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COMPARATIVE ANALYSIS OF E- LEARNING MODELS TO INVESTIGATE THE VALUES OF MODELS FOR SPECIFIED LEARNING MANAGEMENT SYSTEM

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ABSTRACT

The paper is a comparative analysis of some basic models of E-learning process and to investigate values of these models for specified E-learning. These models have been digested, which are used by different researchers for educational technology. These models play very important role for e-learning process development and enhancement. Three models have been reviewed from various researches, compared and an analysis of a suitable framework for the design prototype will be tabulated and discussed based on their material, instructional and technological needs and also assess their strength, weakness and suitability during an E-learning design process. The models compared are Funnel Model (FM), ADDIE and Life Cycle Model (LCM) for E-learning. The analysis shows that FM seems to be the most expensive, LCM on the other hand is time consuming as such, ADDIE model has little shortcoming due to its prototyping approach, it consumes time also. Although, ADDIE is much faster than LCM. On the other, taking into account their effectiveness, all the models compared are suitable based on the situation and required E-learning System target and approach to learning process. FM provides detailed report and takes into account completion of each stage before advancing to next stage, ADDIE promotes flexible and simple build and fix approach before problems escalates. As such, LCM makes sure each stage is reviewed and finally evaluation takes place. In a situation where effective evaluation is needed and time is not of essence, LCM can be adopted. Conclusively, several E-learning models are in existence and their approaches and activities can furthermore be assessed and compared. Moreover, a hybrid type of model can also be applied there by taking into consideration the effective review and evaluation approach of LCM is coupled with the swift, robust and easy going approach of ADDIE model for a successful E-learning design and implementation.

Introduction

E-Learning is a broad term that encompasses many teaching approaches, types of technologies and administrative practices. The term has become a new paradigm and a new philosophy in library services as well as educational sector with a mission to serve as a development platform for present-day society based on knowledge. Consequently, advances in ICT have really revolutionised the way we teach and how we learn in many ways; for instance, increasing access to post-secondary instruction, improving the availability of educational resources, and facilitating meaningful interaction among learners. Harnessing the power of ICT has become a critical strategy among institutions eager to offer an affordable, efficient, and flexible learning environment for rapidly growing and diverse communities of learners. Many scholars have viewed distance and online education as alternative, sometimes inferior, education for individuals with limited access to traditional higher education institutions (HEIs) or those not committed to deep learning.

Today, technology enhanced learning, including distance and online instruction, is recognised as a viable tool necessary for preparing citizens to participate in the technologically driven global environment. A multidisciplinary approach to online pedagogical research recognizes the value of technology enhanced teaching and learning as critical in the mix of diverse strategies.

E- learning can be viewed as computer assisted learning, and as pedagogy for student-centred and collaborative learning. Early developments in e-learning focused on computer assisted learning, where part or all of the learning content is delivered digitally. More recently the pedagogical dimension of e-learning has become prominent. E-learning comprises all forms of electronically supported learning and teaching. The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process. Horton (2005) defined E-learning as the use of internet and digital technologies to create experiences that educate our fellow human beings. E-learning has the potential to revolutionised the way we teach and how we learn (DfES, 2003).

Types of E- Learning

1.   Synchronous

This type of e-learning activity takes place in a synchronised manner where by the learner and the instructor communicated and conduct there learning activity through the internet in real time. It is a form of a virtual class room which depicts a real life class room online over the web. It constitutes modes like instant messaging which includes chatting, audio conversations and video conferencing. It also provides access to session recordings for review and further study. Synchronised e-learning has the following key features:

➢   Learning session can be tracked and recorded.
➢   Session or instructional and learning materials can be altered and edited for successful learning outcome.
➢   It creates a worldwide collection and alliance among learner for conferences and seminars.
➢   Learning activity can be personalised for individual learners.

2.   Asynchronous

This type of e-learning activity takes place in a manner where by the learner and the instructor communicated and conduct there learning activity at learners' expense. It is a web based training that allows user to take part in learning process without an instructor in place. There is no live interaction between the learner and instructor. Instructional materials can be accessed anytime anywhere. This approach provides information availability anytime anywhere. Leaners can interact via forums and message/ bulletin boards. Asynchronous e-learning includes Computer Based Training (CBTs), Instructional materials on CD-ROM's, Web based training accessed through intranet (WBTs), articles and journals. Asynchronous e-learning has the following key features

➢   Availability of Instructional materials anytime anywhere.
➢   Flexible learning.
➢   It can reach wide audience.

> ➤   Consistency of content and swift payment.

Related Literature

E-learning is the application of information technology in the teaching and learning process. Educational technology is the effective use of technological tools in learning. Educational technology is not restricted to high technology. Nonetheless, electronic educational technology, also called e-learning, has become an important part of society today. E-learning comprises an extensive use of digitization approaches, components and delivery methods. For example, m-learning emphasizes mobility, but is otherwise indistinguishable in principle from educational technology (Alexander, 2001.).

However, educational technology includes numerous types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning. Information and communication systems, whether free-standing or based on either local networks or the Internet in networked learning, underlie many e-learning processes.

E-learning has become one of popular tools in learning activities today. Many organizations have adopted e-learning because they believe e-learning has an ability to deliver information and knowledge more effectively and efficiently (Pituch and Lee, 2006). E-learning gives freedom to the participants to decide when and where they would like to conduct their learning activities. By providing 24 hour/day or full access services, E-learning is the most flexible tool to deliver course activities (Garrison, 2011). Nowadays, many higher institutions around the world have adopted e-learning. Some institutions have successfully adopted the e-learning systems however some others have failed. The previous studies in E-learning success implementation can identify the factors affecting the successful of this implementation (Govindasamy, 2001). In e-learning environments, instructional design has evolved from one instructional design for many learners to one design for each learner or many designs for each learner (Chorfi and Jemni, 2003). It is a fact that learners have varying characteristics and skills that affect the way they learn best. Different E- Learning models are implemented on the basis of different purposes. Wide range of e-learning theories and models are evolving day to day according to the domain of e-learning and learning environment. As such, models of E-learning describe where technology plays a specific role in supporting learning. These can be described both at the level of pedagogical principles and at the level of detailed practice in implementing those principles. Models of E-learning describe where technology plays a specific role in supporting learning. These can be described both at the level of pedagogical principles and at the level of detailed practice in implementing those principles. Thus the models can be used to evolve new methods and to study enhanced learning through this methods (Suryawanshi and Suryawanshi, 2015).

E-Learning has become a crucial component of teaching in higher institutions. There are some theories such as reasoned action (TRAs) and planned behaviour that have been used as structures for studying the motivational and contextual elements that impact partaking in instruction activities (N. Garavan. et al. 2010). E-learning has become a common style of providing educational materials in higher education by tertiary institutes in every part of the world. Because of these changes there is an increasing need for flexible deliverance of education. Distant learning takes an imperative part in this. Even though distant learning had been common long before the introduction of the internet, technological development has enabled ICT to become a more main device for other forms of learning. In education, the web (World-Wide-Web) has usually been used as a source of information or even as a learning device (Mahieu & Wolming, 2013). All these models or methods hold that it is crucial to produce the learner's motivation. For this reason, numerous of the computer-based learning environments constructed present realistic problems.

As an outcome of this, many higher institutions of learning have used e-learning in a main way. For this reason, the necessity for academic and technical knowledge to teach utilizing the Internet has been appeared, and this knowledge is becoming core proficiency for many professors. Some scholars have predicted that the traditional classroom will vanish. E-learning has entered the instruction as well as the corporate world in a main way and it also completes the traditional delivery styles. It has enabled the traditional educational patterns like distance learning (Harandi, 2015).

Traditionally e-learning in the higher education model, i.e. at higher institutions, has been engaged to the rise in perceptibility of tertiary institutions, elasticity of educational propositions, and as learning "virtualization". Furthermore, e-learning is a crucial device that professors can use to enhance students' motivation and education

(Harandi, 2015). As such, students are more likely to be more motivated when applying e-learning. If students are more motivated to learn, then they are more likely to be engaged; and if they are engaged and engaged successfully, they are more likely to achieve the learning objectives (Kim & W. Frick, 2011). So, it would definitely be fascinating to utilize e-learning as a standard device in the instruction of students. Applying e-learning as a tool in education needs some attention, (Harandi, 2015) states that the following points should be cautiously regarded before utilizing the e-learning in teaching: - "Content of course - the appropriateness of learning by using e-learning and educational effectiveness; - Assumptions of educational institutions - ICT facilities, personnel ensure; - Assumptions of students - the ICT literacy, access to ICT.

Conclusively, the notion of E-learning is attaining great popularity nowadays, as many higher institutions are offering degree and diploma courses through E-learning approach. (Goyal, 2012) alleged that many big corporations are spending in Elearning and setting up their interactive classrooms like Reliance and Tata in India. Also, as the number of trees is becoming less and less by each passing day due to cutting of trees for manufacturing paper, pencil and rubber; though banned by most governments in their respective countries, is making way for E-Learning. E-learning will overcome these drawbacks, if instead of heavy school bags, each learner is given a tablet with the course content fed in it, which would be much more attractive, enjoyable and thoughtful decision to take in the present era of modernization. Thus, the day is not far away when E-learning will become the future popular method of education throughout the world.

E- Learning Models

In 2003, 62% percent of all learning technology initiatives fail to meet expectations. Discouraging figures like that should prompt E-learning leaders to concern themselves with measure to ensure a successful E-learning program. Scholars reviewed that; it is important to be clear about the assumptions underlying E- learning designs. They iterated that there are no specific models of E-learning but only enhancements of existing models of learning which uses technology to achieve better learning outcomes (Suryawanshi and Suryawanshi, 2015).

E- learning models began as a mere replication of normal class room instruction, but have evolved to those that integrate technology and pedagogy. As such, early models such as the Demand- Driven model (DDM) focusses on role of technology in providing electronic, content and access services. Its emphasis is on demands for content, service and delivery. Other new models strongly emphasise on instructional design of E- learning instruction, they include Gagne's Nine Events (GNE), the strategic E-learning models (Funnel Model (FM)), the traditional ADDIE model, Instructional System design models (ISD), Rapid Prototyping Model (RPM), ARCS Motivation model (ARCS-M), Life Cycle Model (LCM) and Community of Inquiry model (CI). Most of the aforementioned models emphasises on similar instructional process (Suryawanshi and Suryawanshi, 2015). Moreover, the only model that emphasises on different instructional process is the Community of Inquiry model which focuses on interactions in learning (learner to instructor, learner to learner, learner to content, learner to context) developed by Garrison and Anderson.

The potential of e-learning to significantly affect education in developing countries is thus significant. Identifying the actual impact that e-learning programs have had on students, schools and their countries is, however, difficult. Because of the newness and diversity of the programs and the complexity of factors affecting outcome, measuring e-learning's impact is an emerging science. Nevertheless, some direct and indirect outcomes can be discerned.

a)   Their effectiveness is closely related to how the technology is used as an educational tool. Students learn best with e-learning when interactively engaged in the content. Using technology can motivate students, particularly under- achieving students, to learn.

b)   Teachers report that tutorials in subjects such as math and science significantly improve student performance. Word processing software improves writing skills.

c)   Providing technology on its own has little impact on achievement. Substantial effort must be put into infrastructure, teacher training, curriculum development, assessment reform, and formative evaluation.

Prior to Suryawanshi's statement, it is expected that the most direct impact of e-learning would be on the learning achievement of students. The results of large, cross-national studies show that the effects on learning are complex and closely related to how the technology is used as an educational tool, and other factors. Putting

technology into a school is not the simple solution to improving learning. As such, E- learning plays a vital role in boosting the education system in the third world countries and its awareness and implementation is of vast and utmost importance. The proposed client / institution/ department needs to be oriented and be aware of the essence and need for the advanced system of learning using the E- learning technology. Also, there are different models for the E- Learning system and each diversity have its own suitable and most anticipated E- Learning System model. Suryawanshi and Suryawanshi (2015) suggested various models for E -learning, as such, the models to be compared in this paper constitute:

1. Funnel Model
2. E-learning Life Cycle Model
3. Addie Model

Funnel Model (FM) [11] (Mohamed Jama Madar, Dr. Oso Willis, 2014)

FM as a solution for the problems of implementation of E-learning in tertiary education institutions. While existing models such as theory-based E-learning and pedagogical model have been used over time, they generally been found to be inadequate because of their tendencies to treat materials development, instructional design, technology, delivery and governance as separate and isolated entities. The FM enhances all these into one and applies synchronously and asynchronously to E-learning implementation where the difference only is modalities. Such a model for E-learning implementation has been lacking. The FM avoids ad-ad-hoc approach which has been made other systems unused or inefficient, and compromised educational quality. FM should help tertiary education institutions adopt and develop effective and efficient E-learning system which meets user's successful implementation of E-learning can only be achieved by joining three interrelated components as proposed in the final model. Funnel-shaped E-learning implementation model, displays the interaction between these three components. This component is a central axis of this model because of high cost of technology investment and other resources required to develop a fully-fledged E-learning system. The elements of the FM are depicted in following:
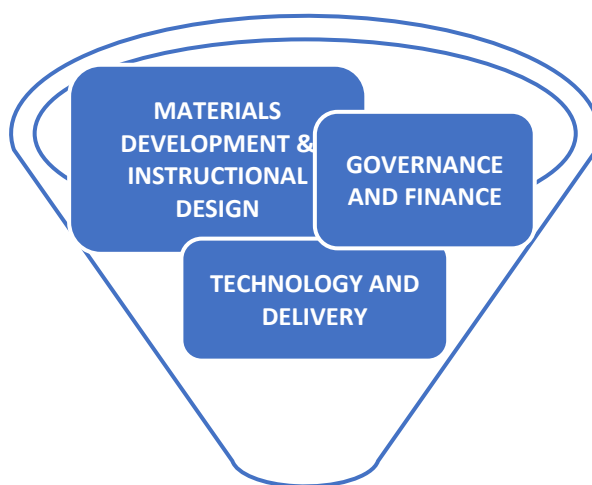

Fig 1: Funnel Model of E-learning

The FM is designed to solve the mismatches between curriculum design of E-learning and its delivery. The other preceding models have either focused only usability, or on pedagogy or on technology. In fact, the TAM and Theory-Based Models do not have governance and finance, and materials development and instructional design, which are key in any educational endeavor. FM takes curriculum or materials development together with

beneficiaries' analysis when implementing E-learning. This is followed by instructional design, which is a pedagogical model. The FM requires that teaching and learning materials be put in place and delivery mode designed. Secondly, technological design can be either synchronous or asynchronous since technology is only a tool to convey content to learners. The FM pays attention to usability and availability of technology to ensure that technology matches instructional design of the teaching materials. The FM also incorporates administration, which encompasses governance and finance, being aware that sustainability of any system depends on its management.

E- Learning Life Cycle Model (LCM)

This model proposes the whole life-cycle of e-learning. One aim is to identify the critical points for evaluation of e-learning. There are two weaknesses with the majority of the existing e-learning evaluation models: Firstly that is existing model of e-learning do not describe the whole life cycle, they mostly start from the point at which course development against institutional or departmental strategic goals and even some are not include planning and resource allocation. Also, existing models do not cover course review and the consequences of that. Secondly these models rarely designed to highlight the critical points for effective evaluation. Not deals with necessary analysis feedback and control aspects of the evaluation process. Existing models are not conditioned by inputs as well as not restricted by outputs.
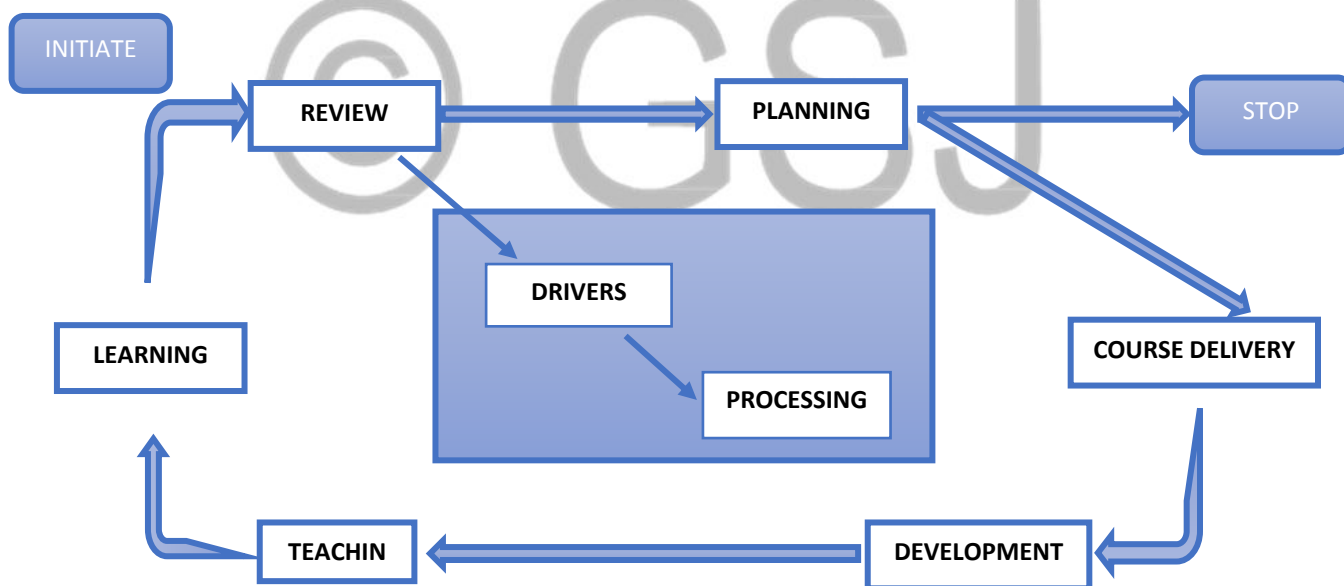

Fig. 2: E- learning LCM

For each of these phases the most important external drivers and controls and the critical processes are shown. The drivers and controls are those forces which place parameters and restrictions on what can be done. They should not be considered immovable however they are unlikely to be significantly changeable in the short term. Clearly, feedback from all stages of the planning, development, delivery and review should be one of the influences on both the internal and external drivers, but the life-cycle for these is generally much longer than for the development of courses.

With basic question in mind the how evaluation can be used to support quality enhancement, and so the model of e-learning has been developed with this function in mind. In order to support evaluation, we need a process

model, by which we mean a model that focuses on the processes that are involved in the creation and delivery of e-learning, rather than focusing on people, activities or roles. There is a need for an explicit model of the full e-learning life-cycle, since without this it is not possible to determine the most effective points at which to evaluate, nor what those evaluations should be aiming to achieve. Most evaluations cover only a small part of the life-cycle, and there has been little theoretical justification given for the points selected. Indeed, the vast majority have focused on whether e-learning is as effective (or more or less effective) as traditional learning and in this context these can be considered largely as irrelevant.

ADDIE model (Analysis, Design, Development, Implementation, and Evaluation)

The ADDIE model is the generic process traditionally used by instructional designers and training developers. The five phases—Analysis, Design, Development, Implementation, and Evaluation—represent a dynamic, flexible guideline for building effective training and performance support tools. While perhaps the most common design model, there are a number of weaknesses to the ADDIE model which have led to a number of spinoffs or variations. It is an Instructional Systems Design (ISD) model. Most of the current instructional design models are spinoffs or variations of the ADDIE model; other models include the Dick & Carey and Kemp ISD models. One commonly accepted improvement to this model is the use of rapid prototyping. This is the idea of receiving continual or formative feedback while instructional materials are being created. This model attempts to save time and money by catching problems while they are still easy to fix. Instructional theories also play an important role in the design of instructional materials. Theories such as behaviorism, constructivism, social learning and cognitivism help shape and define the outcome of instructional materials. In the ADDIE model, each step has an outcome that feeds into the subsequent step. Analysis > Design > Development > Implementation > Evaluation
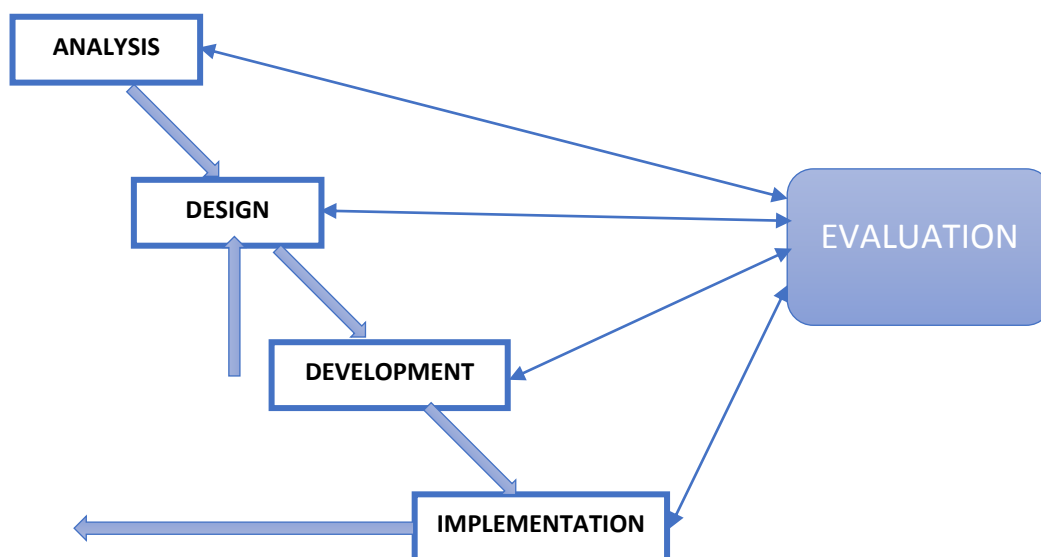
Fig. 3: ADDIE (Analysis > Design > Development > Implementation > Evaluation)

Comparative Analysis of E-Learning Models

The values of these models has been assessed based on their strength and weaknesses followed by three common factors which constitutes key aspects of teaching and learning process. The assessments are described in the table below:

MODELS	MATERIAL DEVELOPMENT	INSTRUCTION DESIGN	TECHNOLOGY	STRENGTH	WEAKNESS
FUNNEL MODEL (FM)	Vividly Combines material development and other activities in a detailed manner	Ensures that technology matches instructional design of the teaching materials	Pays attention to usability and availability of technology	Uses Synchronous and Asynchronous E-learning. The model is flexible, adaptable, and applicable to all institutions and to all concepts because it is requirement driven.	High cost of technology investment and other resources required to develop a fully-fledged E-learning system
ADDIE MODEL (It is an Instructional Systems Design (ISD) model)	Theories such as behaviorism, constructivism, social learning and cognitivism help shape and define the outcome of instructional materials.	Apply instructional strategies according to the intended behavioral outcomes by domain (cognitive, affective, psychomotor).	Represent a dynamic, flexible guideline for building effective training and performance support tools.	This model attempts to save time and money by catching problems while they are still easy to fix. Each step has an outcome that feeds into the subsequent step.	Time consuming due to its prototyping approach and also detailed documentation of activities in each development stage
LIFE-CYCLE MODEL One aim is to identify the critical points for evaluation of e-learning.	Course development goes in line with departmental strategic goals including planning and resource allocation	Considers course review as an integral part of instruction design process.	Emphasis on technology is highly considered critically.	Describes the whole life cycle process. Deals with course review and highlights the critical points for effective evaluation.	Life cycle of course development takes too much time. Also, it does not follow the approach of ADDIE where each stage is evaluated before moving on.

Fig 4: Comparative analysis of E-learning Models

Prior to the analysis given to compare the models. They pose a great idea about what e-learning design and development is and different strategies adopted for a successful design and implementation of E-learning in education and easy adoption for a suitable teaching and learning process.

FM follows the strategy and techniques adopted in waterfall process models for software engineering cooling it detailed and constructive approach to design. As such, FM inherits the detailed and comprehensive approach of waterfall in material development, instruction design and it takes into account technologies needed and its prompt availability before and during the learning design process. One key issue of adopting FM is capital and resource due to its comprehensive approach and nature, to yield greater and effective E-learning activity, supporting tools and technologies needed are quite expensive, voluminous and huge investment in it is a priority in other to achieve the specified goal.

ADDIE model on the other hand focuses its strength on the three learning domains. Its dynamism and flexibility makes it suitable and effective for training and enhancing performance using specified tools there by targeting the learning domains to achieved the desired outcome. As such, different learning theories and instructional design strategies are also looked upon to enhance the development of instructional materials for effectiveness of the E-learning system. Unlike FM, ADDIE tends to be easy going with robust mitigation of problems before it turns out to be out of hand, the approach is swift and kept simple. These makes ADDIE one of the fastest, cheapest and easy to apply model of E-learning. Conclusively, these model showers flexibility, simplicity and easy report generation for upcoming stages of E-learning planning and development. Notwithstanding, these approach has its weakness, even though it saves mitigation time it prototyping approach is time consuming and not suitable for systems that does not involve the user.

Finally, LCM on the other hand is also an evaluation and review oriented approach to E-learning development, that is the sole aim. This approach demands constructive evaluation of course materials during development there by setting individual or department strategy towards achieving the specified goal. During instruction design process, each individual strategy adopted for design process needs to be reviewed before advancing. Also, there is high emphasis on technology which will aid in effective review and evaluation process. The reviewing process help in providing a swift and robust benchmark for effective evaluation there by describing the whole life cycle process. Unlike ADDIE, these model conducts it evaluation process after completing the whole life cycle stages and review process which makes it more time consuming than ADDIE and FM.

Conclusion

This paper compares the values of some key E-learning models by assessing their approaches, activities and strengths towards the design of an effective E-learning development and implementation. It focused mainly on material development, instruction design and technology, as such stressing out their strengths and weakness and suitability based on different scenarios and learning problem. Host of model for E-learning has emerged just like software process models. They are lookalikes, some have same target, same procedure but are differentiated by approaches and hos they tackle problems during design process and also the target outcome by each learning model. They are also distinguished by initiators of those models. However, this paper placed its focus on three key models which are Funnel, ADDIE and LCMs for E-learning. Conclusively, the analysis shows that FMs seems to be the most expensive, LCM on the other hand is time consuming whereas ADDIE model has little disadvantage due to it prototyping approach it is the same with LCM due to their time consuming approach but ADDIE is much faster than LCM. On the other, taking into account their effectiveness, all the models compared are suitable based on the situation and required E-learning System target and approach to learning process. FM provides detailed report and takes into account completion of each stage before advancing to next stage, ADDIE promotes flexible and simple build and fix approach before problems escalates. As such, LCM makes sure each stage is reviewed and finally evaluation takes place. Moreover, they all have their drawbacks, prior to these all the three models can be used for design and development of an effective E-learning system, as such if capital is not an issue, FMs will be more suitable. If capital is an issue, ADDIE model would be effective and also if time is a factor. In a situation where effective evaluation is needed and time is not of essence, LCM can be adopted.

To conclude, several E-learning models are in existence and their approaches and activities can furthermore be assessed and compared. Moreover, a hybrid type of model can also be applied there by taking into consideration the effective review and evaluation approach of LCM is coupled with the swift, robust and easy going approach of ADDIE model for a successful E-learning design and implementation.

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