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The impact of e-learning system on conventional teaching environment

Field study investigate the in UAE Universities (Hamdan e- University, Al Ghurair University, Skyline University, Sharjah University and Ajman University

Professor Dr. Rashad Al Saed
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Abstract

The role of Information and Communication Technology (ICT) is increasingly visible and has many applications in our routines. One such application that currently has profound impact is e-learning systems. The growing potential of online educational systems and their robust utilities are leading to a re-examination of conventional teaching-learning systems all around the world. In this context, this study inquires into learners' and instructors' attitudes towards e-learning systems in a conventional teaching-learning environment, focusing on a few institutes of higher education operating under the approval of the UAE's Ministry of Higher Education. Based on the survey data generated from 66 instructors and 96 students, there is a high level of willingness to adopt e-learning systems in conventional teaching-learning environments like colleges and universities. High levels of association are found between the perceived quality of e-learning systems and their adoptability in the conventional teaching learning environments in the UAE. Thus, this study opens up an avenue for discussing the implications and possible adoption of e-learning systems in the conventional teaching-learning setting currently employed in the UAE.

Key Word: e-Learning; conventional teaching learning; education system

Introduction

The new millennium has emphasized the vital role of information technology and telecommunications in business development. The past decade has witnessed spectacular improvements in the computational capabilities of calculators and computers and, more recently, thrilling advances in their communication capabilities. The marriage of these two functions—computation and communication—has produced powerful information technology tools that have important implications for education. IT, and within this broader designation, its educational, instructional, and learning technology applications, facilitate collaboration, interactive learning, and new pedagogical approaches that can lead to changes in the way students and faculty interact. The rapid pace of change in information technology increasingly impacts the creation, publication, and dissemination of educational materials. Regardless of the rapidity or direction of change offered by revolutionary new technologies, the true challenge for developing guiding principles for their appropriate implementation lies in the inclusion of all students at all types of academic institutions, with secure and tangible links to the public and private sectors.

Personal attitudes are a major factor in individual use of information technology, so understanding users' attitudes toward electronic learning facilitates the creation of appropriate electronic learning environments for teaching and learning. However, methods of assessing electronic learning cannot be evaluated using a single linear methodology, so there is a need to build a multidisciplinary approach in order to survey individual attitudes toward electronic learning (Liaw, 2000; Liaw, in press; Wang, 2003).

The measurement of e-learning must incorporate different aspects of user perceptions to form a useful diagnostic instrument (Wang, 2003). In addition, from the point of view of Liaw (2000), constructing user attitudes toward computer and Internet technologies can be divided into three major kinds of measurements: affective, cognitive, and behavioral. Affective measurements (such as perceived enjoyment) and cognitive measurements (such as perceived self-efficacy and perceived usefulness) have a positive effect on behavioral measurements, such as the intention to use e-learning as a teaching or learning tool (Liaw & Huang, 2003).

The past decade has witnessed spectacular improvements in the computational capabilities of calculators and computers, and more recently, inspiring advances in their communication capabilities. The marriage of these two functional modes—computation and communication—has produced powerful information technology tools that have important implications for undergraduates, registrars, graduates, and many other academic areas. The computational and communication capabilities of information technology offer great promise for supporting continual improvements in all aspects of the learning process and underscore the need for credible research into the practical benefits and limitations of teaching and learning in settings enhanced by information technology.

Information technology now makes it possible for learning and teaching to take place in new settings, inspiring and facilitating lifelong education. Given the importance of individuals in predicting and improving the use of e-learning technologies, information technology has become an urgent necessity in United Arab Emirates Universities and colleges. Thus, the goals of this study are:

1. To determine the willingness of instructors to adopt e-learning tools
2. To analyze the impact of instructors' cognitive factors, affective factors and the perceived quality of e-learning systems on their willingness to use such systems
3. To determine the relationship between the instructors' willingness to use e-learning systems and their perception of the quality of such systems
4. To measure students' perception of the quality of e-learning tools
5. To define the students' preferences for assisted instructor tools in e-learning systems
6. To define the students preferences for multimedia tools in e-learning systems
7.

Literature Review

People learn in different ways. They tend to remember 10 percent of what they read, 20 percent of what they hear, 30 percent of what they see, 50 percent of what they hear and see, 70 percent of what they discuss with others, 80 percent of what they try to do, and 95 percent of what they teach to others (Bush, M., 1997). Thus, we distinguish between learning and education, since learning is a process that brings together cognitive, emotional, and environmental influences and experiences for acquiring, enhancing, or making changes in one's knowledge, skills, values, and world views (Illeris, 2000, Ormorod, 1995), while education is the learning of knowledge, information and skills during the course of life. People learn from their experience, while education is given and govern by specialized institutions like colleges, universities, and schools.

E-learning. From this standpoint, the definition of e-learning is "pedagogy empowered by digital technology" (Nichols, M., 2008, p.17). Electronic learning, sometimes called distance learning, is a planned teaching/learning experience that uses a wide spectrum of technologies—mainly Internet or computer-based—to reach learners. In this paper, we concentrate on e-learning in terms of formal education content and initiatives, sometimes classified as the fifth

generation of learning. In 1981, the Japanese announced a program of research on the fifth generation of computing systems (FGCS) that would integrate advances in the integration of database systems, artificial intelligence, and humans in a new range of computers that are closer to people in their communication and knowledge-processing capabilities (Gaines, 1984).

E-learning has been introduced at many universities and colleges as one strategy with which to transform teaching and learning. The appropriate use of information and communication technologies at many universities and colleges reflects a blended approach to teaching and learning, with asynchronous online communication tools, such as email or online discussion forums forming an essential part.

Table 1, summarizes the comparison between e-learning and traditional learning.

No	Dimensions	e-Learning	Traditional Learning
1	Classroom Discussions	the teacher usually talks more than the student	The student talks at least as much as or more than the Teacher
2	Learning Process	The learning is conducted participating; there is almost no group or individual study	Most of the learning process takes place in groups or by **individual students.**
3	Subject Matter	The teacher conducts the lesson according to the study program and the existing curriculum.	The student participates in determining the subject matter; study is based on various sources of information, including web databanks and net experts located by the student.
4	Emphases in the Learning Process	The students learn "what," not "how"; the students and the teachers are busy completing the required subject matter quota; the students are not involved in inquiry-based education and in solving problems, but in tasks set by the teacher.	The students learn "how," not "how"; the students includes research study which combines searching for and collecting information from web data-banks and authorities on the communications network; the learning is better connected to the real world, the subject matter is richer and includes material in different formats.
5	Motivation	The students' motivation is low, and the subject matter is"distant" from them.	The students' motivation is high due to their involvement in matters that are closer to them and to the use of technology
6	Teacher's Role	The teacher is the authority.	The teacher directs the student to the information.
7	Location of Learning	The learning takes place within the classroom and the school.	The learning takes place at no fixed location.
8	Lesson Structure	The teacher dictates the structure of the lesson and the division of time	The structure of the lesson is affected by the group dynamics.

Requirements for effective e-learning initiatives.

It has been widely accepted that e-learning requires interactivity to improve learners' skills and deliver results. Creating effective e-learning also requires some creativity and knowledge of basic design principles, but that is what makes it interesting, as the e-learning process helps students to understand, rather than to memorize, as in the traditional learning process. Research in cognitive science (Bransford, Brown, & Cocking, 2000) has shown that people remember better, longer, and in more detail if they understand, actively organize what they are learning, connect new knowledge to prior knowledge, and elaborate. The best way to remember is to understand, elaborate, and organize what one already knows (Bransford, Brown, & Cocking).

Table 2 summarizes the criteria that can serve as the basis for evaluating an online course.

√ Prerequisites, if any, is clearly stated.
√ Current knowledge level of students is assessed as appropriate for course.
√ Course goals are clear and appropriate.
√ Objectives are clear, behavioral and measurable and are appropriate to course goals.
√ Learning activities are linked to course objectives.
√ Content is organized by modules, units, lessons, or other meaningful architecture.
√ Formative evaluation is provided to students through ongoing feedback (emails, and discussion board postings).
√ Evaluations are linked to objectives.
√ Instructor assumes a facilitative role.
√ Syllabus is online and complete, including course expectations, goals and objectives, grading criteria and course policies.
√ Support for student questions is provided (e.g., instructor contact information, FAQs, discussion board for questions).
√ Discussion boards and/or is chat available; group activities, email, and orientation to technology are provided.
√ Instructor communicates how he or she will give feedback, including frequency of feedback on discussion forums, assignments, etc.
√ Feedback is evident through announcements, emails, discussion postings, or other means.
√ Students receive orientation to posting in discussion forums, submitting to drop boxes, taking online exams, and using any other type of technology that will be utilized during the course.
√ Students are provided the opportunity to collaborate with other students through group work or other means.
√ Progress through the course is documented.
√ If online testing is used, it includes detailed instructions as to how it will be administered and permitted settings. If possible, a practice test with the same settings should be given first
√ If online testing is used, it should not comprise the greater portion of the final grade (best practice: "open book" testing).
√ Students are provided information as to where to get technical help.

Effective e-learning environment (Liaw, Huang & Chen, 2007). In designing effective e-learning environments, Liaw (2004), suggested three factors are considered: learner characteristics, instructional structure, and interaction. When developing e-learning, it is necessary to understand the targeted population. First, learner characteristics, such as attitudes, motivation, belief, and confidence need to be identified (Passerini & Granger, 2000). Essentially, e-learning signifies autonomous learning environments where users have more opportunities for self-directed learning. As for instructional structure, multimedia instruction enables learners to develop complex cognitive skills, such as understanding important elements of conceptual complexity, the ability to use acquired concepts for reasoning and inference, and the competence and flexibility to apply conceptual knowledge to novel situations (Spiro, Feltovich, Jacobson & Coulson, 1995). Finally, e-learning environments offer group interaction, such as learner-to-learner, or learner-to-instructors. Group interaction is a kind of cooperative learning that helps learners to make progress through their zone of proximal development by the activities in which they engage (Vygotsky, 1978). When learners increase their interaction with instructors and other learners, they increase their ability to build knowledge because so much learning takes place within a social context, and the process includes the mutual construction of understanding (Bruner, 1971). Thus, based on fundamental e-learning criteria, the three kinds of e-learning environments, a combination of which are needed to create an effective overall e-learning environment, are autonomous learning, multimedia environments, and teacher-assisted learning

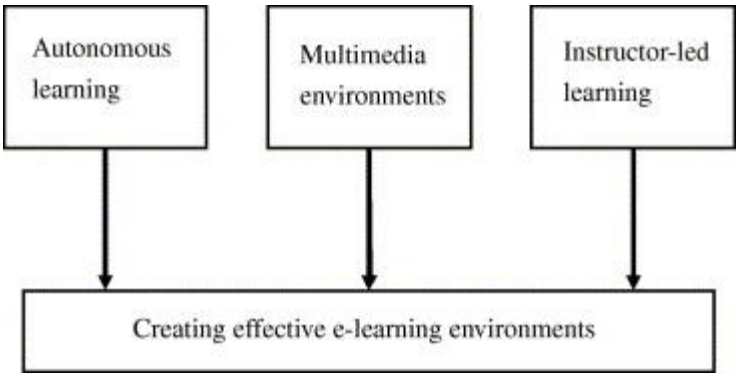

Fig. 1. The Parts of Effective e-learning.
Source: (Liaw, Huang & Chen, 2007)

Online learning programs are showing signs of substantial growth as more resident students have begun to enroll in them (Carr, 2000). Roach (2002) estimated that "As many as half the students in online courses are from the traditional 18-to-25-year-old student cohort who normally takes campus-based courses" (p. 121). Based on this research, there are nine primary requirements for effective e-learning implementation in the UAE:

1- Learning culture: Before any campaign can be implemented, the audiences need to be informed of the opportunities and challenges of e-learning. Educators and administrators need to be aware of the benefits of e-learning in the classroom, as well as the specific technologies involved.
2- Change leadership: E-learning's association with change is an interesting one, and change management itself is one of the key drivers for e-learning adoption. Most educational organizations are very conservative, so an educational technologist not only has to worry about pedagogy and technology, but also about organizational issues.
3- Organizational infrastructure: The organization's infrastructure is the permanent foundation on which e-learning is built. Infrastructure must address an organization's existing culture, governing principles, processes, and structures that will contribute to the success or failure of an e-learning effort.
4- Learning strategy: Organizations need a comprehensive learning strategy that moves beyond basic delivery of learning opportunities. Successful organizations build infrastructure systems that support performance, content, and resource management. Therefore, an e-learning strategy should motivate people, improve productivity, enable skill development, and aid retention across the enterprise.
5- Learning resources and networked learning: Facilitated e-learning makes use of the capabilities of learner-led e-learning and adds the benefit of having an instructor guiding the learners. This approach requires the use of e-mail, discussion forums, and chat capabilities, depending on whether communication will be synchronous or entirely asynchronous.
6- Pedagogy, curriculum design, content and development: Institutions must ensure that pedagogy and curriculum are flexible, adaptable and relevant to students from a diverse range of cultural and language backgrounds.
7- Quality: The two most important criteria for evaluating quality in e-learning are that it should function technically without problems across all users and have clearly explicit pedagogical design principles appropriate to learner type, needs and context.

8- Cost reduction: A successful e-learning initiative should reduce costs over the long term, improve individual and business unit performance, help maintain core competencies, and enable the organization to react quickly to competitive pressures and market needs.
9- Research and evaluation: Includes both assessment of learners and evaluation of the instruction and learning environment

Attitudes toward e-learning (Liaw, Huang & Chen, 2007).

Many institutions of higher education have turned to e-learning for authentic learning and to enhance learning performance, while other schools are jumping on the bandwagon simply because they do not want to be left behind (Govindasamy, 2002). When instructors exhibit more positive attitudes toward e-learning, then they have more behavioral intentions to use it. Indeed, no matter how advanced or capable a technology, its effective implementation depends on users' having a positive attitude toward it. Thus, as individuals become more positive toward e-learning, they will have greater behavioral intention to use it. Although the concept of attitude toward computers has gained recognition as a critical determinant in the use and acceptance of computer technology, there is no single, universally accepted definition of the computer attitude construct (Liaw, 2002; (Smith et al., 2000). Previous research (Triandis, 1971) has suggested that attitude consists of affective, cognitive, and behavioral components: the affective component is the emotion or feeling, which includes statements of like or dislike toward certain objects; the cognitive component refers to statements of beliefs; and the behavioral component is what an individual actually does or intends to do (Liaw, 2002).

The three-tier technology use model (3TUM) is a conceptual approach for investigating user perceptions toward information and Internet technologies. The original concept of 3-TUM was derived from TAM (the Technology Acceptance Model), a popular approach for surveying user attitudes of information technologies (Davis, Bagozzi & Warsaw, 1989). TAM suggests that two specific behavioral beliefs, perceived ease of use (EOU) and perceived usefulness (U), determine an individual's behavioral intention to use technologies. Based on the 3-TUM (Fig. 2), individual attitudes toward information technology form three different tiers: the tier of individual experience and system quality, the affective and cognitive tier, and the behavioral intention tier. The tier of individual experience and system quality evaluates how individual experience and system quality influence individual affective and cognitive components. The affective and cognitive tier investigates how affective and cognitive components change individual behavioral intentions. In the behavioral intention tier, the 3-TUM predicts individual behavioral intentions to use technology for a particular purpose (e.g., search engines as learning-assistance tools or computers).

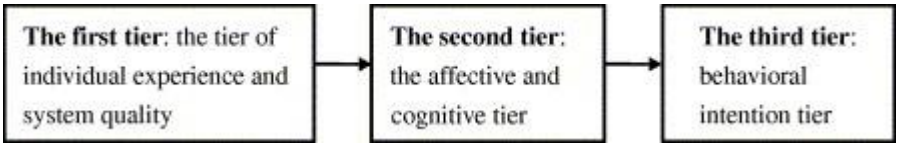

Fig. 2. The three-tier use model (3-TUM).
Source: (Liaw, Huang & Chen, 2007)

Research Hypotheses

H1: Faculty members' willingness to use e-learning systems does not depend on their perception of the quality of such systems, supported by cognitive and affective aspects of using such systems.

H2: Faculty members' willingness to use e-learning systems does not differ with their perception of the quality of such systems.

H3: Students' perception of the quality of e-learning systems does not differ with their liking for the instructor assisting the learning in such systems.

Research Methodology and Sampling Details

The blueprint for executing this research was prepared in keeping with the nature of the problem identified and the objectives for the work. Hence, a descriptive research design with two separate questionnaires for the primary data collection was employed. The survey for this study was conducted in two major institutions of higher education in UAE. The valid sample size of survey respondents was 162, comprised of 96 students and 66 faculty members. The sample size of the faculty member represents more than 80 percent of the total population of the instructors employed in the educational institutions considered in the present study, while the sample size of the students represents 50 percent of the senior-batch students, who are on the verge of graduation in both the institutions. Further, due care was taken regarding the majors of the students who took part in the survey; the responses from the students who opted for an IT major were not considered in the final analysis in order to eliminate undue bias that may have arisen in the responses to the system considered. Thus, the sampling procedure adopted for this survey can be categorized under the judgment sampling method. The primary data pertaining to the present study was collected in March 2009.

Questionnaire Development.

The questionnaire for this study was developed based on a survey of the literature and was adapted from previous research. Participants expressed their feedback regarding the effectiveness of e-learning courses or programs through a series of quantitative survey questions. The surveys also gathered quantitative feedback about attitudes toward e-learning with respect to age, gender, level of education, experience, and so on. Perceptions were gathered in the following areas:

- quality of e-learning
- e-learning efficiency and collaboration
- e-learning flexibility
- communication support
- e-learning pedagogic

Training evaluation scale.

In order to reduce measurement error, the scale that accompanies each question on the attitudes and perception was designed and constructed appropriately, using the Likert scale. The issues to be addressed when constructing a Likert scale are the number of response options and the placement of response options.

The Likert scale generally uses an odd-numbered, five-point scale with the following response alternatives: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree, weighted 1, 2, 3, 4, and 5, respectively. The odd-numbered Likert scale allows for the adoption of a neutral point (3), which represents no expression of agreement/disagreement. The advantages of using a five-point Likert scale with the neutral point include:

- The neutral point allows for expression of uncertainty.
- The neutral point doesn't force the participant to answer.

- When the neutral point is omitted, there is a greater tendency to give no response.
- The Likert scale has greater reliability than a scale with fewer points.
- Likert scales are empirically more valid than forced-choice scales.
- The scale reduces acquiescent response bias (the tendency to respond "yes" indiscriminately to a forced-choice scale).
- A five-point Likert scale is more cost-and time-effective than a seven-point scale
- Measurement uses an interval scale, placing equal distance between the response options when determining placement. Equal spacing allows people to assign "equal psychological distance" between each of the options and to regard those options as convenient references or stopping points along the continuum of the concept being measured.

Statistical Data Analysis

Willingness to use e-learning systems classification.

Distribution of Instructors' Willingness To Use e-learning Systems

Level of Willingness	Frequency	Percent	Valid Percent	Cumulative Percent
Low	29	43.9	43.9	43.9
High	17	25.8	25.8	69.7
Very High	20	30.3	30.3	100.0
Total	66	100.0	100.0	

Table 3 shows that more than half of the instructors indicated high or very high willingness to use e-learning systems, while less than half (40 percent) indicated a low willingness to use such systems.

Table 4.

Results of Regression for the Test of Hypothesis 1

Model 1		Unstandardized Coefficients	*Std. Error*	Standardized Coefficients	t	Adjusted R Square	*F*
		B		*Beta*			
	1	(Constant)	2.914	4.427			
	Cognitive Measurement	0.835	0.475	0.596	1.760*		
	Affective Measurement	0.190	0.735	0.084	0.259	0.63	12.890*
	Perceived quality	0.539	0.283	0.370	1.903*		

*Significant at 5 percent level.

Dependent Variable: Willingness to use e-Learning Systems

Table 4, indicates that the F value of 12.89 is significant at the 5 percent level, which confirms that instructors' willingness to use e-learning systems is strongly affected by factors like cognitive and affective measurements of the perceived quality of e-learning systems. Out of the above three influencing factors, the t value of 1.76 and 1.9 for cognitive measurements and perceived quality, respectively, are significant at the 5 percent level. From the adjusted R square value, it can be confirmed that 63% of the willingness to use e-learning systems by the

instructors is defined by three major factors: cognitive and affective factors and the perceived quality of e-learning systems. Based on these results, hypothesis-I is rejected and greater likelihood is placed on instructors' willingness to use e-learning system's being dependent on factors like cognitive and affective measurements with perceived quality on such systems

Instructors' willingness to use classification vs. their perceived quality cross tabulation.

Table 5.

Results of Cross-tabulation of Willingness To Use and Perceived Quality of e-learning Systems

		Perceived quality of e-learning systems			Total
		Low	High	Very High	
Willingness to use e-Learning systems classification	Low	5	17	4	26
	High	5	5	1	11
	Very High	5	5	19	29
Total		15	27	24	66
Pearson Chi-Square Value =47.867*			Degree of freedom = 4		N=66

*Significant at 5 percent level.

Table 5 shows that the chi-square value of 47.87 with 4 degrees of freedom is significant at the 5 percent level. The cross-tabulation also shows that 45 percent of the instructors have high or very high willingness to use e-learning systems and high or very high perceived quality on e-learning systems. Based on these results, hypothesis 2 is rejected; there is an association between the instructors' willingness to use e-learning systems and their perception of the quality of such systems. *Students' perceived quality of learning e-learning tools vs. their liking for instructor assisted learning.*

Table 6

Results of Cross-tabulation for Students' Perceived Quality of e-learning Systems and Their Preference for Instructor-assisted Learning

Perceived quality of learning with e-learning systems		Preference for instructor-assisted learning			Total
		Low	High	Very High	
	Low	7	5	7	19
	High	5	10	26	41
	Very High	5	5	26	36
Total		17	20	59	
Pearson Chi-Square Value =34.867*			Degree of freedom = 4		N=96

*Significant at 5 percent level

Students' preference for multimedia assisted learning systems.

	Frequency	Percent	Valid Percent	Cumulative Percent
Low	4	4.2	4.2	4.2
High	54	56.3	56.3	60.4
Very High	38	39.6	39.6	100.0
Total	96	100.0	100.0	

Table 7 *Distribution of Instructors' Willingness To Use e-learning Systems*

Table 6 shows that the chi-square value of 34.87 with 4 degree of freedom is significant at 5 percent level and that 70 percent of the students have high or very high perceptions of the quality of e-learning systems, along with high and very high liking for instructor-assisted learning. Based on these results, hypothesis 3 is rejected and there is a strong likelihood that there is an association between students' perception of the quality of e-learning systems and their preference for instructor-assisted learning. More than 90 percent of the students indicated high or very high preferences for multimedia-assisted learning.

Research Findings

1. The instructors who participated in the present study showed high levels of willingness to adopt e-learning systems in their pedagogy. In this context, their willingness to adopt e-learning systems is strongly affected by three major factors: cognitive factors, affective factors and perceived quality. A significant level of dependency was also noted between the instructors' willingness to adopt e-learning systems and their cognitive measurements and perception of the quality of such systems.
2. A significant level of association could be found between the Instructors' willingness to use e-learning systems and their perception of the quality of such systems. More specifically, this kind of association exists among those who have higher levels of perceived quality of e-learning systems. Thus, it's also found that the instructors with low levels of perceived quality of e-learning systems have low levels of willingness to use them.
3. A significant level of association was found between the students' preference for instructor-assisted learning and their perception of the quality of e-learning systems. More specifically, this kind of association exists among those students who have higher levels of preference for instructor-assisted learning, so e-learning systems can be an excellent supplementary tool for conventional teaching pedagogy, although they may not totally replace more conventional methods of teaching and learning.
4. Both the instructors and the students showed high levels of perceived quality of e-learning systems and willingness to use e-learning systems. In fact, e-learning systems have higher levels of operational acceptance with the students and instructors who have higher levels of perceived quality on such systems.
5. Less than 5 percent of students expressed a dislike of e-learning tools, while 95 percent accepted them.

Implications and Conclusion

Based on our findings, we see several implications of the study and can make several suggestions related to its findings.

1. Educational institutions should move to adopt e-learning systems along with their conventional teaching learning systems to a greater degree than is currently the case. Since such systems have wide acceptance both from instructors and students, expanding e-learning opportunities may be a way to maintain higher levels of quality in the teaching-learning exercise.
2. Although many institutions are moving towards more e-learning, it should be given more emphasis. In particular, educational institutions should recruit instructors with high levels of ICT (Information and Communication Technology) ability in order to encourage an environment more conducive to the migration of the teaching-learning system in the direction of e-learning systems.
3. The high level of student acceptance of instructor-assisted learning confirms the importance of instructors in the teaching-learning environment as a whole. However, educational institutions should work toward finding the optimal mix of instructor-assisted and e-learning-based teaching-learning environments. Such an optimal mix will contribute significantly to maintaining quality in the institutes of higher education.
4. The instructors in various educational institutions should incorporate a greater mix of multimedia instruction in their pedagogy. Since there is resounding acceptance of the use of multimedia systems, from the students' perspective, institutions should take steps to develop multimedia presentations that can enhance the quality of the teaching-learning environment as a whole. Such a mix also presents good business opportunities for software multimedia.
5. Educational institutions whose instructors have lower levels of ICT expertise should implement training on ICT for such instructors in order to enable them to face the challenges of the future, particularly as they related to increased use of e-learning-based systems.

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