-based learning environment using multimedia, students experience a high level of motivation and self-esteem.

"More recently, and emphasis on discovery and constructivist procedures encouraged learners to discover knowledge rather than to have instructors transmit knowledge (Sweller, 2008, p. 372). Students use their prior knowledge to construct new knowledge that is relevant to them and their situation MacGregor citing (Hill & Hannafin, 2001) states, "Resource-based learning has great potential to improve the development of higher-order cognitive skills, critical thinking, and problem solving skills that the fast paced information age demands" (MacGregor, 2004 p. 164). Effective use of multimedia elements can help facilitate the learning process. "Interactive knowledge construction is normally facilitated in an environment that stimulate meaningful, social and strategic learning process (Verhoeven, L., Schotz W., & Paas, F. 2009)." Social learning is information learned from others and by receiving meaningful feedback on course work. Strategic learning is the method of knowledge acquisition employed to facilitate learning. These are methods the student employs time and again. It is what works best for him or her.

Multimedia and Course Design

All course design needs to be well planned out. Course objectives and measurable learning outcomes need to be established before the designing phase begins. Teaching at a distance requires that greater emphasis be placed on the initial planning phase (Simonson, p. 325). Instructional design should be thought of as a system incorporating all components of that system. Research indicates that learning is the result of systematic instruction design which, of course, is the goal of educational course design. Instructional design is a process to ensure learning is developed with specific measurable outcomes. The main elements of instructional systems development model are analysis, design, development, implementation and evaluation which falls under the acronym, ADDIE (Aris, Ahmad, Mohamad, Harun , Zaidatun,, 2008). An instructional design model contain the following inherent elements:

It is systematic

It is systemic – Processes and elements of the course are considered together with their interrelationship amongst them.

It is reliable

It is iterative – The steps of the course design are repeatable.

It is empirical

Samaras's research identifies two underlying philosophies of multimedia learning theory principles, behaviorist and cognitivism. Behaviorist multimedia course design deals primarily with low-level learning tasks, i.e. the rapid acquisition of basic concepts and skills. In Samaras's terms first generation multimedia course design uses the behaviorist philosophy for instructional pedagogy and assessment.

Course design and presentation are critical factors in developing a distant education course. Forethought and planning are essential ingredients to effective course design. A judicial use of multimedia inclusion fitting the course material enhances the learning environment. The course designer must choose what multimedia effects to include and when to include them in the course presentation. Samaras. H. et al. (2006) p. 8, research on the affects of media in course design came to the conclusion that the fundamental question is not whether media affects learning but *how to take advantage of the various media to make instruction and learning more effective*. In other words, Samaras et al. rightly conclude there is an appropriate time and place to include media effects in course design and there is time when it is more appropriate to exclude it. The emphasis in course design should be on content and presentation rather then media inclusion. A well designed and presented distant learning course which meets stated course objects is the goal and media can augment course design but should never be the basis for course design. (Simonson et al. 2009, p. 133) supports the notion of matching media to fit the course design and presentation: "The first criterion is to match the medium to the curriculum or content. Other considerations are the accuracy of information, motivation quality, engagement quality technical quality and unbiased nature of material." What works best in the in-class environment may not always work as well in the distant education arena. Since this is the case, the instructor needs to carefully consider the media content that is best for the distant learner not just what is being used in the classroom environment.

The key is to match the appropriate media to the instructional material (Simonson et al 2009, pg. 133). Kumar points out the philosophy of any distant course designer and developer is that students learn with technology and not from technology. This is Clarke's basis premise that media is neutral it is a delivery system of course material and content from which the student learns (Clark, R.E., 1983).

The use of multimedia may enhance learning if the student population has limited prior knowledge of the course subject matter. On the hand, multimedia use may impede learning when the student population has great deal or prior knowledge relative to the subject matter. This thought is echoed by Verhoeven (p. 370) citing (Schnotz & Rasch, 2005) when he states, "Static or animated pictures may either facilitate or inhibit students' comprehension of the multimedia text depending on external and internal conditions of learning

Course objectives, research, planning, understanding, technical abilities, understanding learning styles and the effects of multimedia on cognitive load are essential ingredients for the distance educator course designer to have when designing and presenting course content. It may take several iterations after appropriate feedback to restructure the course content and presentation so that it best meets the needs of the distant learner.

An effective way to make learning relevant is to base the learning experience in a real word problem. The problem must be interesting, engaging and appealing and relevant (Mai, 2009). Having a real world problem to solve engages the student in the constructivist method of knowledge acquisition and application. Ultimately, the students accumulate the knowledge to solve the problem through the discovery model and experience transference in the application of

the knowledge to the stated problem. This new knowledge is stored in the learner's Long Term Memory for recall and accumulation at some later date. Schnotz Verhoeven describes the problem introduction initiating a unit lesson as an anchor (p. 2). These anchors keep the students engaged and on track to solve the problem by discovery of a valid solution to the problem.

Verhoeven's research concludes by stating:

> … learning outcomes are dependent on personal characteristics such as prior knowledge, motivation and perspective-taking. Furthermore, learning outcomes appear to be mediated by task demands, which are the result of instructional design (Verhoeven, et al. 2009, p. 374).

Multimedia and Student Learning Styles

Courseware designers and developers, where possible, should take into account learning style differences. Time, manpower, and effort are required to produce separate processes for each learning style (Aris, et al., 2009 p. 64). Research has found that a student's learning style affects achievement on multimedia-based learning (Backer).

Of prime importance for the distant educational course designer and instructor is to know the students for which the course is designed. With modern telecommunication affordability and availability, an increasing number of people are engaging in distant learning. Simonson et al. state there are similarities as well as difference in types and groups of distant learners. Amongst other considerations, the designer should know something of their prior subject matter knowledge, learning styles, motivation and course expectations. Spector et al. citing Honey and Mumford (1992) states "A learning style is a description of the attitudes and behaviors that determine and individuals preferred way of learning (p.306)." Multimedia tools such as: text, audio, visual, graphics, animation etc. can be adapted for the individual learner by the designer knowing something of his/her learning style. Some learners are more visual oriented than others who may be more auditory oriented. "The more the distance education teacher knows about the individual student within the whole class, the more elegant the application of education tools to the learning situation (Simonson et al. p. 169)."

Cognitive Load

Effective course design takes into consideration cognitive load. "Cognitive research deals with how people perceive, learn, remember, and think about information (Samaras, et, al., p. 12)." "Cognitive load theory focuses on how constraints of working memory have to be taken into account in order to optimize learning processes (Verhoeven, 2009, p.371)." Cognitive research has determined there are two capacities of the brain that process information. One is Long Term Memory (LTM) which stores and recalls learned information and has virtually a limitless capacity. "Long Term memory is the central structure of human cognitive architecture (Sweller, 2008, p. 371)."

The Borrowing Principle is the chief means by which the individual acquires learned information. The Borrowing Principle is information that has been previously learned by others and is passed on to the learner. There is a cumulative affect to the Borrowing principle. The learner can learn bits of pieces of information from others and assimilate it to already acquired stored information that builds up over time and is available upon recall. There is a random process associated with the Borrowing Principle that allows for uniqueness and variation in the accumulation of stored information.

Random generation is the other means by which new information is learned. When the Borrowing principle does not apply to a new learning situation the learner is left to random information

processing. This is the more difficult process of the two information and transference systems in that randomness has no cognitive LTM recall to apply to the learning situation. The brain therefore has to work all the harder to sort out and categorize and make sense of the new learning situation. "Random generation can only function properly when coupled with effectiveness testing and the combination of random generation and effectiveness testing provides the knowledge- or information – creating process of natural information-processing systems (Sweller, 2008, p. 373)."

The other function of the brain dealing with information processing is called Working Memory (WM) and unlike LTM has a limited processing capacity. Since WM has limited process capacity it can be overloaded hindering effective learning. Kumar (2004 p. 3) citing Clark & Mayer (2003) states, "WM is the center of cognition and scaffolds all the active thinking activities that occur." Encoding occurs when new knowledge in WM is combined with LT stored knowledge. Rehearsal is the process that takes place to facilitate encoding and retrieval is the process whereby the individual recalls and applies stored knowledge in a given circumstance (Kumar, 2004). Two prime channels of information processing are the auditory and visual channels. "Significant factors associated with efforts to reduce learner cognitive load are prior knowledge, schema formation, automation, and chunking (Samaras, et al. 2006, p. 13)." Chunking is the grouping of logically related material relevant to the unit topic that is processed in mass by the learner and stored in LTM.

The executive system of WM is the control mechanism to coordinate storage and processing of information. Newly acquired information is stored in LTM in the combination of element called schemas.

It is important to note the emerging hypertext learning environment places an inordinate demand on WM load capacity since the learners can find themselves lost in cyberspace not knowing where to go next (Muller-Kalthoff, 2006). So while the student is actively engaged in the discovery process of knowledge acquisition which the hypertext environment fosters, learning may be impeded by the extraneous cognitive load demand on the learner. This load impediment can be mitigated by navigational aids in the forms of maps or graphical overviews of the hypertext environment (Muller-Kalthoff, 2006).

Multimedia pedagogy

World-wide research has shown that using constructivism and multimedia technology has become increasingly import in teaching and learning in higher education in order to promote and enhance the teaching and learning process (Neo, Mai, Neo Tse-Kian , 2009). Using Information Communication Technology (ICT) students learn how to learn, i.e. discovery, versus how much is learned. In this environment, the teacher is no longer the instructor but the facilitator of the education process with the students actively engaged in process information acquisition. The MacGregor research article concluded with the affirmation that conceptual scaffolds in the form of a study guide and a concept mapping template supported students as they were engaged in learner-centered resource-base learning (Magregor 2004, p 172.). A good distant course design will provide instructional scaffolds pertinent to the topic on hand to help facilitate focused attention by the student on information gathering and knowledge acquisition. Lower levels of prior-knowledge require additional support scaffolds to help learners in within the subject domain as apposed to those with higher levels of prior-knowledge.

The process of knowledge construction by the learner is dependent on the load a task places on the cognitive system (Verhoeven, et al. 2009). Sweller describes Working Management (WM) capacity and the elements that would hinder the effective and efficient use of it. He states that extraneous cognitive load is due to poor instructional design and must be reduced. Next he

explains germane load as that use of WM capacity that has direct bearing on subject matter content. Germane's load use of WM capacity is maximized when extraneous load is minimized. Intrinsic load has reference to the complexity of the subject matter. Intrinsic load cannot be minimized unless learning objectives are altered and learning outcomes and expectation reduced. (Sweller, 2008, p 374). Cognitive load capacities are additive. Since this is the case the course designer must bear in mind the types of load capacities that are integrated in the design and take steps to ensure the maximum, effective and efficient use of WM load capacity is being used to facilitate the assimilation of the course material.

Kumar (2004) briefly defines six principles of effective multimedia course design and presentation.

1. **Multimedia principle:** When explaining a concept make use of two modes of representation rather than one. For example, using text and graphics enriches the learning environment and helps the learner to mentally facilitate two schemas of interactive between the two and then construct connectivity and interactivity between the two and commit the new information to LTM. Kumar argues for appropriately selected multimedia objects that correlate and compliment one another that make subject matter sense within the domain. Research indicates that a higher quantity of learning (i.e. recall of facts) and quality of learning (i.e., capacity to transfer what is learned to new situations) is attained when text and pictures are presented in an auditory – visual mode as opposed to visual alone (Schnotz, 2005). Studies indicate that pictures can help clarify difficult concepts.
2. **Split-Attention Principle:** When using text and graphic together they should be integrated contiguously rather than separately. "To understand the material, learners must mentally integrate the two sources of information (Sweller, 2008, p. 375)." Contiguous integration of the two elements minimized the cognitive capacity of WM thus facilitating learning whereas separation of the two elements causes the randomness effect to operate as a drain on WM capacity.
3. **Multimodality Principle:** Words in multimedia content should be audible rather than text alone. The multimodality principle facilitates scaffolding and streamlines the learning process. The Multimodality principle distributes the workload across both channels, audio and visual, of WM making effective and efficient use of the WM capabilities and capacity. One interesting study concluded that music can assist a student's creative and thinking ability while painting (Yu, Pao-Ta, Lai, Yen-Shou, Tsai, Hung_Hsu, Chang, Yuan-Hou 2010).
4. **Redundancy Principle:** This principle refers to the overlapping of meaning and information causing the material to be extraneous to the WM and thus a drain on WM capacity. Redundancy hinders the learning process and careful measure must be taken to minimize its use.
5. **Elements of Interactivity principle:** When the complexity of the course material is relative low the detrimental effects of the above principles are less severe than when the complexity of the material is high. An analysis of the material is in order beforehand and the effects of these principles kept in mind with or when course design is underway.
6. **Individual Differences Principle:** Students differ in their prior knowledge of the subject material. "The principles of multimedia, split-effect, multimodality and redundancy are more applicable for low-knowledge than high knowledge learners, and for high-spatial rather than low-spatial learners (Kumar, 2004, p.6)."

These six principles are excellent guidelines and precautions to keep in mind in course design. The course designer must know his/her students, have a firm grasp of the subject matter, understand the underlying technology for the delivery of the content, keep the students engaged

and active and invite meaningful feedback. The ever evolving nature of online course design and presentation integrates essential ingredients for a successful online course.

Discussion and Conclusion

The range of multimedia elements, visual and auditory, when incorporated into a well planned out Distant learning program can enhance the learning process. The World Wide Web contains a vast amount of multimedia objects and information for educators and students alike to exploit for their own purposes. Technology and high-speed broadband access make it possible to retrieve and process a vast amount of information in a relative short period of time. All course designers, distant or otherwise, need to consider the use of multimedia elements. Multimedia effects alone don't guarantee a successful learning outcome. In fact, the overuse and misuse of multimedia can hinder learning. Course design needs to be planned out starting with course objectives and measurable expected learning outcomes. The course designer needs to understand the nature of the student population. Such factors, as age, prior knowledge, learning styles and preferences all become relevant factors when designing an effective distant learning course. Cognitive load theory plays an important role in course design as well. The designer needs to be careful not to introduce an extraneous load that hinders learning. The course designer needs to bear in mind the following cognitive load bearing factors:

Multimedia principle
Split attention principle
Multimodality principle
Redundancy principle
Elements of Interactivity principle
Individual differences principle

Distant learning course designers need to be able to adapt and apply their in-class course presentation to the internet format. Distant learning courses b y nature are student –centered not Instructor focused. This makes the Instructor more of a facilitator than tradition instructor. From the constructionist point of view, the student learns how to learn and discovers relevant new information within the context of the subject domain. The distant learning course should contain the necessary elements to help foster active student learning and social communication. Designing the course around a real-world problem or application helps to bring relevancy to the course and motivates the student in their active pursuit of knowledge. There are instructional course design models that educators can use to help them plan, design and develop distant learning courses. The Dick and Care module is one such module that identifies certain procedural steps for the designer to follow (Simonson, p. 126). When designing using this model, the designer can consider important relevant elements found in most successful distant learning course. Revising prior design elements at any point along the procedural process is an important part of this design process.

The third generation of internet technology, communication and online learning deals with social networking, wikis, and multimedia objects and events. Students are now able to accumulate and share newly discovered material with each other. Motivated active students can help add to course content via wikis thus enriching course content over time. Additionally students can build up a personal e-portfolio of their life's learning experiences storing multimedia material relevant to themselves in their file. Hypermedia and Hypertext environments are emerging student-centered multimedia learning environments were the students are self-directed and discover and acquire new knowledge at their own pace. The hypertext environment has been classified as non-lineal, non-sequential or more appropriately multi-lineal in nature.

Choosing the course content, designing the course presentation (bearing in mind the students' learning styles, prior-knowledge and preferences), understanding WM load capacity, incorporating appropriately placed multimedia learning objects within the body of the course, and facilitating the course, covers the essential elements of an effective distant learning program where students active engage in the discovery of new information and apply it to real world situations.

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Editor's Note: The process of adoption of new technologies is driven by availability, need, and ease of use. Change takes off slowly and accelerates over time. This has been the pattern for industrialized countries and the same pattern is evident in developing countries as shown in this article.

Practices and Problems of Technological Interventions in Distance Learning in Colleges/Universities of Addis Ababa

Manisha Pandey and Hibret Asegid
Ethiopia

Abstract

The principal aim in undertaking this research was to assess the current practices and problems of technological interventions in distance learning in colleges and universities of Addis Ababa and thereby forward possible suggestions for the improvement and better use of technologies in the universities/colleges. A descriptive survey method was employed for the study. The sample colleges/universities were Unity University, Alpha University College, Saint Mary's University College and Ethiopian Civil Service College from Addis Ababa. A total of 77 academic staff and 123 students participated in the study. Major statistical tools applied in the study were the mean values, t-test, percentages, chi-square, correlation and one way ANOVA. Findings documented that the colleges/universities were only in the first generation of technology application backed by only a little support from the second generation. Very few factors were found to be considered in selecting technologies. It was also revealed that the technologies were only integrated with some of the objectives and content of the instructional design elements and not with the others. It was found that learner support system which was not supported by technologies that existed. It was found that there were many problems and that the attitude of learners' towards technology in general and applying it to DL in particular was negative but that of the academic staff was positive. More government initiative is required to facilitate Distance Learning institutions in their effort to promote technology assisted programs.

Keywords: technological intervention, generations of technology, factors in choosing technology learner support system, multimedia, pedagogy, instructional design, distance education/learning, correspondence, models, internet technologies, print materials, and technology mediated learning.

Introduction and Overview

In distance education the use of modern technologies is inevitable. A distance learning institution has a lot to benefit from a sound application of different technologies in its program. Technology enhances teaching and learning in distance education and a wide range of technological options are available for a distance educator to apply. These technologies range from print to advanced web-learning where learners are not necessarily separated from the tutor by time and space. Although the prime focus in distance education is on the instructional outcomes, the technology of delivery is an aspect that needs thorough consideration.

The different technologies that have been used in the world have been categorized into different generations. Distance education operations have evolved through the following four generations: First, the Correspondence Model is based on print technology in the form of study guides, self-study materials, resource materials such as books, journals, and articles and auxiliary materials such as course brochures and assignments. Second, the Multi-media Model is based on print, audio and video technologies. In this generation, listening, tactile and visual features give students much more control over the medium – as in the ability to stop, start and replay at will, unlike the TV and radio which they replaced. Third, the Tele-learning Model based on applications of telecommunications' technologies provide opportunities for synchronous

communication. A possibility of providing students with a means of contacting their tutors and vice-versa was developed in third generation software. Fourth, the Flexible Learning Model is based on online delivery via the Internet. E-mail, computer conferencing, CD-ROMs and the World Wide Web are the prominent technologies used in this generation. These allow the widest possible use of media (text, graphics, audio and video). Although many universities are just beginning to implement fourth generation distance education initiatives, the fifth generation is already emerging based on the further exploitation of new technologies. The fifth generation of distance education is a derivation of the fourth generation that integrates features of the Internet and the Web (Taylor, 2001 and Melton, 2002).

The evidence on the development of distance education in developing countries suggests different concerns. For most part, while it may have been driven by the idea of using a range of technologies, it has not been technologically driven. Rather, there has been a cautious and restricted use of any technology other than print, backed by limited opportunities for face-to-face study (Perraton, 2005:158). A review of 150 distance education programs in sub-Saharan Africa has concluded that traditional paper-based means of Distance Learning (DL) continues to be more reliable, sustainable and widely used than technology-mediated DL programs particularly online and web-based methods of learning (Leary and Berge,2006 in Gualti, 2008: 96). The technological advantages in distance learning being entertained in most developed countries are not effectively being utilized in Ethiopia like the other developing countries stated in the research above. Even though the history of distance education in Ethiopia takes us back 40 years, the system has long been bound to print materials and only very recently to some technological advancements. In support of this, Sahlemariam (2004) states that the prominent medium used in distance education for upper primary school teachers in Ethiopia is the course module (print).

Purpose of the Study and Research Questions

In this article, the practices and problems of technological interventions in distance learning were addressed. Seven research questions were at stake: (1) To which technological generation of distance learning do the colleges/universities belong? (2) What factors have been considered in selecting technologies being used in the colleges/universities? (3) To what extent are existing technologies integrated with elements of distance learning instructional design? (4) To what extent does existing technology enhance the learner support system? (5) What are the attitudes of learners and the academic staff of the universities/colleges towards the use of technologies in the distance education program? (6) To what extent does the government take the initiatives to support technology enhanced distance learning programs? (7)What are the problems confronted by the colleges/universities in the use of technologies in distance education?

The first research question relates to the whereabouts of the technology in the distance learning colleges/universities of Addis Ababa, Ethiopia. In his review, Williams (2005) states five generations of technology that have been used in the world through the life span of distance learning. Hence, we have tried to answer questions about which technological generations are represented in our universities and colleges.

The second question relates to the importance of considering factors in choosing technologies for application in distance learning. A technology in the market should not be used in the distance learning system only because it is there. The article, therefore, uses the ACTION model suggested by Harry and Khan (2000:124) as a framework to assess the consideration of different factors in selecting technologies.

The third question attempts to address the need for integrating existing technologies with instructional design elements. The use of technologies should be to enhance instruction. Thus, it should be checked that whether or not the technology is well integrated with the five instructional

design elements: learning objectives, learning contents, learning delivery, learning interactivity and learning assessment.

The fourth question is concerned with the application of technologies in the learner support systems. A distance learner should be given regular and continuous support owing to his/her separation from his instructor both by time and space. The learner support system is believed to be best delivered when an Information Communications Technology (ICT) is used in the system (Mills, 2003).

In the fifth question, an attempt is made to identify the attitudes of learners and the academic staff both towards technology in general and the application of technologies in the distance learning in particular. The authors also seek to know the correlates between some independent variables of both the learners and the academic staff within their attitudes. This is done because unaccepted actions and negative attitudes might result in a failure of a technology application.

The sixth question relates to the initiatives taken by the government as an important stakeholder inj the universities/colleges. Pandey (2007) argues that acceptance of technology is related to the level of political support or resistance at local and national levels. National governments have been key players in the expansion of educational projects that depend on technology. Most mega-universities have privileged access to telecommunication systems that are controlled or regulated by the government in their base country.

The last research question addresses to some of the problems encountered by the colleges/universities. These technology-associated problems can affect DL regardless of the level at which it is being offered. Perraton and Moses (2004:143) call many of the problems that are related to the use of technology in DL "Local and National Constraints". Knowing the challenges the universities/colleges are facing is very crucial in the sense that practitioners will not get frustrated as when these challenges happen for they had already been thought of ahead of time. A proactive measure is usually taken when problems are first anticipated.

Data, Sample and Methodology

Data

The study involved different groups directly or indirectly related to a distance learning program so that relevant data on the use of emerging technologies in the program were integrated. Accordingly, data was gathered from deans, experts, program coordinators, distance education experts, tutors and students of the colleges/universities.

Relevant documents of the universities and colleges, government policy guidelines, documents, books, journals, other countries' experiences, reports, research articles, and website information from the internet related to the use of emerging technologies in distance learning were studied and referenced to enrich and supplement the data gathered from the primary sources.

Sample

Simple random sampling technique was used to select the universities and colleges on which the research was carried out. Accordingly; Unity University, Alpha University College, Saint Mary's University College, and the Ethiopian Civil Service College were selected. Regional centers were selected in the study using stratified sampling technique for this technique allows the researcher to consider some variations like geographical distance from the main center. The stratum was made based on geographical inhabitation of the centers. To this effect, three strata called North, Central and South which included their East and West peripherals were formed. Accordingly, three regional coordination centers; namely Bahir Dar, Adama and Hawassa were selected for the study using this technique.

From the aforementioned colleges/universities and regional centers, a total of 200 respondents were selected using both probability and non-probability sampling techniques. Out of the 200 respondents 77 were academic staff selected from the national center where the colleges/universities were found and 123 were students selected from the three regional centers. The following graphs summarize the number of respondents by age and sex.

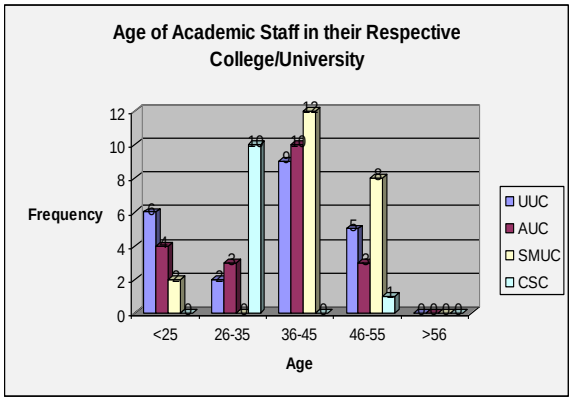

Fig 1 Graphic Representation of Age Profile of Academic staff

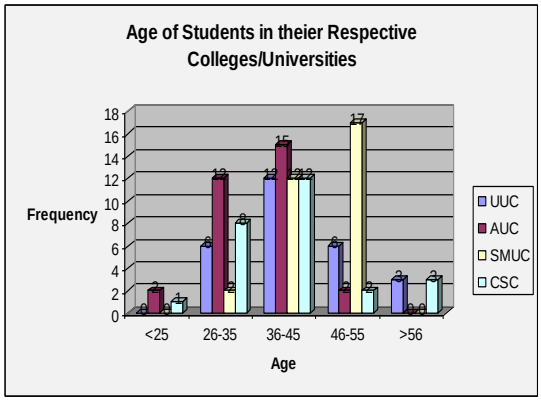

Fig 2 Graphic Representation of Age Profile of Students

As can be seen from the above graph (Fig 1), many (41.33%) of the respondents belong to the age group 36-45 years followed by 46-55, 26-33, less than 25 and greater than 56 years in their respective order. Though none of the respondents was older than 56, it can be said that the distribution is more in the matured age category. Unity University College is represented by more youngsters than the others. A relatively fair distribution among the age groups is seen in all the colleges except for Civil Service College where 90.09% of the respondents belong to the age group 26-35 years and only one in the group 46-55 years. This indicates that respondents of the academic staff are mature enough, for the purpose of the study, to give relevant information enriched by their valuable experience in both the DL system and their lives.

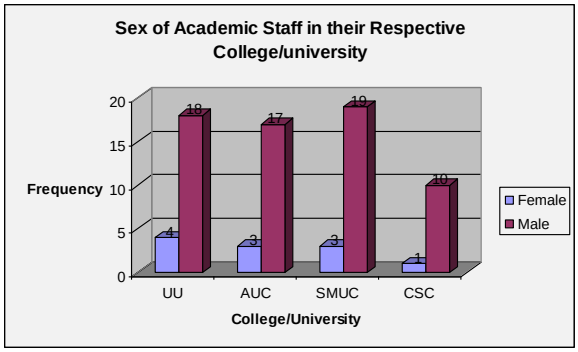

Fig 3 Graphic Representation of Sex Profile of Academic Staff

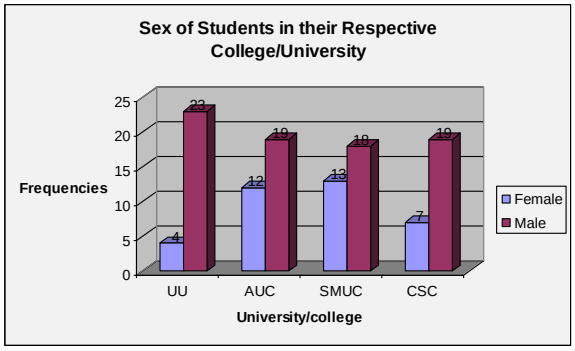

Fig 4 Graphic Representation of Sex Profile of Students

With students, the majority of respondents are in the age category 36-45. The graph above depicts that 73.04% of the respondents are older than 36 years which does not happen to be the case in the regular conventional face-to-face learning. It is interesting to note the presence of 6 respondents who are above 56 years of age. This illustrates one of the characteristics of distance learning - that it is lifelong learning and may benefit anyone in any age group (Keegan, 2000:20). Hence, it opens some rooms in colleges/universities for older people to attend and learn without the necessity to be on the institutions campus.

Parity for men and women is a major characteristic of distance learning (Keegan, 2000:20). A less significant contribution was seen for female members of the academic staff who made up only 14.67% of the total respondents. It was predominantly male dominated. Though this may not have anything to do with DL directly, a fair share might work as a motivation for female learners who might want to consider them as role models.

Close matches between the number of female and male students was seen in Saint Mary's University College. Only 14.81% of the respondents from Unity University were female. In general terms, 31.30% of the respondents were female which still happens to be lesser for maximizing one of the benefits of DL. The need for working towards increasing the number of female learners emanates from the fact that these parts of the society, particularly in the rural areas, might shoulder housewife responsibilities and do not get the chance to attend the conventional face-to-face colleges/universities.

Methodology

The study employed a descriptive survey method to gather necessary data. This method was the choice in place for the very reason that it enables the researcher to obtain information on the current status of the use and intervention of technologies in the universities/colleges covering a fairly wide area of technological elements like the generation, factors, integrating with technological elements, learner support system, problems encountered, initiatives taken by the government and attitude. The appropriateness of this approach for such a study is noted by Seyoum and Ayalew (1998).

In many of the discussions, the responses found from students were compared with those of the academic staff. For this, a t-test was used. One way ANOVA was used in places where there was a need to make a comparison among the four colleges/universities in the study. A chi-square was also employed to measure the degree of agreement between sets of responses of the same group.

The following table summarizes the sample items used in collecting data for the purpose of the study.

TABLE 1

Sample Items about Aspects of Technology and Learner Support Systems, Attitude, Government Initiatives and Problems Encountered.

Generation of Technology

a. Technologies being applied	Printed material? Radio broadcasting? Audio cassettes?
b. Types of print-based technologies	Courseware leaflets? Text books? Journals?
c. Second generation (Purposes)	Documentaries? Archive materials? Speech?

Factors in Selecting a Technology

a. Organizational issues / requirements?	Opportunities? Threats? Organizational barriers & Learners? Tutors? Administrative staff? Support staff?
b. Accessibility of technology to Cost of the technology	Maintenance? Dedicated technology personnel? Support system?
c. Others	Novelty? User friendliness? Duration courses can be mounted?

Integrating Technology with Instruction

a. Learning objectives	Media are used in ways that facilitate objectives.
b. Learning contents	Designed so that varied deliveries could be used.
c. Learning delivery	Course incorporates a variety of instructional media.
d. Learning interactivity	Learners are provided with list of technologies required.
e. Learning assessment	Use of varieties of technologies.

Technology and Learner Support System

a. Individualized learner support assisted by technologies e.g. emails, telephones, faxes	To what extent is the individual learner supported?
b. Group-based learner support	What form of group-based learner support systems exist (tutorials, audio conferencing, peer group support)?
c. Counseling learner support	What technologies are used in the counseling service?
d. Center-based learner support	What kinds of supports are given in the center?

Attitude of Learners and Academic Staff

a. General	c. Working with technologies makes me very nervous
b. Distance learning	d. Technology can be a useful instructional aid in almost all subject areas of distance learning

Problems Encountered

a. Access	Computers? Tape recorder? Television? Internet?
b. Attitude of Learners? Tutors? Administrative staff?	Technology based training centers? Band width connectivity?
c. Others	Trained human resources? Integrating problem? Donor interest?

4.0 Findings of the Study

Generation of Technology

The following table summarizes responses found from academic staff and students with regard to application of the different generations of technologies.

Table 2
Frequencies and Mean Distribution of Some Aspects of Technology Generation

No.	Item Description	Respondents												t
		Academic Staff (N=75)						Students (N=115)						
		AL (5)	MO (4)	ST (3)	RA (2)	NE (1)	X*2	AL (5)	MO (4)	ST (3)	RA (2)	NE (1)	X*2	
1	Printed Material	66	9	-	-	-	4.88	101	10	-	4	-	4.81	0.93
2	Radio broadcasting	-	-	6	21	48	1.44	3	15	3	43	51	1.92	-3.40**
3	Audio cassettes	-	26	4	15	30	2.34	6	48	17	19	25	2.92	-2.97**
4	Video tapes	-	21	3	9	42	2.04	6	52	7	7	43	2.75	-3.37**
5	Television	-	3	7	9	56	1.43	10	40	4	10	51	2.55	-5.78**
6	Audio-conferencing	-	8	-	3	64	1.36	7	21	10	26	51	2.19	-4.68**
7	Video-conferencing	-	4	3	6	62	1.32	3	27	-	34	51	2.19	-4.77**
8	Electronic Mail (E-mail)	4	9	6	11	45	1.88	10	12	4	35	54	2.03	-0.80
9	Computer-conferencing	-	4	-	3	68	1.20	10	14	4	33	54	2.07	-5.15**
10	CD-ROM*1	-	20	-	3	52	1.84	3	22	8	31	52	2.09	-1.31
11	World-Wide-Web (WWW)	-	13	4	3	55	1.67	10	8	-	49	48	1.98	-1.76

[4.50-5.00=Always, 3.50-4.49= Mostly, 2.50-3.49= Sometimes, 1.50-2.49=Rarely, 1.00-1.49=Never]
***1=Compacted Disc Read Only Memory *2=Calculated Means across Cells**
****=Statistical Difference among Mean Values at α = 0.05 and df = 188**

It was found that print was the technology always used in the distance learning program as confirmed by the majority of respondents. Technologies like radio, television, video conferencing, electronic mails, computer conferencing, CD-ROMs and the World-Wide-Web were not used in the colleges to support the teaching learning process. It was revealed that audio cassettes and video tapes were used occasionally in the teaching learning process as depicted by mean values ranging from 2.34 to 2.75, the average rate being 2.5. Print-based technology, confirmed to be used always in the above section, did not include print types called journals and articles. Hence, the colleges/universities were found only in the first generation.

Factors in Selecting Technologies

Factors that impact technology selection for distance learning program are included in Table 3. The table summarizes responses from four institutions of higher education.

Table 3
Mean Distribution and One-way ANOVA Results of Some Aspects of Factors Considered in Choosing Technologies (Organizational Issues)

No.	Item Description	Mean Values				F
		UU *1 (N=22)	AUC*2 (N=20)	SMUC*3 (N=22)	CSC*4 (N=11)	
Opportunities						
1	Working government policy	4.45	3.60	3.18	4.54	7.02
2	Students mental preparedness	4.09	3.50	3.50	3.91	1.20
3	Students' positive attitude	4.05	3.65	3.14	4.00	4.16
4	Availability of materials	3.77	3.85	3.64	3.91	0.30
5	Reasonable cost of technology materials	4.36	4.25	3.77	4.18	2.03
6	Availability of funds	3.77	2.80	2.95	3.36	2.72
Threats						
7	Poor infrastructure	4.09	3.35	3.18	4.55	6.59
8	Negative attitude of students	3.91	2.95	3.36	2.82	4.49
9	High cost of technology materials	4.27	2.80	3.27	3.73	7.28
10	Lack of support from the government	4.09	2.70	2.95	4.18	7.69
Organizational Barriers						
11	Negative attitude of tutors	3.91	4.25	3.00	3.09	8.34
12	Negative attitude of administrative staff	3.91	4.20	3.55	3.18	3.34
13	Knowledge/skill of tutors	4.14	3.35	3.55	3.45	2.29
14	Knowledge/skill of administrative staff	3.91	3.70	3.18	3.18	1.40
15	Lack of working technology plan	3.68	4.20	3.23	4.00	3.13
16	Inadequate financial support	4.14	3.95	3.45	4.27	3.32
17	Poor supply of facilities	4.00	4.25	3.32	4.09	4.83
Organizational Requirements						
18	Commitment of the management	4.23	3.30	3.77	4.55	3.62
19	Proper resource availability	4.55	3.50	3.45	4.64	9.08**
20	Readiness for change	4.18	2.75	3.59	4.64	8.81**

[4.50-5.00=Strongly Agree, 3.50-4.49=Agree, 2.50-3.49=Uncertain, 1.50-2.49=Disagree, 1.00-1.49=Strongly Disagree]
***1=Unity University, *2= Alpha University College, *3= Saint Mary's University College, *4= Civil Service College**
****=Statistical Difference among Mean Values at α = 0.05 and df = 74**

It was disclosed that the colleges/universities considered the factors related to opportunities that exist in the external environment, accessibility and cost before selecting existing technologies. Many other factors related to novelty, user friendliness, teaching and learning process, interactivity and speed of the technology were indicated to be either inexistent or respondents were uncertain about them.

Instructional Design Elements

Hereunder is a table summarizing the responses from both groups of respondents on one of the instructional design elements, learning objectives.

Table 4
Frequencies and Mean Distribution of Some Aspects of Integration of Technology with Learning Objectives

#.	Item Description	Respondents												t
		Academic Staff (N=75)						Students (N=115)						
		SA (5)	A (4)	U (3)	D (2)	SD (1)	X	SA (5)	A (4)	U (3)	D (2)	SD (1)	X	
1	Are defined as part of the instructional design	41	18	-	15	1	4.12	48	43	12	7	5	4.06	0.27
2	Are explicitly communicated to learners	43	18	7	6	1	4.28	31	65	11	5	3	4.01	1.94
3	Instructions include skills to meet the objectives	24	33	-	14	4	3.79	42	54	13	6	-	4.15	-2.43**
4	Instructions include knowledge to meet the objectives	31	24	-	13	7	3.79	48	46	17	4	-	4.20	-2.58
5	Instructions include experience to meet the objectives	17	28	11	16	3	3.53	23	65	16	7	4	3.83	-1.96
6	Related to real life experiences through examples	18	34	8	14	1	3.72	31	37	14	30	3	3.55	0.99
7	Are designed to accommodate differences in learning styles	24	27	7	12	5	3.71	16	54	26	13	6	3.53	1.05
8	Are stated in measurable terms	24	32	7	12	-	3.91	26	57	7	18	7	3.67	1.43
9	Contain action for performance	22	35	12	6	-	3.97	33	57	14	6	5	3.93	0.30
10	Contain conditions for performance	14	42	4	10	5	3.67	42	48	14	9	2	4.03	-2.38**
11	Contain criteria for performance	17	27	16	7	8	3.51	29	50	10	26	-	3.71	-1.21
12	Are sequenced appropriately	39	18	1	16	1	4.04	19	43	32	18	3	3.49	3.29**
13	Media are used in ways that facilitate objectives	14	38	7	11	5	3.60	30	57	10	15	3	3.83	-1.46
14	Evaluation is directed towards measuring objectives	26	26	7	16	-	3.83	32	52	5	23	3	3.76	0.42

[4.50-5.00=Strongly Agree, 3.50-4.49=Agree, 2.50-3.49=Uncertain, 1.50-2.49=Disagree, 1.00-1.49=Strongly Disagree]
***1=Calculated Means across Cells **=Statistical Difference among Mean Values at α = 0.05 and df = 188**

Existing technologies were reported by both groups of respondents to be integrated with the learning objectives and contents for the majority of the variables were rated above the average rate. However, the technologies being used have not properly been integrated with the instructional design elements related to delivery strategy, interactivity and learning assessment in the colleges/universities.

Technology in the Learner Support System

Different technologies are used in the learning support system. The following table summarizes questions asked and results found as to what technologies were being used for individualized learner support.

Table 5

Frequencies and Percentage Distribution of Some Aspects of Learner Support System (Technology in Individualized Learner Support)

Item Description (Technology used in individualized form of support)	Respondents						
	Academic Staff (N=41)				Students (N=82)		
		App.	Not App.	X^2	App.	Not App.	X^2
Telephone	f	37	4	26.50*	70	12	41.02*
	%	90.2	9.8		85.4	14.6	
Mail	f	13	28	5.49	34	48	2.39
	%	31.7	68.3		41.5	58.5	
Email	f	7	34	17.78*	-	82	-
	%	17.1	82.9		0	100	
Faxes	f	7	34	17.78*	10	72	46.88*
	%	17.1	82.9		12.2	87.8	
Face to face	f	37	4	30.45*	66	16	30.49*
	%	90.2	9.8		80.5	19.5	

App. = Applicable *Statistically Significant Chi-square Value at $\alpha = 0.05$

It was found that there existed an individualized learner support system as confirmed by 54.7% of the academic staff and 71.7% of the students. Responses also indicated that this system was supported to a greater extent by telephone technologies and face-to-face meetings. While traditional mail is moderately used, the individualized learner support system was not supported by technologies such as email and faxes.

The group-based learner support system was found to be tutorials and not audio conferencing and peer group learner group support systems. The tutorials were indicated to give major emphasis to introducing content in broad terms and not much more. Respondents showed that counseling was an element of the colleges/universities learner support system as indicated by 90.7% of the academic staff and 91.3% of students. The counseling service was assisted only by telephone and face-to-face meetings, other technologies, mail, emails and faxes, were shown not to be used.

It was found that a center based learner support system existed in the DL system of the colleges/universities as confirmed by 85.3% of academic staff and 97.4% of students. The center-based support system was limited to providing only library and bookstore services. Other services

that one could provide in centers, like newspapers, setting up computers, downloading software, operating programs, institutional and course based website, financial aid and providing course syllabi, were not indicated to exist.

Attitude towards Technologies

The attitude of the academic staff towards technologies in general was found to be positive as depicted by the gross mean value of 3.84 unlike the students who were found to be just moderately attracted by technology. The academic staff was found to have positive attitudes towards the application of technology in DL while students were uncertain in general terms about using technology in DL. The study disclosed that there was a minimal relationship between the independent variables age, sex, academic status, specialization and year of study and attitude towards the use of technology in distance learning.

Table 6
Frequencies and Mean Distribution of Some Aspects of Evaluation of Learner Support System

#	Item Description	Respondents										t
		Academic Staff (N=75)					Students (N=115)					
		M (4)	PM (3)	DM (2)	NA (1)	X*1	M (4)	PM (3)	DM (2)	NA (1)	X*1	
1	Assisting the learner in effectively utilizing resources provided	24	27	21	3	2.96	52	33	23	7	3.13	-1.25
2	Technology support	20	23	29	3	2.80	52	30	33	-	3.16	-2.85**
3	Technical support	14	33	19	9	2.96	58	27	27	3	3.22	-3.91**
4	Access to library	11	34	28	2	2.72	15	71	25	4	2.84	-1.18
5	Advising/counseling	14	27	22	12	2.57	17	46	43	9	2.62	-0.33
6	Problem solving	7	33	27	8	2.52	47	33	28	7	3.04	-3.93**
7	Convenience to diverse group	11	30	27	7	2.60	42	57	36	-	2.88	-2.45**
8	Efficiency to diverse group	5	33	25	12	2.41	21	57	37	-	2.86	-3.98**
9	Responsiveness to diverse group	11	25	29	10	2.49	3	75	34	3	2.68	-1.73
10	Accurate disclosure of information	12	33	18	12	2.60	13	72	30	-	2.85	-2.26**
11	Orientation on all information	12	22	32	9	2.49	24	61	24	6	2.90	-3.24**
12	Regular revision of support system for their currency.	7	29	29	10	2.44	17	54	41	3	2.74	-2.58**
13	Regular revision of support system for their effectiveness.	7	25	25	18	2.28	24	42	43	6	2.73	-3.42**

[1.00-1.25=Not Applicable, 1.26-2.25=Do not Meet Evaluation Criteria, 2.26-3.25= Partially Meets Evaluation Criteria, 3.26-4.00=Meets Evaluation Criteria]

***1=Calculated Means across Cells **=Statistical Difference among Mean Values at α = 0.05 and df = 188**

Government Initiatives

Significant level of uncertainness was indicated as to whether the government took initiative to promote technology-assisted distance learning programs in the country. The following table depicted this fact.

Problems Encountered

Having access to computer and internet technologies was found to be a problem. Access to technologies like tape recorder, television and telephone was found to be a problem to some extent whereas scarce financial resources, attitude of learners towards technology, lack of infrastructure, lack of technological capability and lack of trained human resources were indicated to be some of the major problems encountered.

Conclusion and Recommendations

Based on the findings of the study the following conclusions and recommendations are forwarded:

1. As observed in the study, the colleges/universities were mainly found in the first generation of technology application, which is a print dominated distance education program. The sole application of print technology may not provide the colleges/universities with quality distance education empowered with speed and flexibility. The DL program is believed to be most effective when ranges of technologies from the first generation to the fifth generation are used to supplement instruction. Therefore, it is suggested that the colleges/universities make a thorough analysis to investigate which other technologies could be used to maximize the benefits that newer technologies render. This could be done by first studying the learner accessibility to the technologies and then investing in some technologies which could facilitate the teaching / learning process and the learner support system and thus increase the access to computers and the Internet.
2. The study revealed that some of the factors worth considering in the selection of technology were also missing. It is evident that there is no one best form of technology, therefore, it is appropriate to check on different variables when selecting technologies such as accessibility, awareness, novelty, user friendliness, instructional design and pedagogy, interactivity and speed of technologies and so on. It is also recommended to form an interdisciplinary team which would take time and effort to research on the technologies under consideration for their feasibility and viability. Technology related policies may also that include factor checking aspect when selecting and finalizing appropriate technologies.
3. The effort to integrate technologies being used with all elements of instructional design needs to be made. It is, therefore, recommended that the colleges/universities take time in working towards the integration of technologies with instructional technology elements. This could be organized by a collaborative effort of the different stakeholders of the DL program with an initiative by the universities/colleges. The institutions could involve IT specialists, content experts, instructional design experts, training professionals, tutors and students in their DL material preparation so that they could work as a team towards integrating technologies with the appropriate instructional design elements and pedagogy.
4. The study revealed that the colleges/universities faced many different problems that held them back from introducing newer technologies in their DL system. Consequently, the major problems in promoting technology in Distance Education were access to computers and the internet, scarce financial resources, lack of positive attitude of learners towards

technology, lack of infrastructure in the country, lack of technology trained human resources and technological capability. Such problems faced by the colleges/universities may be the possible reasons for their dependence on old methods like the print medium and failing to embrace current and newer technologies in their Distance Education Programs. Therefore, this requires that the colleges/universities and the government take proactive measures to overcome these problems and hire trained teachers and experts with sound knowledge and skills in use of various technologies either from within or outside the country and use their expertise to resolve various issues related to the use of technology. They should also arrange continuous awareness programs for learners in order to increase their awareness and confidence in the use of Technology in the Distance Learning Programs.

5. Moreover, the sole effort on part of the universities/colleges to promote the use of technologies in the DL system may not be enough. The government has to take some definite initiatives and measures in facilitating the colleges/universities in the promotion and implementation of Technology Mediated Distance Education. This could be done by reviewing policies related to technology, funding for technology mediated projects, promoting teacher training in use of technology, investing in materials, equipment and infrastructure for digital technologies such as computers, telecommunications, and the internet; and implementing standards of quality. It is highly recommended to send a team to different countries that have progressed further in the use of technologies and networking of educational institutions in the Distance Education and thus benefit from their success in this endeavor.

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