

Technology adoption and the integration of computer-aided learning in Asian universities

* **Muhammad Tahir Khan**
University of Okara

Sarfraz Zaman
Superior University, Gold Campus, Lahore

Furrakh Abbas
University of Okara

*Email of the corresponding author: Sarfraz.zaman@superior.edu.pk

ABSTRACT

The human-computer interface is one of the main challenges while developing packages for e-learning. Extensive research has been done in the past that analyzed whether high-quality user experience depends on the design of an interactive system. Developing interactive spaces is vital for e-learning, as these advanced interactive spaces allow one to create own conceptualizations from the provided educational content. In addition, users can follow their pathways by adopting a combination of constructionist-constructivist approaches with no restrictions on learning paths and styles. It also gives maximum user autonomy to choose their own pace of learning. There has been a rapid increase in the adoption of e-learning, mainly due to the advancements in the Web and internet, electronic communications, and other associated technologies, which further motivate organizations and educational institutions to adopt e-learning to improve accessibility. This paper discussed the issues that needed to be resolved so that the e-learning support tools could effectively be integrated within an e-learning environment. This study is conducted in a prior case study, which observed how the e-learning environment contributes to learning and teaching relational data analysis (RDA) among undergraduate students. The present study discussed the potential and actual use of computers in these teaching packages. Furthermore, the study emphasized the role of the computer in teaching e-learning applications and computer-aided courses.

Keywords: integration, Asian, Technology

INTRODUCTION

Nowadays, the use of computers is common to manipulate and store data for analyzing the progress and performance of the students. Similarly, the same hardware and software can also be adopted for teaching computer-based courses. In e-learning, educational material must be structured and not creating difficulty for the students in understanding and following the learning path. However, E-learning systems are complex, making it quite

challenging for the developer or teacher to decide which regime would be suitable for developing a new e-learning system.

The adoption history of ICT in the education sector extensively explains the significance of technology for today's education. During the 1960s, programmed learning was assumed to bring revolution to the classrooms. Although it was an optimistic approach, placing computers in each classroom was rare then. The reason was examined by O'Dwyer, Russell, Bebell, & Tucker, and Seeley (2005) and the study reported that since the knowledge and use of computers have been increasing, teaching programs have been starting to produce diverse content without particularly emphasizing much content delivery. His study pointed out that the emergence of the e-learning system creates motivation among students to research relevant data and knowledge in the library and not rely entirely on e-learning. Over the years, there has been a significant improvement in the quality of programs and software (Thelwall, 2002). E-learning is a way of learning and teaching encompassing several technological tools for learning (Amzi, 2004). These tools facilitate teaching complex content, while some tools create possibilities for effective communication among teachers and learners. In addition, E-learning is expected to provide resources for performance support, interactivity, and structured learning. For individuals, technology-based learning improves their prospects of employment, while from the collective point of view, it helps achieve economic competitiveness. Thus, lifelong learning can better be named workforce re-skilling.

LITERATURE REVIEW

In Barnard, Ridder, Pretorius, and Cohen's (2003) study, the ability of computers to store and recover information and data are the key features of the computer; besides, it enables to create programs that can convert the retrieved information into a presentable and understandable form. This function can be carried out in no time and with high speed. These features make the computer a perfect teaching machine but are not an alternative for teachers (Hwang, Hsiao, and Tseng, J. C. (2003). However, due to the rise in the use of the internet, growth of computers, technological advancement, pressure upon education staff to economize teaching time, reduction in software and hardware costs, and the educators' belief that e-learning is relatively better than traditional teaching methods, it is partly true that computers are ideal for teaching (Liberian 2002, p.44). In addition, a survey was conducted by Liberian (2002), and the responses were obtained from the students to compare the computer-assisted instruction (CAI) and interactive tutorials. The survey results reported both CAI and interactive tutorials as effective tools for teaching. With every new technological development, there would be dehumanization of the learning process. A study (Hwang, 2003) attempted to prove through evidence that students' personality is significantly affected by computers, particularly those students who were relatively more nervous.

On the other hand, another study (Letterie, 2003) analyzed that lower and upper-end students do not get their teacher's attention except for a small percentage. Furthermore, the study discovered that the direct interaction between students and teachers is somehow non-existent or limited at the secondary level or above. Therefore, proper integration of e-learning can play a supportive role in providing benefits to all stakeholders.

Previously, teachers were required to have some know-how or computer programming skills to use the computer for teaching students and transferring information to them. This requirement has been limiting teachers from accepting computers as a source of teaching. The introduction of authoring systems served as a tool to develop a connection between computers and teachers. The degree of sophistication and the quality of the course material determine the quality and effectiveness of e-learning. After deciding the program format, strategy, and content, then comes the creation of educational content, i.e., to present the teaching program in the best possible way so that it could accept different pathways and learning styles, particularly when in the case of self-managed study. The courseware author would have the option to include authoring languages, programming languages, authoring systems, and exercise generators. Today, the majority of the teachers are now skilled in terms of computer programming. However, there is still a lack of expertise in human-machine interaction design. Furthermore, teachers must manage their classroom duties while producing teaching material. Therefore, the peripheral audio-visual devices and authoring facilities were developed to implement and adopt e-learning possibilities and resolve the difficulties that arise while producing e-learning material.

The contrastive illustrations below depict the role of the authoring system. It shows how an e-learning delivery system can influence as a mediator in the student-teacher relationship. In the context of the traditional teaching approach, students had multiple options to communicate directly with the teacher subject to their capacity (such as teacher time). The introduction of the computer has changed this situation. It serves the role of a third entity between student and teacher by acting as a teacher's proxy during the teaching program (Thelwall, 2000). The authoring system enables the author to monitor students' responses and organize e-learning resources according to the conditions. Besides, it allows for the incorporation of decision rules in the program for handling the process.

A database comprises graphics or text developed using an authoring system. Some authoring systems require an author language and are relatively easier to use. For instance, the teacher's teaching strategy is automatically implemented and includes easy-to-learn syntax. Diagnostic testing, drill and practice, problem-solving, tutorial mode, calculation, simulation, and inquiry mode are common strategies. In addition, the authoring language facilitates the operation of peripheral devices and the collection, distribution, and analysis of data and information.

The student usually receives information from their surroundings which provide knowledge to the student, and they organize this information to understand and generalize the specific terms. Thus, the computer serves the role of a mediator, i.e., from one flow of information to the other, i.e., from the learning environment to the student's end (Dewhurst, D. G., MacLeod, H. A, and Norris, T. A. (2000), they argued that variety of facts, information, guidance, and feedback emerge during the learning process. However, the amount and quality may vary. For instance, on the one hand, the nature of information would be rapidly changing and would be detailed when students gain knowledge from reading a book or participating in a small-grouped seminar. On the other hand, not all information can be stored or recorded at this level, such as information shared during a seminar discussion. Also, it will be unnecessary to record such a level of detail; instead, recording a summary would be more relevant and represent the activities of the student.

On the other hand, there can be further summarization of information when the rate of information change is slower and does not involve much detail. Practically, the course and the individual students describe what level of data can be effectively utilized by the student. The learning process model can be described using different computer applications, i.e., how the e-learning process mediates the information flow from the teacher to the student.

For various applications, computers can be a powerful medium. So why did the previously attempted fail, i.e., the integration of the education process and teaching software? According to (Du Plessis, J. P, Van Biljon, J. A, Tolmie, C. J., & Wollinger, T.(1995)). It occurred mainly because of the sub-optimal integration of teaching software into the academic approach. A noticeable fact is that the teacher cannot solely rely on computer specialists or programmers to prepare and plan for the educational system. Computer games are an excellent example of high programming skills since they require advanced technology, which does not come under educational content. Contrarily, educational content is mainly presented in full print with dull screens and at a slow speed, which does not appeal to or catch the students' attention and does not motivate them to engage. Thus, creative design and educational skills need to be incorporated into the educational software design—for instance, a combination of teamwork between teachers and multimedia system designers. According to Herriot (Al-Mashaqbeh, I. F, & Al Khawaldeh, S. A. (2009)), self-directed learning and close teamwork may result in improved utilization of e-learning.

E-learning refers to the process of interactive dialogue that takes place between a computer and a student. It is a response learning program and a self-paced constructed response. E-learning focuses on the delivery of educational content. Free and easy access to the academic content enables positive student reactions. It allows them to choose their own pace of learning, which can bring about maximum benefits to the students (De Boer, A. L, Steyn, T., & Du Toit, P. H. (2001)). Referring to e-learning as a shortcut to learning and teaching is not true; rather, it facilitates the teacher and the student to restructure the existing material and knowledge. In addition, e-learning does not encourage knowledge transmission to the students; rather, it enables them to develop a problem-solving ability or handle the existing knowledge through skills (Watson, P., & Workman, G. (2008, November)).

The computer is programmed to control the learning process, just like a tutoring session where the learning process occurs through student-teacher (human tutor) interaction. In this process, a computer system is needed to communicate and access the educational content. Therefore, the design of e-learning must be something that could efficiently present the educational content and collect student response data. E-learning refers to the interactive dialogue between a computer and a student, which can take the form of a tutorial, assuming real-world examples, or producing some exercises. Thus, an e-learning system plays the role of background support and assesses the student's performance for a specific period; it keeps the student's progress and performance record and guides students about the possible route that can be taken. In e-learning, feedback plays a key role as it monitors student responses and then arranges the lesson material accordingly, implying that student responses control the lesson material. Two modes are generally used when the computer is adopted as a medium of teaching: learner mode and author mode. In learner mode, text, graphics, sound, etc., provide students with the instructional material and monitor and record their responses. Student responses are gathered in the learner mode, followed by the

computer's analysis of these collected responses. After investigation, valuable feedback is shared and sent to the teacher or author about the students' courseware progress and performance.

On the other hand, the computer serves as an aiding tool in the author's mode, which helps the author prepare and keeps the educational content and assesses the students' progress. According to Lieberman (2002), the cost of the educational process does not decline with the use of the computer during the learning process; it somehow improves the quality of the instructional process. E-learning also involves material costs, the programmer's time in developing the program, computer usage, overhead expenses, and audio-visual equipment. E-learning minimizes the utilization of costly resources and tends to use those requiring less cost.

It can be concluded from this study how the change in the learning environment, i.e., from traditional to e-learning, changes the roles of the learner and the teacher. E-learning changes the role of the teacher from an initial source to a manager of information and a facilitator of learning. Similarly, e-learning also transforms the role of a student, i.e., from passive to active participant. Students' participation means they now have the most significant responsibility for their learning and others' learning when in the group. For an effective e-learning process, the teacher and the organization must be aware of changing roles while moving from traditional to contemporary education. While adopting e-learning, it must be kept in mind that the previous training does not need to be discarded during the process. Thus, e-learning can be used or adapted as an additional medium that can be combined with the existing material or media.

DISCUSSION AND CONCLUSION

The results from the previous studies suggest that there is a consensus among the respondents that, besides other learning approaches, e-learning must be integrated as an additional medium and should not be replaced with the traditional means of learning. Students and staff believed that, unlike the classroom teaching approach, which does not require much effort and preparation and mainly relies on students' interaction, intense preparation is needed for e-learning. According to the teachers, a novelty factor is associated with e-learning due to more enthusiasm among students while learning through the web and computer, compared to the traditional self-study methods, like learning through books. In addition, it may be because of the interactive questions and ideas that the e-learning environment provides to the students, which stimulate their thought process and because these questions are mainly outside the textbooks.

E-learning is an effective means for achieving desirable outcomes, but it cannot be replaced with traditional teaching and learning methods. So far, e-mail is of particular importance and is helpful because it provides the student with an easy way to interact with the teacher, i.e., by asking questions from the teacher through e-mail. A consensus is reported that teacher-student interaction is necessary for effective learning; therefore, traditional learning and teaching methods cannot be entirely replaced with e-learning. Similar views were found in Hwang's (2003) and Tucker's (1997) studies; it was emphasized in their studies that the progress of each student can easily be assessed through e-learning, and it allows the teacher to give more time and attention to the weak students. Students also consider it a key factor since it influences the student's learning progress.

E-learning has advantages like greater accessibility and cost-saving, allowing and encouraging students to choose their place of learning. Unlike paper-based material, it will enable easy editing and updating of the educational content. Accessing learning material at any place and time is a crucial advantage of e-learning. It is suitable for physically disabled persons and those with difficulty accessing the content. However, E-learning also has some limitations; a significant drawback is that those students who need more attention and support feel demotivated and fail to concentrate with the perception of the teacher's absence and cannot learn through self-managed study. In such cases, the isolation makes e-learning even more difficult. Other drawbacks include data integrity and over security (other people can view personal information). Thus, we conclude that no opposing opinions were obtained about e-learning adoption. However, some reluctance is still observed to adopt e-learning regimes. It proves that the traditional teaching approach can never be replaced with the e-learning approach. Finally, positive responses and facts were obtained regarding e-learning and its suitability.

The advantages of e-learning include all the positive comments, such as i) it is cost-effective, ii) the effectiveness of learning is improved with visual aids and animation. iii) E-learning provides the opportunity for the students to self-assess their performance, and iv) the e-learning process takes less time and does not pressure the learner in terms of time. However, the effectiveness of e-learning can only be ensured when the system is user-friendly and is easier to be used by the learner.

The respondents perceive e-learning as an effective tool of learning. In contrast to Lieberman's (2002) observations that e-learning seems inappropriate for some areas, like laboratory work, and traditional social interaction is relatively more important for education, most survey respondents believed that e-learning is appropriate and can be applied in all areas of education. Letterie (2003) presented contradictory views on e-learning, i.e., e-learning is more advantageous for students who are less friendly and stated that available evidence has proved that such students are less interactive in ordinary classrooms and prefer to interact more with computers. Literature suggests that students and tutors both perceive e-learning and its adoption differently. According to the tutor's point of view, full implementation of e-learning is not recommended, whereas students supported the full implementation of the e-learning strategy. Inconsistent with the tutors' point of view, Hwang (2003) also believes that no system like e-learning can replace the teacher's role but can be used as an aiding tool. The e-learning package enables the teacher to analyze the progress of each student.

On the other hand, some scholars support the students' point of view, such as Lieberman (2002) suggested that in areas where e-learning can be perfectly integrated or well-adopted, it can bring about effective and desirable outcomes just like the traditional teaching approach. Lieberman (2002) and Hwang (2003) well summarized the discussion by stating that e-learning has evolved the role of teachers, i.e., most of the teachers' task is done by computers, thereby changing the teacher's duty from a tutor to an administrator. Besides, in e-learning, the teacher is required to deal with other tasks and not to teach, for instance, identifying learning issues, answering the students' queries, etc.

Most students also confirmed that e-learning brings more opportunities for them and enables them to repeatedly study and learn a particular area until they feel confident about it. This view is also supported by Lieberman (2002), who suggests that in e-learning, the

student can choose their own pace of learning, and they do not feel hesitant to ask the question, as in the case of a classroom. Introducing an e-learning package would be enjoyable and attractive for young learners who have been watching video games and television since childhood (Dewhurst & Williams, 1998).

Furthermore, a teacher's inadequate response was obtained on the resource issues (cost, timing, etc.), i.e., preparing books and lectures is more time-consuming than e-learning delivery, which does not consume much time. Tutors may find it challenging to do multi-tasking, which also requires developing and preparing e-learning material and requires the tutor to be well-aware and proficient with multimedia skills (Cloete, 2001). Contrarily, e-learning students also confirmed that learning through books is more time-consuming while e-learning consumes less time. Friedrich and Karslioglu (2003) also supported this idea. They argued that through e-learning, each student or learner could learn at their own pace without worrying about the classroom pressure and environment. By adopting e-learning, the learner does not need to be away from home or the workplace for an extended period and will cause fewer disruptions in the learner's work pattern than in traditional classroom learning. In another study, Herriot (2003) mentioned that it is nearly impossible for a slow learner to pass without extra tutoring or instructions, which can only be achieved by taking the spare time or attention from the tutors. In such cases, e-learning courses allow the user to get more time and provide them the opportunity to learn and pass at their own pace. According to most respondents, the convenience of learning from anywhere and at any time makes e-learning cost-effective as it saves the cost of buying reading material and books, travel expenses, etc.

It is concluded from this research that to deploy e-learning or technology-enhanced learning at a larger scale; relevant multimedia software platforms must be integrated for production, personalized delivery, and distribution within the educational model. In addition, the subject delivery model can be designed with an adaptive approach that allows responding according to each learner's preference and style of learning. The results from primary and secondary data have shown that e-learning can be effective if adequately adopted. However, inconclusive literature was obtained on whether e-learning is a substitute or a different learning medium.

Another key literature is that a novelty factor is associated with e-learning which appeals young generation, while the older population is reluctant to adopt e-learning. No doubt, it is advantageous for the disabled and disadvantaged people. In addition, it provides a pathway for those who would not have access to education and allows them to join the education system, ultimately allowing them to work. However, complete reliance on e-learning may prevent the learners (early learners) from learning life and social skills and may lead to a lack of education in their day-to-day interactions. In addition, it would also prevent them from healthy interaction with their peers and teachers. Therefore, creating a balance between instructor-mediated group learning and a virtual learning approach is essential. It can be achieved by adopting the blended learning approach that will undoubtedly help develop collaborative creativity among the learners.

REFERENCES

- Abbas, F., & Iqbal, Z. (2018). Language Attitude of the Pakistani Youth towards English, Urdu and Punjabi: A Comparative Study. *Pakistan Journal of Distance and Online Learning*, 4(1), 199-214.
- Abbas, F., Nazir, S., & Rana, A. M. K. (2017). Language as cultural capital: Exploring the language use by Pakistani multilingual speakers in four domains. *Hamdard Islamicus*, 40(3&4), 1-16.
- Ahmed, S. N., Abbas, F., & Qureshi, A. M. (2021). The use of social-networking sites in English language education: An exploratory study using SWOT analysis technique. *PSYCHOLOGY AND EDUCATION*, 58(1), 4640-4650.
- Barnard, A., de Ridder, C., Pretorius, L., & Cohen, E. (2003, June). Integrating computer ethics into the computing curriculum: A framework for implementation. In *Proceedings of IS2003, Informing Science+ Information Technology Education Joint Conference* (pp. 265-279).
- O'Dwyer, L., Russell, M., Bebell, D., & Tucker-Seeley, K. R. (2005). Examining the relationship between home and school computer use and students' English/language arts test scores. *The Journal of Technology, Learning and Assessment*, 3(3).
- Thelwall, M. (2002). A comparison of sources of links for academic Web Impact Factor calculations. *Journal of Documentation*.
- Hwang, G. J., Hsiao, C. L., & Tseng, J. C. (2003). A computer-assisted approach to diagnosing student learning problems in science courses. *J. Inf. Sci. Eng.*, 19(2), 229-248.
- Valcke, M., & De Wever, B. (2006). Information and communication technologies in higher education: evidence-based practices in medical education. *Medical Teacher*, 28(1), 40-48.
- Thelwall, M. (2000). Computer-based assessment: a versatile educational tool. *Computers & Education*, 34(1), 37-49.
- Tarar, I. A., Khan Rana, A. M., & Abbas, F. (2021). Right to Education: Comparative Study of Constitutional Contours, Legislative Initiatives and Institutional Arrangements in India and Pakistan. *Ilkogretim Online*, 19(3). 3365-3371
- Parveen, S., Abbas, F., & Rana, A. M. K. (2022). WHAT DETERMINES THE PERCEIVED EASE OF THE USE OF AN ONLINE LEARNING SYSTEM. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 19(1), 1679-1696.
- Dewhurst, D. G., MacLeod, H. A., & Norris, T. A. (2000). Independent student learning aided by computers: an acceptable alternative to lectures?. *Computers & Education*, 35(3), 223-241.
- Du Plessis, J. P., Van Biljon, J. A., Tolmie, C. J., & Wollinger, T. (1995). A model for intelligent computer-aided education systems. *Computers & Education*, 24(2), 89-106.
- Al-Mashaqbeh, I. F., & Al Khawaldeh, S. A. (2009). The Effects of Using Educational Software in the Computer-Assisted Instruction (CAI) Method to Increase Adult Learners' Achievement. *Malaysian Journal of Distance Education*, 11(2), 85-95.
- De Boer, A. L., Steyn, T., & Du Toit, P. H. (2001). A whole-brain approach to teaching and learning in higher education. *South African Journal of Higher Education*, 15(3), 185-193.

Watson, P., & Workman, G. (2008, November). A Case Study Application of e-Supported Learning in a Continuing Professional Development (CPD) Degree Programme. In *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 1370-1374). Association for the Advancement of Computing in Education (AACE).