# Factors Affecting E-Learning Effectiveness in a Higher Learning Institution in Malaysia
### (Faktor-faktor yang Mempengaruhi Kebekesanan e-Pembelajaran di Institusi Pengajian Tinggi di Malaysia)

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ABSTRACT

*The purpose of this research was to investigate factors that influence the effectiveness of the e-learning system in a higher learning institution. The participants were students randomly selected from diploma and degree programs. The main instrument was a questionnaire that was distributed to the students. The researchers collected 205 completed questionnaires out of a total of 300. Four factors were chosen as independent variables namely: reaction and satisfaction, learning outcome and achievement, familiarity with online learning technology, and participation and interaction. It was found that the effectiveness of the e-learning system was significantly affected by reaction and satisfaction, learning outcome and achievement, and familiarity with online learning technology. The participation and interaction factor had no apparent effect on the effectiveness of the e-learning system. Therefore, it is recommended that higher learning institutions interested in introducing e-learning should focus on students' reaction and satisfaction towards the system. E-learning should focus on learning outcomes and achievement. It is also recommended that institutions first look into the issue of familiarity with online learning technology among students before introducing the e-learning system so as to determine whether students are comfortable with the online learning tools.*

*Keywords: e-learning effectiveness, higher learning institution, online learning technology, learning outcome*

ABSTRAK

*Kajian ini dijalankan untuk melihat faktor-faktor yang mempengaruhi keberkesanan penggunaan sistem e-pembelajaran di pusat pengajian tinggi. Pelajar-pelajar dipilih secara rambang daripada kalangan mereka yang mengambil kursus diploma dan ijazah untuk melihat dan menilai keberkesanan penggunaan system e-pembelajaran dalam proses pembelajaran mereka. Data adalah dalam bentuk soalan soal selidik yang diedarkan kepada pelajar-pelajar yang terlibat. Daripada 300 set soalan soal selidik yang diedarkan hanya 205 set soalan sahaja yang diterima dan dijawab oleh pelajar. Empat faktor dipilih sebagai pemboleh ubah/variabel terhadap kajian ini iaitu tindak balas dan kepuasan, hasil pembelajaran dan pencapaian, kebiasaan dengan teknologi pembelajaran dalam talian serta penyertaan dan penglibatan. Didapati bahawa keberkesanan e-pembelajaran sangat memberi kesan terhadap tindak balas dan kepuasan, hasil pembelajaran dan pencapaian dan kebiasaan pelajar dengan teknologi pembelajaran dalam talian. Variabel penyertaan dan penglibatan tidak memberi kesan yang ketara terhadap sistem e-pembelajaran kepada pelajar. Oleh itu, adalah dicadangkan agar pusat pengajian tinggi yang berminat untuk memperkenalkan sistem e-pembelajaran ini menumpukan kepada aspek tindak balas dan kepuasan pelajar. E-pembelajaran perlu memberi tumpuan terhadap hasil-hasil pembelajaran dan pencapaian pelajar. Juga dicadangkan agar setiap institusi tersebut mengkaji isu-isu yang menjadi kebiasaan kepada pelajar dalam menggunakan teknologi e-pembelajaran sebelum memperkenalkan e-pembelajaran bagi menilai sama ada pelajar selesa dengan sistem e-pembelajaran.*

*Kata kunci: Keberkesanan e-pembelajaran, institusi pengajian tinggi, teknologi pembelajaran atas talian, hasil pembelajaran*

## INTRODUCTION

E-learning is a common practice today and one can easily find advertisements on the web on earning a degree online. This is possible in today's Information and Communication Technology (ICT) era because almost everyone is connected through a cyber world. In this cyber world context, everyone is closely connected to one another via computers.

Today, e-learning is easily adopted by any individual or organisations. E-learning is the use of internet technology to enhance user knowledge and performance (Ruiz, Mintzer and Leipzing 2006). E-learning allows learners direct access to materials such as electronic journal articles or electronic books easily and efficiently in a controlled environment. Besides that, learners can use e-learning as a support tool in their studies, whereby learners can use e-learning to reduce the time they spend in traditional

classrooms, studying from home or the their workplace. E-learning also provides a networking syatem for groups of learners or between learners and instructors together in real-time electronic discussions such as through chat rooms that enable discussion, conversation and questions at anytime and anywhere.

The Opinion Research Corporation (2000) reports that 54 percent respondents believe that college courses offered via the Internet is the future of higher education. The study also found that 32 percent of respondents agreed to take courses through the internet rather than attending a traditional classroom. Another 53 percent of respondents said that the biggest benefit of taking courses online was the ability to work from home, while 19 percent stated that time is saved from not having to commute to work. In this respect, e-learning programs are considered as one of the learning methods that enhances learners' knowledge and skills.

As far as the e-learning scenario in Malaysia is concerned, a recent survey conducted by Multimedia University (MMU 2003) revealed that (1) E-learning will become an important field with more than 50 percent of top academic management, staff/academics and students/ clients accepting the concept, (2) Sixty-five percent of institutions provide some form of training or instruction utilising aspects of the online or e-learning format, (3) Only 2 percent use e-learning at the advanced level, (4) 19 percent are highly involved, (5) 16 percent are exploring the possibility, while (6) 63 percent are at the implementation level.

There are many issues regarding the effectiveness of e-learning. Is an e-learning program able to provide an effective way of delivering knowledge? Is peer to peer interaction well supported in e-learning environments? Do learners feel that they are learning anything from the e-learning programs? How do learners rate the quality and effectiveness of their e-learning programs? To what extent are the learners satisfied with the online learning experience provided by e-learning? Do these-learning programs lead to a greater way of improving the learners' learning progress? What do learners think about the e-learning courses they took in terms of course content, layout, language, graphics, and animation technology?

To effectively implement e-learning programs for learners, educators or trainers need to integrate testing and assessment tools throughout the learning process. It is important to understand the effectiveness of this innovative and advanced-learning method in many related learning areas. This study attempted to answer the following research questions: "What are the factors that affect the effectiveness of e-learning"? Without this understanding, it is difficult for the learners to know the value of e-learning. Therefore, a study of the effectiveness of an e-learning program is important to assess the extent to which e-learning is effective for learners and to determine any added value for the educational field.

## LITERATURE REVIEW

The introduction of new computing technology is now widely adopted throughout the world for storing, keeping, searching and gathering information and records, constructing knowledge, performing simulations to develop knowledge base, skills, distance learning, and global collaboration for lifelong learning and work. The power of emerging computing technologies has indeed transformed our lives. These new tools have enabled powerful computing technologies to run and manage business processes more efficiently, boost customer satisfaction and improve business performance. Advanced and innovative computing technologies have impacted our lives and have changed the learning process. For instance, educators use of internet technologies in online teaching and learning has enabled learners to receive and interact via these educational materials and resources, and thus allow teachers and students to interact in ways that previously may have not been possible (Kirkwood 2001).

Some studies have indicated that the use of technology has an effect on all aspects of teaching and learning. When educators integrate technology into a lesson, it requires new learning approaches to the curriculum in that it develops the ability to look at and explore information in new ways (Cohen 2001). Moreover, some studies show that technology can help by allowing learners to take a more active role in their learning through different instructional modes or methods (Kussmaul and Dunn 1996). Dewar and Whittington (2000) stated that new technologies provide opportunities for creating learning environments that enhance learner learning and achievement. However, inappropriate use of technology can result in ineffective learning. Thus, it is important to understand what technology is and how to use it and, most important, whether we are comfortable using it (Smolin and Lawless 2003). An interactive approach in an e-learning system allows proactive and random access to video content. This study examined the influence of an interactive approach on learning outcomes and learner satisfaction in an e-learning environment. Students in the e-learning environment who were provided with interactive video showed significantly better learning performance and a higher level of learner satisfaction than those in other settings (Zhang et al. 2005). O' Connor (1997) highlighted that electronic communication such as e-mail, interactive distance learning, and the internet such as World Wide Web sites help build a strong and close relationship where experts share ideas in a scholarly community.

Similarly, Thornburg (1997) looked at ways in which interactive multimedia presentation with audio, video, graphics and animation could enrich, extend or facilitate learning, increase productivity and promote creativity. Stepp-Greany (2002) also noted that technology helps weak students by "redistributing teacher and classmate attention so that incapable students can become more active

participants in the class". [Page 25] A review of studies carried out by Stepp-Greany (2002) showed that there are a number of benefits for students related to the general use of technology in the classroom. These include increased motivation, more higher-order thinking skills and better recall. As evidenced by various research, the presence of computer technology has increased dramatically and has become an important instrument in learning environments because they do not just offer powerful pedagogical tools, but also extensions of human capabilities and contexts for social interactions that support learning.

The implementation of an e-learning system by any institution can be achieved using one of three approaches: (1) This implementation will depend on the level of readiness in terms of the budget, infrastructure and human resource such as experience, skills, knowledge and attitude. Some institutions are already practicing e-learning in one way or another without using the network, but by deploying the computer stand-alone learning materials such as CD-ROMs, CAI courseware and other locally-produced courseware. There are three main approaches to e-learning within education: using technologies to support or supplement traditional face-to-face courses, integrating online activities into traditional courses to enhance learning experience, and delivering courses that are entirely online. In Malaysia, there have been some attempts to incorporate e-learning into the educational system. They include the following:

1. The Smart Schools project under the Multimedia Super Corridor (MSC) flagship. Apart from the Smart Schools, teachers in normal schools are provided with laptops and LCD projectors to teach selected subjects, such as mathematics, science, and English using standalone multimedia.
2. The establishment of the National Digital Library.
3. The use of various forms of technology to support or supplement the delivery of traditional courses in institutions of higher learning.
4. The setting up of virtual universities – Universiti Tun Abd Razak (UNITAR) in 1998 and Open University of Malaysia (OUM) in 2000.
5. The establishment of the Multimedia University in 1999 to support the MSC projects.
6. The use of e-learning in the distance learning programs at universities.

## The Transformation from Traditional Learning Methods to E-Learning Methods in the Education Sector

Traditional methods of learning involves instructors, face-to-face traditional classrooms with whiteboard and blackboard, together with transparencies and text books for delivery of information to learners who have to attend classes based on a fixed schedule. Learners depend on textbooks or any other reference books containing information on the particular subject. There is an instructor present in the classroom, and the role of instructors is to teach and assist learners to acquire knowledge and academic skills necessary for success in higher education. The learners listen to an instructor; write down the main points and any important facts, opinions and examples. The traditional learning mode involves a two-way communication because there is face-to-face interaction between instructors and learners. Therefore, the learners may feel more comfortable when they can communicate immediately and interact directly with their instructors about any difficulties they are facing.

With the rapid evolution of technology, using traditional methods of learning may quickly become outdated and ineffective as learners cannot adapt their learning process to fit today's complex work environment even though traditional learning methods may still work and are used in many market segment areas. However, new innovative leaning methods are important in order to stay ahead in the new technology-driven world.

Cohen (1997) states that introducing technology into the classroom has made it possible for learners to learn up to four times more effectively than traditional education approaches. Charp and Sylvia (2003) point out that learning incorporates technology within the students' learning process and the teachers' delivery process is more effective compared to the traditional classroom. They also emphasized that technology-based education can improve learning and teaching experiences, increase interaction with people who are in geographically remote areas and also provide richer communication opportunities. Fry, Ketteridge and Marshall (2009) concur that e-learning plays an important role in teaching and learning in higher education.

Technology has created a powerful set of tools in continuing to revolutionize teaching and learning in the educational world. In the teaching and learning evolution, e-learning has been accepted by learners from a wider geographical range. E-learning can be defined as an approach to educate and aid in the leaning process through the use of electronic technologies such as personal computer, satellite TV, CD-ROMs, internet and other multimedia. E-learning utilizes a network technology such as LAN, WAN, internet or intranet, along with the ability to deliver learning materials directly to a learner's desktop computer, allowing learners to learn anywhere in the world and at anytime. It is a convenient and inexpensive way to gain knowledge and information while pursing higher learning. E-learning is an advanced communication technology-based learning in delivering learning, teaching or training in education programs electronically. Therefore, learners who want to use an e-learning system must have at least some moderate computer knowledge and skills in operating computer terminals.

Pete Maurer (2001) recognises that the purpose of providing e-learning to schools is to improve student learning outcomes and achievement and other educational outcomes, rather than to provide state-of-the-art equipment

for its own sake. Electronic learning or so-called e-learning is an advanced technology-based learning delivering educational programs or training electronically. E-learning is a flexible education method that can fit into any schedule. Introduction of this new method has greatly eliminated time, travel and other such constraints. Many researchers define e-learning in various ways. Dormant Woodall (2002) defines e-learning as "experience" learning that uses technology to design, deliver, select, administer, support and extend the learning process [Page 3]. Kapp (2003) defines e-learning as "the delivery of training materials, information and contact directly to an employee's computer desktop by taking advantage of Web browser technology to purposefully change behavior or attitude. [Page 1] Hall and Snider (2000) define e-learning as the process of learning via computers over internet and intranets, or referred to as web-based training, online training, distributed learning or technology for learning. Urdan and Weggan (2000) define e-learning as "the delivery of contact via all electronic media, including the Internet, satellite broadcast, intranets, audio or video tape, and interactive TV". [Page 4] They also emphasize that e-learning covers a wide set of applications and processes, including web-based learning, computer-based learning, virtual classrooms, and digital collaborations. E-learning material consists of graphics, text, video, audio; animation or virtual environment. These materials can be delivered in many forms. For example, learning material can be presented through electronic chatting, interaction through videoconferencing, discussion through e-mail, simulations, online quizzes, tests, or assignments.

## COMPARISON OF TRADITIONAL CLASSROOM LEARNING AND ELECTRONIC LEARNING

Everyone needs to learn in order to keep themselves up-to-date with the fast-paced world. The practice over centuries has been with classroom learning styles whereby students attend classes with books, lecture notes or other hard copy materials with a lecturer or teacher explaining about the content of studies. With the advancement of technology, learning has become electronically or virtually-based such as Electronic Learning or e-learning.

What is this new age technology that has been introduced and what are the differences between this new way of learningcompared to the traditional classroom learning? How could students relate to the lecturer or teacher in the electronic era? E-learning uses CD-ROMs, internet, Web Portal, E-book, video, audio, and animation to get the materials across to the students.

## FACTORS INFLUENCING THE EFFECTIVENESS OF E-LEARNING

E-learning is still considered to be in its "embryonic stage" (Vicere 2000: 34). As a fresh technique or mode of conveying knowledge, it would still be too premature to discern its impact despite the frequent allusions to its tendency to revolutionize education and training. Conclusions that can be drawn about its effectiveness are at best tentative and by no means authoritative. Several parameters in determining the level of effectiveness of e-learning has been already advanced. This research focused on the following factors that affect the effectiveness of e-learning: (1) Learners' Satisfaction and Reaction, (2) Participation and Interaction, (3) Familiarity with the Technology, and (4) Measuring Learners' Achievement.

### LEARNERS' SATISFACTION AND REACTION

A significant quarter of the 21st century society has expressed appreciation for the breakthrough that e-learning has brought about particularly in the field of contemporary education and corporate training. Despite this initial positive response, some scholars articulated caution. Russo (2001) warned against rushing the innovation to the fore while the fundamentals are still lacking. He argued that it is better to have e-learning only after a careful study, rather than importing it right away, and in so doing, face contextual inconsistencies which would prove to be costly to handle and could even possibly lead to students' dislike of e-learning as a new medium. For students' continued interest, Howell (2002) proposes that teachers stay away from the conventional lecture format and explore other possibilities that e-learning can offer. In this endeavor, he also encourages the help of technology experts and private firms. Weaver (2002) sternly warned against complacency and laxity that e-learning may bring to education. He stresses that its entry is not an end in itself, but rather a beginning in the pursuit of more responsive methods of imparting

TABLE 1. Comparison between E-Learning and Traditional Learning

| Traditional Classroom Learning | E-Learning |
|---|---|
| 1. Textbooks and reading lists | 1. Electronic content portals, CD-ROM, online resources |
| 2. Chalk and talk | 2. Rich multimedia & interactive content |
| 3. Class discussion | 3. Inter-classroom collaboration online, chat room |
| 4. On school grounds | 4. Multiple locations (distance learning) |
| 5. Classes are on a fixed schedule | 5. Study on your own schedule |
| 6. Follow a fixed curriculum | 6. Choose exactly what need to study most |

knowledge. He adds that the effectiveness of an e-learning system is dependent on continuous evaluation, improvement and refinement. Failure to take this into account would surely debilitate learners' satisfaction and could elicit negative feedback. Although the literature abounds with positive remarks on e-learning, there are those who point to its limitations. Vicere (2004) lamented over its contributions to measurement and evaluation, saying that it is grossly focused on figures and statistics and is unable to relate them to performance criteria. He concluded that its effectiveness, as an intervention, is not being properly assessed.

### PARTICIPATION AND INTERACTION

Weaver (2002) concluded that a successful e-learning system assumes the coordination and cooperation of the entire organisation. From its acquisition to implementation and evaluation, he insisted on the need to solicit, incorporate and respect all the input of all concerned, from teachers to the IT personnel and technicians, and policy makers and students. Russo (2001) concurs that with the demise of geographical and time barriers, it is more pressing to have close collaborative efforts between and among various levels of government, across states, as well as federal agencies. He further stressed that the primary consideration should, and still be that in education, technology is just summoned as an aid, thus alarming policymakers on the possibility of a goal displacement. In the corporate workplace, Vicere (2004) noted that e-learning seems to cater more to younger managers and employees than to their relatively older counterparts. Nevertheless, he still approved of its maintenance, claiming that eventually the latter would be enticed to use it as venue from which senior executives could reach out to as many people as possible. Besides that, Liaw et al. (2007) conducted a study in which instructors were found to have very positive perceptions about using e-learning as a teaching tool.

### FAMILIARITY WITH TECHNOLOGY

Many organisations are convinced of the potential of online education and training as powerful delivery methodologies of e-learning, (Wentling et al. 2000). Russo (2001) documented the rise of e-learning as a viable and effective tool of teaching. While some schools have devised their own courses, some have entered cyberspace, buying the technology form proprietary firms and state agencies, in order not to be left-out on the latest trend. Market Date Retrieval, a research company specialising in technology in schools, claims that e-learning has already gained the attention of 70% of colleges and universities in the United States alone, who are now offering several courses through the web. This is over and above the private corporations, which were already focusing on this intervention (Russo 2001).

Nevertheless, there still seems to be an atmosphere of unpreparedness on the part of some school authorities,

companies, and decision markers. Weaver (2002) expressed his alarm over the hasty and ill-advised manner by which organisations have committed themselves so that they just get their hands on this precious technology. He said that technology would not work without human intervention and thus this called for employees' familiarisation with it. Wentling et al. (2000) advised companies that plan to adopt an e-learning system to also look at content problems. Other than selecting the best delivery medium, they highlighted the need for studying the intended audience and to ensure that the online module content is appropriate for them.

### MEASURING LEARNERS' ACHIEVEMENT

There is a dearth of data, as well as research, relating to the effectiveness of e-learning (Russo 2001). The impression is that there is not much evidence to support the argument that e-learning directly leads to students' learning, if not to greatly supplement classroom-based instruction. Based on emerging studies, there is reason to believe that despite the vast potential of e-learning, it cannot still replace the dominant teacher-led education (Weaver 2002). This is because, in the end, humans as social animals learn best through interaction and face-to-face contact, which is something that internet-based technologies could never provide.

### METHODOLOGY

Data for this study were collected from a higher learning institution through the use of a questionnaire. Survey questionnaires were distributed to randomly selected students who were experiencing e-learning in the diploma, advanced diploma and degree programs.

A survey questionnaire was designed to gather information on the students' reaction and satisfaction, participation and interaction, familiarity with online learning technology, learning outcomes and achievement, and the effectiveness of e-learning. The statements and questions were close-ended, whereby the choice of response for respondents was limited to fixed responses on specific points on a 5-point Likert and nominal scales. [5 point?]

The questionnaires were distributed to 300 respondents together with permission letters. The respondents comprised students of different gender, age group, background and who enrolled in different types of courses at the institute. The questionnaires were prepared in English.

Weaver (2002) found that the effectiveness of an e-learning system is dependent on continuous evaluation, improvement and refinement. Failure to take this into account would surely debilitate learner's satisfaction and could elicit negative feedback. Do reaction and satisfaction significantly affect effectiveness of e-learning system? Therefore the following hypothesis was proposed:

Ho: There is no significant relationship between the reaction and satisfaction of the students and the effectiveness of e-learning.

Weaver (2002) concluded that a successful e-learning system assumes the coordination and cooperation of the entire organisation. From its acquisition to implementation and evaluation, he insisted on the need to solicit, incorporate and respect all the input of all concerned, from teachers, to the IT personnel and technicians, policy makers and students. Do participation and interaction significantly affect effectiveness of an e-learning system? Hence the following hypothesis was proposed:

Ho1: There is no significant relationship between the participation and interaction of the students and the effectiveness of e-learning.

Charp and Sylvia (2003) pointed out that learning incorporates technology within the students' learning process and the teachers' delivery process is more effective than traditional classrooms. They also emphasized that technology-based education can improve learning and teaching experiences, increase interaction with people who are in geographically remote areas and also provide richer communication opportunities. Do learning outcomes and achievement significantly affect effectiveness of an e-learning system?

Ho2: There is no significant relationship between the learning outcomes and achievement of the students and the effectiveness of e-learning.

Russo (2001) documented the rise of e-learning as a viable and effective tool of teaching. While some schools have devised their own courses, some have entered cyberspace, buying the technology form proprietary firms and state agencies, in order not to be left-out on the latest trend. Does familiarity with online learning technology significantly affect effectiveness of an e-learning system? Hence hypothesis three was proposed:

Ho3: There is no significant relationship between students' familiarity with online learning technology and the effectiveness of e-learning.

RESULTS

A total of 205 questionnaires out of 300 were collected. Therefore, the response rate for this study is 68.33%. The questionnaire was divided into three main sections: demographic characteristics, independent variables (reaction and satisfaction, participation and interaction, learning outcomes and achievement, and familiarity with online learning technology) and dependent variable (effectiveness of e-learning). Section A comprises a total of eight demographic characteristics: gender, age, student status, program of study, level of education, race, marital status, and employment.

TABLE 2. Demographic Profile of Respondents

| Factors | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 44 | 21.3 |
| | Female | 161 | 78.7 |
| Age | 18-20 | 28 | 13.8 |
| | 21-23 | 120 | 58.8 |
| | 24-26 | 23 | 11.3 |
| | 27-29 | 13 | 6.3 |
| | 20 and above | 21 | 10.0 |
| Students Status | Full-time | 161 | 78.8 |
| | Part-time | 44 | 21.3 |
| Program of Study | Information technology | 44 | 21.3 |
| | Business Administration | 92 | 45.0 |
| | Humanities and Social Science | 59 | 28.8 |
| | Graduate Studies | 10 | 5.0 |
| Level of Education | Diploma | 44 | 21.3 |
| | Advanced/Higher/Graduate Diploma | 8 | 3.8 |
| | Bachelor's Degree | 154 | 75.0 |
| Race | Malay | 95 | 46.3 |
| | Chinese | 33 | 16.3 |
| | Indian | 77 | 37.5 |
| Marital Status | Single | 182 | 88.8 |
| | Living Together | 10 | 5.0 |
| | Married | 13 | 6.3 |
| Are you Currently Employed | Yes | 56 | 27.5 |
| | No | 149 | 72.5 |

From the data, it was observed that female students made up the highest number, which is more than half of the total respondents (78.8%). Only 21.3% of the respondents were male students. The majority of the respondents were relatively young. Most of the respondents were from the age group 21-23, which takes up 58.8% of the total respondents. This is followed by the 18-20 age group (13.80%), 24-26 (11.3%), 30 and above (10%) and finally 27-29 (6.3%) age group. A total of 78.8% were taking full time courses, while the rest were part time students. The programs of study consisted of information technology, business administration, humanities and social sciences, and graduate studies. Out of these courses, a large proportion of the respondents were doing business administration (45%), humanities and social sciences (28.8%), information technology (21.3%) and graduate studies (5%). About 75% respondents were doing degree courses, 21.3% diploma, and 3.8% advanced/higher/graduate diploma. In terms of race, Malay students made up the majority, comprising nearly half of the total respondents (46.3%). This is followed by the Indian students (37.5%), and Chinese students (16.1%). In terms of marital status, almost all of the respondents were single (88.8%). The rest were married. With regards to the respondents' employment, 27.5% were employed, and 72.5% were unemployed.

## RELIABILITY TEST

The internal consistency of the dependent variable "effectiveness of e-learning and four independent variables namely: reaction and satisfaction, participation and interaction, familiarity with online learning technology and learning outcomes and achievements were estimated using Cronbach's alpha. Variables with Cronbach's alpha index of lower than 0.7 were rejected. As can be seen from Table 3, all the variables show Cronbach's alpha of above 0.7.

## FACTORS AFFECTING EFFECTIVENESS OF E-LEARNING

For the study, multiple regression analysis was employed to find out whether the independent variables that comprise reaction and satisfaction, participation and interaction, familiarity with online learning technology, and learning outcomes and achievements have any significant effect on online learning effectiveness. Table 3 presents the results of the regression analysis.

Based on the analysis, it was found that there was a significant relationship between reaction and satisfaction and the effectiveness of e-learning at 1% significance level (p = 0.001) with a positive beta value of 0.339. This indicates that reaction and satisfaction has a significant positive effect on the effectiveness of online learning. Therefore, hypothesis 1 was rejected. It can be suggested that e-learning is a two-way learning system, involving students and online learning. Therefore, reaction and satisfaction affect students' overall satisfaction with the online learning system.

As can be observed from Table 4, participation and interaction were found to have no significant effects on online learning at 5% significance level (p = 0.182). This observation may be explained by the fact that face-to-face communication and interaction seem extremely important in the learning process. The students' participation through online forum and discussion may not be as efficient as traditional methods of learning, which involve instructors, face-to-face classrooms with whiteboards and blackboards,

TABLE 3. Reliability Test Results for All Variables

| Variable | No of Items | Items eliminated | Cronbach's Alpha |
|---|---|---|---|
| Reaction and satisfaction | 8 | - | 0.878 |
| Participation and interaction | 10 | - | 0.707 |
| Learning outcome and achievement | 11 | - | 0.856 |
| Familiarity with online learning technology | 8 | 1 | 0.839 |
| E-learning Effectiveness (overall) | 10 | - | 0.853 |

TABLE 4. Result of Regression Analysis

| Variables | Beta | T | Sig t |
|---|---|---|---|
| Reaction and satisfaction | 0.339 | 3.645 | 0.001 |
| Participation and Interaction | -0.102 | -1.348 | 0.182 |
| Familiarity with online learning technology | 0.183 | 2.155 | 0.035 |
| Learning outcomes and achievements | 0.700 | 7.345 | 0.000 |

$R^2 = 0.667$      Durbin-Watson = 2.081
F Value = 36.108      sig. F = 0.000
Condition Index = 27.386

together with transparencies and textbooks for delivering information to students. In fact, students may feel more comfortable when they can communicate immediately and interact directly with their instructors about any difficulties they are facing.

Learning outcomes and achievement significantly affect online learning at 1% significance level (p = 0.000) with a positive beta (0.700). This indicates that learning outcomes and achievement significantly affect online learning. Therefore, hypothesis 3 (H3) was rejected. On the variable familiarity with online learning technology the results show a significant effect at 5% significance level (p = 0.035) with a positive beta value of 0.183. Thus, hypothesis 4 was rejected. Essentially, familiarity with online learning technology has a positive significant effect on online learning.

The percentage of the variance in the dependent variable predicted by the variation in the independent variables was assessed using the coefficient of determination ($R^2$). The R square value was found to be at 0.667. This implies that reaction and satisfaction, participation and interaction, familiarity with online learning technology, and learning outcomes and achievements account for 66.7% of the variation in the effectiveness of online learning. The Durbin-Watson value was 2.081, which falls within the acceptable range of 1.5 and 2.5. This indicates that there is an absence of auto-correlation problem with the data used for the current model. The Collinearity Statistics to Tolerance and VIF and the Condition Index all lie within the acceptable range. This indicates that there was no multi-collinearity problems in the regression model used for this study. The F value was large and found to be significant at 5% significant level (p = .000). This shows that the regression model used for this study is appropriate.

### DISCUSSION

Reaction in this study is a measure of how the students feel about their experience of using e-learning. The subjects were assessed on whether they are satisfied with what they earned or whether they regard the materials relevant and useful. If students find the tool helpful, they may continue using it, whereas if they think the tool makes no difference compared with the conventional method of learning, which is classroom-based, then they may prefer the conventional method. Similar studies found that reaction and satisfaction are major factors affecting the effectiveness of e-learning even among working people who are studying for a higher degree. Many researchers found that there is a positive effect of e-learning on learning and achievement. A recent study showed that the use of internet, specifically the video segments, resulted in greater gains in science and social studies skills compared to the students who had not received the video segments (Boster, Meyer, Roberto & Inge (2002) as cited by Cardler (2003).

Performance-based rubrics assessing elementary, middle, and high school students yielded scores suggesting that cyber mentoring, an online mentoring, has clear and impressive effects on student's learning. Navarro and Shoemaker (1999) reported that the cyber learners in their study performed significantly better than the traditional learners at 99% level of significance. The mean score in the final exam for the cyber learners was 11.3 while the mean score for traditional learners was 9.8.

Similarly, a study within the insurance industry conducted by Redding and Rotzien (1999) reported that the online group was the most successful at cognitive learning as measured by the end of course examinations. The results of the study suggest that online instruction for individuals in the insurance field is highly effective compared to traditional classroom-delivered instruction. In 2001, a summary of empirical studies prepared by Asynchronous Learning networks (ALN) revealed that two-thirds of 15 papers reported on e-learning were found to be more effective compared to traditional learning methods. Another factor that affects the effectiveness of e-learning is familiarity with online technology. E-learning includes online courses, e-mail, computer learning, e-book, CD ROM, virtual simulation, and other types of software. Thus, students have to be computer-literate to access knowledge. Being familiar with online technology also makes the learning process easier for students. According to Jensen (2000), students who have an inclination for computers will not stop to explore more on technology such as learning HTML when developing websites, MYSQL for building databases and ERL for writing codes. In this way, advanced information can be obtained. On the other hand, students who are not comfortable using the internet may end up confused and overwhelmed of the features that it offer. Consequently, this may affect their perception on e-learning.

One major reason explaining why there was no relationship between participation and interaction and e-learning is that e-learning does not involve human contact at all as compared to face-to-face instruction. Interaction with the instructor and other students is important in learning. Much can be learned from other students such as personal experiences which impact learning. If there are questions or vague ideas about a certain topic being discussed, these can be answered right away. Disadvantages of e-learning are already being solved through the use of message boards, chat rooms and e-mails to enable learners to communicate with other e-learners. In addition, students around the world could communicate in real time used advanced technology.

In general, this study revealed the factors that significantly affect effectiveness of e-learning. Beetham and Sharpe (2007) showed that e-learning or mobile learning can be a helpful tool and resource for learners to achieve better learning outcomes. E-learning has so much to offer and thus it is up to the users to take advantage of it. E-learning offers the advantage of accessibility since the

internet can be accessed at any time and place. The cost is also affordable since internet can easily be directly installed into the computer through the use of modems. Methods of instruction in e-learning are usually visual and thus have a strong impact on fast learning. More important, these methods can be easily updated which provide for a more comprehensive, detailed and up-to-date instruction. Although it has its limitations, such as the lack of human interaction, technology is making a way to resolve this by creating a full video screen for live interaction. Past studies have shown the significance of e-learning in gaining additional and up-to-date knowledge that might not be gained from only traditional classroom-based instruction. Online learning can be integrated with classroom-based methods to facilitate teaching. The findings from the present study may provide background knowledge for future studies in investigating the effectiveness of e-learning and its effects on other areas such as employment, social work practice and economy.

## CONCLUSION

This study focused on investigating the effectiveness of an e-learning system as a function of several important variables, mainly reaction and satisfaction, learning outcome and achievement, participation and interaction, and familiarity with online learning technology. It examined how students' rate the quality and effectiveness of an e-learning program, whether e-learning improves the students' learning progress, and determined students' familiarity levels of online learning technology. The results showed that the effectiveness of e-learning was significantly affected by independent variables such as reaction and satisfaction, learning outcomes and achievement and familiarity with online learning technology. Reaction and satisfaction are significant factors because e-learning is a two way learning system that involves students and the online learning system. The learning outcomes and achievement variable are important because they measure how students benefit from e-learning, and therefore they reflect the effectiveness of the e-learning process. As for familiarity with online e-learning technology, the hypothesis was supported. The e-learning process involves the use of tools and practices, therefore students have to be computer-literate. This familiarity with online learning technology is of paramount importance in order to enhance the learning process. However, participation and interaction have no apparent influence on the effectiveness of the e-learning system. Face-to-face communication and interaction of traditional teaching systems seem extremely important in the learning process. In this study, only a total of five independent variables were selected. Although these independent variables were selected via a pre-survey research, the incorporation of more variables into the research may provide a better picture of the effectiveness of an e-learning system. The present research only used

students as respondents. Feedback and opinions from other parties involved in the education system are also crucial to gain a better understanding of the effectiveness of an e-learning system.

## REFERENCES

Asirvatham, D., Woods, P., Takahashi, K. and Abtar, K. 2003. E-learning initiatives in Malaysiain E-learning: The future. http://www.marketreserach.com. 25th January 2005.

Barkdale, K. 1999. *Internet concepts & activities.* Cincinnati: South-Western Educational Publishing.

Beetham, H. and Sharpe, R. 2007. *Rethinking Pedagogy for a Digital Age: Designing and Delivering E-Learning,* New York: Routham.

Brian, B., West, B. and Donovan, M. 2002. "E-learning Returns: Why (and When) Your Organization should Consider E-learning", Option Six White paper 02-2002, *E-Learning Returns.*

Chandler D. 1984. *Young learners and the microcomputer.* Milton Keynes: Open University Press.

Charp and Sylvia. 2003. Online learning in Virtual High School. *International Journal of Instructional Media:* 8.

Cohen, V. L. 1997. Learning styles in a technology0rich environment. *Journal of Research on Computing in Education:* 339-350.

Cohen, V.L. 2001. Learning Styles in a Ninth-Grade High school Population. *Journal of Reaserch on Computing in Education* 33(4): 355. February 26, 2004, from EBSCO database.

Dewar, T., and Whittington, D. 2000. Online learners and their learning strategies *Journal of Educational Computing Research* 23(4): 385-403.

Esthetic Supersite. *Esthetic & Beauty Therapy Training, Education and More.* [Online]http://www.estheticsu-persite.com/elearning.html. 29th March 2005.

Fry, H., Ketteridge, S. and Marshall, S. 2009. *A Handbook for Teaching and Learning in Higher Education: Enhancing Academic Practice.* New York: Routham.

Gotschall, M. 2000. E-learning strategies for executive education and corporate training. *Fortune* 141(10): S5-S59.

Hall, B. and Snider, A. 2000. Glossary: The hottest buzz words in the industry. E-Schreiber, D.A. & Berge, Z. L. 1998.

Hall, B. 2000. How to embark on your e-learning adventure: Making sense of the environment. *E-leaning* January-March.

Hortom, W. 2001. Learning E-learning, Alexandria, USA: *American Society for* Training and Development.

Karon, R. L. 2000. Bank solved compliance training challenge with internet. *E-learning* January – March.

Kirkwood. 2001. *Teaching and Learning on the World Wide Web.* Institute for Interactive Multimedia University of Technology: Australia.

Kussmual, C. and Dunn, J. 1996. Using technology in technology. *College Teaching* 44(4): 123. February 26, 2004, from Academic Search Premier database.

Liaw, S.S., Huang, H.M., Chen, G.D. 2007. Expert System with a Application: Survey Instructor and Learner Attitude Toward E-Learning. Vol 32. Issue 4.

MMU, Multimedia University. 2003. Survey Report Multimedia University.

Muhammad Rais and Yusup Hashim. 2004. "The Experience of the E-Learning Implementation at the Universiti Pendidikan

Sultan Idris, Malaysia. *Malaysian Online Journal of Instructional Technology* 1(1): 50-59.

O'Conner, T. 1997. *Using learning styles to adapt technology for higher education.* [Online] http://www.indstate.edu/ctl/styles/learning.htm. 12th April 2005.

Opinion Research Corporation. 2000. *Education News, Working Adults like Online Education.* [Online] http://www.skymarkgroup. com/industry-news-education. 12th April 2005.

Pete Maurer. 2001. *Evolution and Revolution in Management: From Organizational Learning to E-Learning.* Tampere Polytechnic Business School.

Rosenberg, M. 2001. *E-learning.* New York McGraw-Hill.

Ruiz, Jorge G, Mintzer, Michael J, Leipzig and Rosanne M. 2006. The Impact of E-Learning in Medical Educational, *Academic Medicine* March (81): 207-212.

Santoro, G. 1995. Overview of computer-mediated communication in education. In Zane Berge and Mauri Collins (Eds.). Volume 1: Overview and Perspective. Cresskill, NJ: Hampton Press.

Schreiber. D.A. and Berge, Z.L. 1998. Distance training: How innovation organizations are using technology to maximize learning and meet business objectives.

Science Direct. *Instructional Video in E-Learning: Assessment the Impact of Interactive Video on E-Learning Effectiveness.* [Online] http://www.sciencedirect.com/science_Article.html. 15th April 2005.

Smolin, L. L. and Lawless, K. A. 2003. Becoming literate in the technology age: New responsibilities and tools for teachers. *Reading Teacher* 56: 570. February 24, 2004, from ERIC database.

Stepp-Greany, J. 2002. Student Perceptions on Language Learning in a Technological Environment: Implications for the New Millennium. *Language Learning and Technology* 6(1): 165-180.

Thornburg, D. 1997. *Multimedia encourages new learning styles.* [Online] http://newhorixons.org/strategies/technology/thornburg.htm.

Urdan, T.A. and Weggen, 0C.C. 2000. Corporate e-learning: Exploring a new frontier. WR Hambrecht.

Weigel, G. and Waldburger, D. (eds) 2004. ICT4D – *Connecting People for a Better World Lessons, Innovations and Perspectives of Information and Communication Technologies in Development.* Published by the Swiss Agency for Development and Cooperation (SDC) and the Global Knowledge Partnership (GKP). [Online] http://www.ict-4d.org.news.htm. 20th April 2005.

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