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A Tutorial on E-learning Paradigms

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ABSTRACT

Online learning or e-learning is not only an important cost saving measure for corporations to train their staff and customers but it provides the flexibility and opportunities to reach out to a much larger audience. Schools and institutions have been using it to complement their existing classroom lectures. E-learning become the most used and popular teaching method in universities with availability of E-learning tools and techniques, development of technology communications and networks. This paper discusses the fundamentals of e-learning which include the trends of e-learning, e-learning modalities. Also, various learning paradigms were highlighted up to date with the inclusion of blended learning. The literature of the past review on relationship of e-learning paradigms was updated too. This work also brought to light the pedagogical designs of optimizing the e-learning paradigms. Furthermore, various management and administrative requirements of e-learning paradigms were discussed. And finally, different methodologies of evaluating e-learning paradigms were pointed out and analyzed.

Key words: E-learning, Blended learning, E-learning paradigms, E-learning modalities and Face-to-face learning.

INTRODUCTION

Learning paradigms include open learning, distance learning, e-learning, m-learning, flexible learning and recently discovered blended learning. Thus, e-learning, which keep on regenerating throughout others is used to represent other paradigms in this work. E-learning (Electronic learning) is commonly referred to the intentional use of networked information and communications technology (ICT) in teaching and learning. Some other terms are also used to describe this mode of teaching and learning including online learning, virtual learning, distributed learning and web-based learning (Naidu, 2006). The growth of e-learning is directly related to the increasing access to ICT, as well as its decreasing cost. E-learning systems are easily divided, according to the separation in space among the learner and teacher, to those that enhance learning in contrast to those that deliver learning. The former support and supplement the traditional face-to-face classes in synchronous meetings through the replacement of paper-based material, videotapes or audio recordings with their corresponding digital formats.

The latter do not require the “class” to be at the same place, can be synchronous or asynchronous, and offer novel ways of interaction such as “virtual classrooms”. The diagram of a typical e-learning system is depicted in Figure 1 (Ahmed and Sadiig, 2005). Furthermore they support distributed e-learning by taking advantage of state of the art communication technologies and can reach audiences that could not attend traditional courses. It is apparent that e-learning systems that deliver learning must be able to respond to the demands of the individual learner or the “virtual classroom” on-line and in real-time (Hamid, 2001). Also, four different computing platforms/paradigms have evolved overtime to enhance

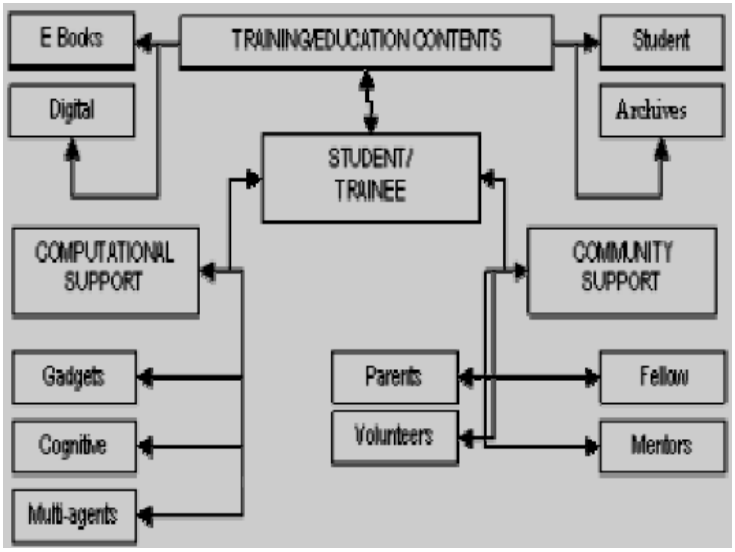

Figure 1. A Typical e-learning system.

Table 1. E-Learning modalities.

Modalities	Type	Examples
Individual Self-paced	Individualized self-paced e-learning online refers to situations where an individual learner is accessing learning resources such as a database or course content online via an Intranet or the Internet.	A learner studying alone or conducting some research on the Internet or a local network.
	Individualized self-paced e-learning offline refers to situations where an individual learner is using learning resources such as a database or a computer-assisted learning package offline (that is, while not connected to an Intranet or the Internet).	A learner working alone off a hard drive, a CD or DVD.
Group paced	Group-based e-learning synchronously refers to situations where groups of learners are working together in real time via an Intranet or the Internet. It may include text-based conferencing, and one or two-way audio and videoconferencing.	Learners engaged in a real-time chat or an audio-videoconference.
	Group-based e-learning asynchronously refers to situations where groups of learners are working over an Intranet or the Internet where exchanges among participants occur with a time delay (that is, not in real time).	On-line discussions via electronic mailing lists and text-based conferencing within learning managements systems.

Source:Naidu, 2006.

e-learning viz networking or distributed computing, grid computing, mobile computing, and cloud computing.

E-Learning Modalities

E-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices. These various types or modalities of e-learning activity are represented in Table 1.

Definitions of Learning Paradigms

E-learning or *Online Learning*

E-learning or online learning is the use of electronic technology to deliver, support and enhance teaching and learning. E-learning is commonly referred to the intentional use of networked information and communications technology (ICT) in teaching and learning (Naidu, 2006).

Open Learning

Open learning is learning in your own time, pace and place". Open learning involves but is not limited to: classroom teaching methods, approaches to interactive learning, formats in work-related education and training, the cultures and ecologies of learning communities, and the development and use of open educational resources Calder and McCollum (1998).

Distance Education

Distance education is any educational process in which all or most of the teaching is conducted by someone removed in space and/or time from the learner, with the effect that all or most of the communication between teachers and learners is through an artificial medium, either electronic or print, UNESCO (2002).

Flexible Learning

Flexible learning is designed to provide learners with increased choice, convenience and personalization. This is highly compatible with the concept of constructive alignment and its key concept, that students construct meaning from what they do to learn (Biggs, 1999). It enables learners to choose aspects of their study. Flexible Learning includes aspects of open learning and distance learning.

Mobile Learning

Mobile learning is general term that refers to the general delivery of e-learning materials on a variety of portable devices including laptops, Personal Digital Assistants (PDAs), mobile phones or MP3 players. It is the method of e-learning which is based on the use of mobile devices anywhere, any time. (Hemabala and Suresh, 2012).

Blended Learning

Garrison and Vaughan (2008) define blended learning as “the organic integration of thoughtfully selected and complementary face-to-face and online approaches and technologies”.

RELATIONSHIPS BETWEEN LEARNING PARADIGMS

According to literature, learning paradigms include open learning, distance learning, e-learning, m-learning, flexible learning. A few years ago blended learning came into light. Blended learning is a combination of face-to face learning and online learning. Both learning environments have unique features. One unique instructional feature of a face-to-face learning environment is that it provides direct, place based, social interaction between students, the instructor and other students. This feature provides a synchronous mode of communication that fosters high motivation and engagement by allowing learners to test their understanding immediately through interactions with instructors and peers. Online learning provides course materials and messages anywhere and anytime that allow students to study independently of time and space. In other words online learning environment provides flexibility to students at any time and from any location that is convenient and it shows the asynchronous nature of the online environment. (Bulent, 2014). According Khan (2005), the Internet supports open learning because it is device, platform, time, and place independent.

It is designers who take advantage of the openness of the Internet to create learning environments that are flexible for learners. Thus, the Internet, supported by various digital technologies, is well-suited for open, flexible, and distributed learning (Figure 2). According to the approach put forward by Georgiev et al. (2004), Figure 3 shows the relationships between learning paradigms. This approach considers m-learning as a part of e-learning, e-learning as a part of distance learning. Furthermore, an m-learning activity is seen as an e-learning and an e-learning activity is considered a distance education activity. Akour (2009) compares learning paradigms with respect to flexibility provided for learners and learning time span. When traditional learning, distance education, e-learning and m-learning are compared, it is stated that m-learning has a more learning time span. It is acknowledged that m-learning is used by a lot of learners since it can be reached at anytime and anywhere and also provides easy access, Akour (2009) compares in terms of flexibility and learning time spanning of traditional education, distance education, e-learning and m-learning paradigms (Figure 4). Tick’s approach (2006) is thought to be the best for this study as it states that m-learning can provide educational opportunities at anytime and anywhere when used with e-learning and distance education. Figure 5 shows the relationship between learning paradigms according to this approach. Also, b-learning (blended

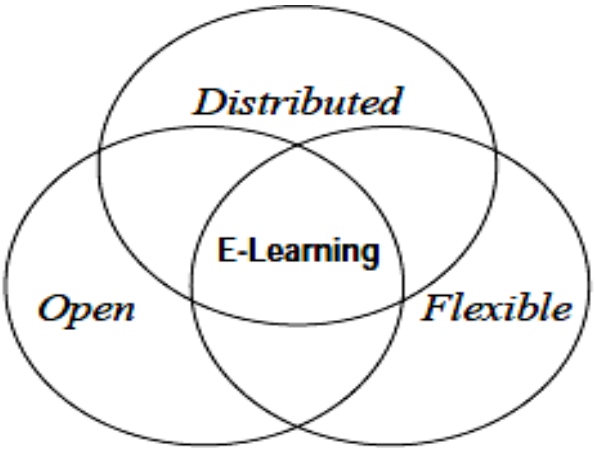

Figure 2. Open, flexible, and distributed e-learning paradigms.

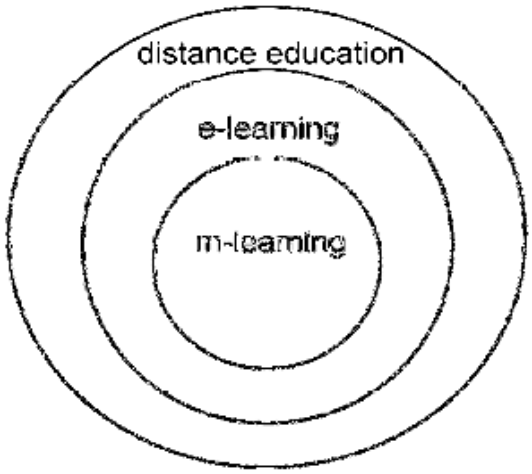

Figure 3. Set theory perspective of learning paradigms.

learning) can incorporate face-to-face classes with online learning and mobile learning as shown in the Figure 6. In this way, resources can be provided in various ways using media such as videos, audio, e-books etc, and participants can use different tools to communicate with each other and the teacher, and to interact with the learning environment. (Bulent, 2014).

Principles of Effective E-Learning Paradigms

The Multimedia Principle

The multimedia principle: Adding graphics to words can improve learning. By graphics we refer to a variety of illustrations including still graphics such as line drawings, charts, and photographs and motion graphics such as animation and video. Research has shown that graphics can improve learning.

The Contiguity Principle

The contiguity principle: placing text near graphics improves learning. Contiguity refers to the alignment of graphics and text on the screen. Often in e-learning when a scrolling screen is used, the words are placed at the top and the illustration is placed under the words so that when you see the text you cannot see the graphic and vice versa. This is a common violation of the contiguity

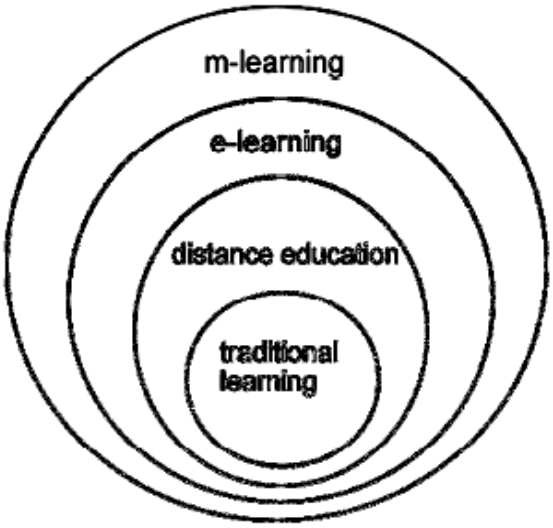

Figure 4. Learning space range and ease of access for learning paradigms.

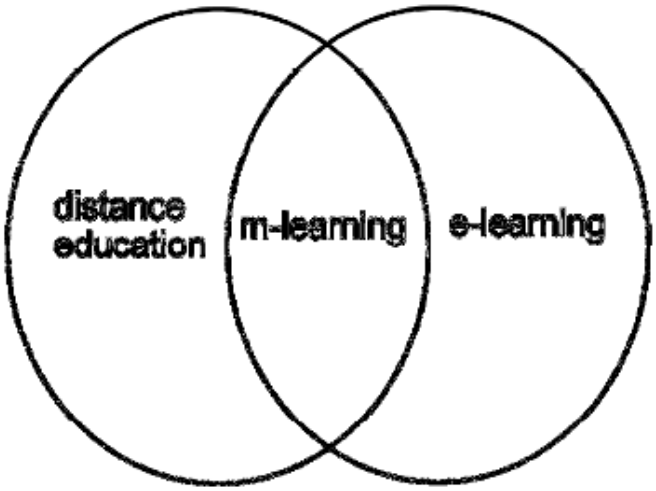

Figure 5. The interrelationship of d-learning, e-learning, and m-learning.

principle that states that graphics and text related to the graphics should be placed close to each other on the screen.

The Modality Principle

The modality principle: explaining graphics with audio improves learning. If you have the technical capabilities to use other modalities like audio, it can substantially improve learning outcomes. This is especially true of audio narration of an animation or a complex visual in a topic that is relatively complex and unfamiliar to the learner.

The Redundancy Principle

The redundancy principle: explaining graphics with audio and redundant text can hurt learning. Some e-Lessons provide words in text and in audio that reads the text. This might seem like a good way to present information in several formats and thus improve learning. Controlled

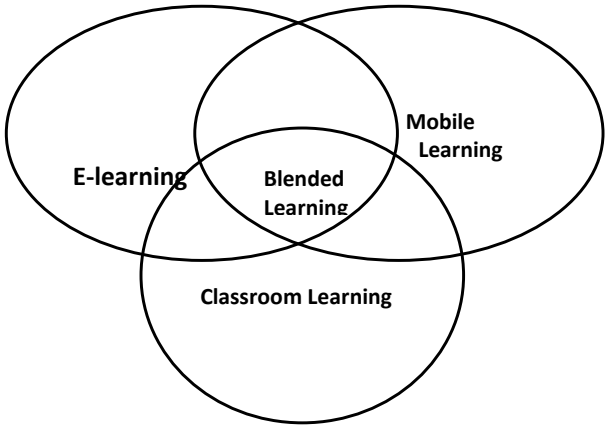

Figure 6. The interrelationship of classroom learning, e-learning, m-learning and b-learning.

research however, indicates that learning is actually depressed when a graphic is explained by a combination of text and narration that reads the text.

The Coherence Principle

The coherence principle: using gratuitous visuals, text, and sounds can hurt learning. It's common knowledge that e-Learning attrition can be a problem. In a well intended effort to spice up e-learning, some designers use what is called Las Vegas approach. That is adding glitz and games make the experience more engaging. The glitz can take a variety of forms such as dramatic vignettes (in video or text) inserted to add interest, background music to add appeal, or popular movie characters or themes to add entertainment value.

The Personalization Principle

The personalization principle: Use conversational tone and pedagogical agents to increase learning. The Media equation showed that people responded to computers following social conventions that apply when responding to other people. For example, it was found that when evaluating a computer program on the same computer that presented the program, the ratings were higher than if the evaluation was made on a different computer. People were unconsciously avoiding giving negative evaluations directly to the source (Ruth, 2002).

PEDAGOGICAL DESIGNS FOR OPTIMIZING E-LEARNING PARADIGMS

Pedagogy is any conscious activity by one person designed to enhance learning in another. It's the art and science of teaching...or more specifically, the strategies and tactics that teachers use, and the philosophies and educational theories that underpin them, to achieve learning outcomes and enhance the learning and teaching experience. It is widely acknowledged that the role and influence of media (that is, information and communications technology) on learning and teaching is optimized especially when it is skillfully integrated into the educational experience. This concept of "learning by doing" is at the heart of pedagogical designs that stand to optimize e-learning. These pedagogical designs include "scenario based learning", "goal-based learning", "problem based learning", "case-based learning", "learning by designing", and "role-play-based learning". These pedagogical designs are grounded in the principles of constructivism and situated cognition, and in the belief that learning is most efficient and effective when it is contextualized and when it is based on real world or similarly authentic settings.

Scenario-Based Learning

Scenario-based learning is a pedagogical design where one or more learning scenarios serve to anchor and contextualize all learning and teaching. The scenarios in these educational settings are usually drawn from real life situations. For the teacher and the tutor this scenario provides a meaningful context which can be used to explain abstract concepts, principles and procedures a lot more easily. For the learner, it serves to make learning relevant, meaningful and useful. Typically a good learning scenario will reflect a common occurrence from the relevant field .It may be a case, problem or incident that

is commonly encountered in the workplace. Using such cases, problems or incidences from the workplace in the education of learners serves to more adequately prepare them for the workforce as opposed to focusing their attention on the mastery of the subject matter content. The use of such scenarios is particularly relevant and meaningful in professional education (Naidu et al., 2005).

Problem-Based Learning

In problem-based learning, a problem situation serves as the context and anchor for all learning and teaching activities. Problem-based learning begins with the presentation of a problem to students, which can be in the form of short video clip, a picture with text, or just text. Upon encountering this problem situation, students are expected to analyze it and decide what needs to be done next. A critical feature of problem-based learning is small group problem-solving and inquiry. Students work in small groups to analyze the presenting problem, make decisions on what needs to be done next, and act upon them to resolve the problem situation satisfactorily. In so doing they will have been expected to achieve the intended learning outcomes. While problem-solving is implicit in problem-based learning, learners are not told explicitly what their role in the problem is, or what they are supposed to do as they seek to analyze the presenting problem.

Goal-Based Learning

In goal-based learning, they are told very specifically what is their role in the scenario and what they are supposed to do in order to resolve the problem satisfactorily. How they go about analyzing the problem to achieve a satisfactory solution to the problem is left to their imagination and creativity. Both, problem-based and goal-based learning designs have been widely used in the study of medical, education and environmental sciences.

Case-Based Learning

In case-based learning, a case serves to provide the context and anchor for all learning and teaching activities. Cases have been very widely used in the study and teaching of Law, Business, Accounting and Economics. In these instances, students are required to use the case to explore issues, concepts and problems that they are likely to encounter. Cases that stand to optimize learning and teaching opportunities are those that have the richness, complexity and variety that are embedded in real life situations and encounters. It is therefore most important that the cases that are selected for study and teaching are carefully selected to match the intended learning outcomes for the subject, Carrol and Rosson (2005).

Learning by Designing

In learning by designing, the design task affords the essential anchor and scaffold for all learning and teaching activities. In this learning design students are required to engage in a learning activity which comprises conceptualizing and building something. This is a common learning and teaching activity in the study of architecture, and engineering sciences. As in goal-based learning, in the case of learning by designing, the goal is made very clear to the students. How the students chose to pursue that goal and achieve the targeted learning outcomes is left to their imagination and creativity.

Role-play-Based Learning

In role-play-based learning, the role-play provides the anchor and scaffold for all learning and teaching activities. Role-play is widely used as a valuable learning and teaching strategy in social sciences and humanities subjects where very complex processes are prevalent. This learning design comprises the playing out of identified roles by learners which is followed with reflection upon the activity and its analysis in order to focus attention on the expected learning outcomes for the study.

MANAGEMENT AND IMPLEMENTATION OF E-LEARNING PARADIGMS

E-learning, like any organized educational activity is a very complex undertaking. Many organizations seeking to engage in e-learning activities quite often overlook the fact that its successful deployment requires the same level of diligence and rigor in its planning, management and implementation that is necessary in setting up conventional education systems. In fact, e-learning has added elements such as the technology infrastructure that require attention far beyond that is necessary in conventional educational settings. Furthermore, e-learning is neither a cheap nor an easy educational option. It does not offer a quick fix for problems associated with dwindling enrollments, distance education, or poor teaching and learning. Lack of careful planning and implementation of e-learning can actually lead to decreasing standards and morale, poor performance in learning and teaching, and wasted

resources and loss of revenue. This section explores the preconditions for e-learning activities; examine the administrative and implementation requirements of e-learning activities.

Preconditions of E-Learning

Any efforts to embark on e-learning must be preceded by very careful planning. This would necessarily comprise, strategic and operational planning that are consistent with the values, mission and goals of an organization. Educational organizations that have a history of employing alternative approaches to learning and teaching such as distance education will have many of the prerequisites and dispositions for e-learning already in place which they can easily capitalize and build upon. However, conventional campus-based educational organizations that have traditionally relied on residential face-to-face classroom-based learning and teaching activity would need to reconsider their values, mission and goals of educational provision in order to adequately accommodate the adoption of e-learning activities. A critical component of this orienting or reorienting for the successful adoption of e-learning is institutional sponsorship. For e-learning to succeed in any setting, there has to be complete support for the initiative from the highest levels. This is important not only because it will have implications for funding allocation for any such new initiative, but also because of its implications for the mindset of the rest of the organization.

Administrative Requirements of E-learning

Like any organized educational activity, e-learning needs to be very systemically (that is, from a systems level) managed. Foremost this will include attention to the technology and the infrastructure that is necessary to support it. It will include different approaches to course design and development and strategies for generating and managing subject matter content from that which is suitable in conventional educational settings.

The Technology

While this is crucial to the success of any e-learning activity, technology is not the driver of the initiative. It is there to serve an educational function and such; it is a tool for learning and teaching. However, it has to be robust, reliable and affordable. It is critical to ensure that this is so, just as it is important to ensure that in a classroom-based educational setting, the classroom is available and it is comfortable, and it has the necessary equipment such as tables and chairs and other tools for teaching and learning to take place. Most teachers and students in such educational settings would take these facilities for granted and they will be unaware of what goes on behind the scenes to ensure that the classroom setting works in the way in which it is expected to work. Staff and students alike would be very agitated if the computer, the projector, or the lights in the classroom did not work, as that would be very disruptive to their learning and teaching activities. In the same way e-learning technology needs to work just as transparently and fluidly to allow teachers and students to concentrate on learning and teaching and not be distracted by the technology. If teachers and students have to be taught to operate this technology, then there should be processes and programs in place for this training to occur, routinely (Kwan et al., 2008).

Course Design and Development

Like any other organized educational activity, e-learning, is a team effort, as a number of people and a range of expertise need to be brought together to make e-learning work. In conventional educational systems, course design and development is the sole responsibility of the subject matter expert who is also the teacher. E-learning will require the delivery of that subject matter content in alternative forms such as online or on a CD-ROM. Some teachers are able to produce their content themselves. However, this might not be the best use of their time and expertise in most educational settings. A more efficient and effective model of course development is the team approach, which brings together people with subject matter knowledge and expertise in the development of technology enhanced learning materials. However, the establishment and nurturing of such a team process is not to be taken lightly as it has implications on where the boundaries lie for various types of expertise and on the costs of supporting it across a large organization.

Subject Matter Content Management

In conventional educational settings, the generation and presentation of the subject matter content is the sole responsibility of the teacher. In e-learning, while the teacher may still be generating this content, for it to be made accessible to the learners, it needs to be modified, enhanced and presented in a form that is amenable to the technology that is in use. Content once generated will need to be updated in order to retain its currency and relevance. For this to happen, academic staff and other content developers will need expert assistance with

learning and instructional design activities. They will need to be supported in the design and development of such self-study materials in alternative media forms. Permissions will be required in the form of copyright clearance to publish some of this material in such form. In large educational settings, this will create a substantial amount of work, which will require enough trained staff and appropriate procedures and processes (Naidu, 1987, 1988).

Implementation Requirements of E-learning Paradigms

E-learning, with its use of information and communications technology, enables the presentation of subject matter content in alternative forms, as such freeing up lecture time which can now be more usefully devoted to the facilitation and support of learning activity. However, e-learning in itself does not guarantee efficient or effective learning and teaching. For it to be efficient and effective, a great deal of care and attention needs to go into its implementation. This comprises attention to the recruitment and registration of students, facilitating and supporting learning, assessing learning outcomes, providing feedback to learners, evaluating the impacts of e-learning on the organization, and a host of other issues related to these functions (Naidu, 2003).

Student Registration

Most educational and training organizations have rigorous systems and processes in place to manage student registrations and their graduation. Those who choose to adopt on-line learning would want to also ensure that they are able to recruit, registrar and manage their students online in the fashion of e-commerce and e-business. Doing so would be consistent with an ethos and philosophy of making one's registration processes accessible online. This would require administrative systems to be in place and that the staff members are appropriately trained.

Learner Support

In the context of e-learning, learner support takes on an added importance, as learners become separated in time and place from the teacher and the educational organization. This does not mean that necessarily more learner support is required. What changes is how learner support is provided, where and when and how often it is provided and who provides it. An online learning course may not be supported and facilitated by those who developed these courses.

Assessment of Learning and the Provision of Feedback

While in e-learning, the fundamental and guiding principles of assessment of learning outcomes and providing feedback on learning remains the same as that for any other educational setting, what changes is how some of the learning outcomes can and might be assessed and also how feedback may be provided. Most educational settings must also deal equitably and fairly with unfair practices such as plagiarism and authenticity of student work. E-learning because of the flexibility it affords in terms of time and space independence are more prone to unfair learning and assessment practices. Opportunities for these occurrences need to be properly managed.

Evaluation of the Impacts of e-learning

It is crucial to have processes in place for knowing how you are doing with what you have initiated. This will include how your staff and students are engaging in e-learning. Without this kind of evidence, you are in no position to know how you might be traveling and what changes and/or improvements are necessary. Evaluation of impacts is often neglected or inefficiently carried out in most educational settings. Evaluation of the impacts of your processes should be closely integrated into the planning and implementation of any e-learning activity (Naidu, 2005).

Evaluation Methodologies in E-learning

The term "evaluation" is being used here to refer to the systematic acquisition of feedback on the use, worth and impact of some activity, program or process in relation to its intended outcomes. One should aim to gather data from all stakeholders (that is, students and staff) regularly using a set of evaluation instruments within a consistent evaluation framework which should include front-end analysis, formative, summative and integrative evaluation. One should also aim to collect a variety of data using a range of data gathering instruments. However, data gathering process should be kept as simple and as less intrusive as possible.

Front-end Analysis

Front-end analysis comprises a set of ways by which you would plan to ascertain the readiness of students and

staff and their preferences in relation to teaching and learning online. Carrying out such surveys periodically and especially prior to the full roll-out of e-learning will enable the organization to get a better handle on how to align its services to meet the needs of prospective users. The information gathered will help to inform the organization on the nature of its user needs, their perceptions and expectations, and any gaps in the provision of existing support.

Formative Evaluation

Formative evaluation would involve gathering feedback from users and other relevant groups
during the implementation process. Its purpose would be to identify problems so that improvements and adjustments can be made during the implementation stages of e-learning in your organization. You may wish to plan to carry out formative evaluations routinely and regularly. It would be best that these evaluations use a consistent set of tools comprising surveys, and focus group interviews with users.

Summative Evaluation

Summative evaluation ascertains the full impacts and outcomes of e-learning on teaching and
learning at your organization. You would usually carry this out upon the completion of an e-learning program, even though there is not likely to be a crisp dividing line between formative and summative evaluation phases. As part of this process, your aim is to periodically assess the sum impacts of e-learning on teaching and learning activities in your organization. Data gathered should reveal how e-learning is responding to challenges facing teaching and learning in your organization, and the extent to which you are achieving benchmarks and milestones which you have set.

Monitoring or Integrative Evaluation

Monitoring or integrative evaluation will comprise attempts to ascertain the extent to which the use of e-learning or online learning is integrated into regular teaching and learning activities at your organization. Data gathered as part of this process will reveal the extent to which, and how teaching and learning activities in the organization have been impacted with e-learning (Naidu, 2006).

Conclusion

The main objective of e-learning systems is to make information accessible to any type of user. E-learning systems consist of complex activities which include e-learning architecture, computing based e-learning paradigms, different technological platforms of disseminating e-learning, etc. This reflected in e-learning systems which are being designed based on client/server, peer to peer; and recently Web Services architectures together with the mobile learning which is commonly use nowadays and cloud technology system. However, the recently designed e-learning paradigm, blended learning, was briefly discussed and its relationship with other e-learning paradigms was given. While the optimization of learning paradigms using pedagogical designs which include scenario-based, problem-based, case-based, etc were highlighted and discussed. The management of e-learning which include the administration requirements, implementation requirements and evaluation of learning paradigms were exploited.

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