ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2022; 8(6): 350-356
www.allresearchjournal.com
Received: 18-03-2022
Accepted: 03-05-2022

Sherimon PC
Faculty of Computer Studies, Arab Open University Muscat, Sultanate of Oman

Neena Uthaman
Faculty of Computer Studies, Arab Open University Muscat, Sultanate of Oman

Vinu Sherimon
Department of IT, University of Technology and Applied Sciences, Muscat, Sultanate of Oman

Walid Aboraya
Faculty of Education Studies, Arab Open University, Muscat, Sultanate of Oman

Corresponding Author:
Sherimon PC
Faculty of Computer Studies, Arab Open University Muscat, Sultanate of Oman

Instructional design of e-content in massive open online course platforms for higher education: An overview

Sherimon PC, Neena Uthaman, Vinu Sherimon and Walid Aboraya

DOI: https://doi.org/10.22271/allresearch.2022.v8.i6e.9894

Abstract
In the technologically advanced digital era, Massive Open Online Course (MOOC) platforms provide huge opportunity to the interested learners for continuous learning and enables to achieve their goals. The Information and Communication Technology (ICT) based MOOC platforms play a vital role in enhancing the knowledge and skills of the people by giving access to higher quality courses. These platforms are convenient for the people who are capable of self-learning irrespective of their geographical locations. Hence, it is the time for the higher education authorities across the globe to design more MOOC platforms with suitable Electronic-content (E-content), so that the learners can upscale their skills. The E-learning designers use Instructional Design (ID) models to create E-content in the MOOC platforms. This paper emphasis on the development of the instructional design of digital content included in the MOOC platforms. Also, this paper discuses five popular and widely accepted ID models - "Gagne's Nine Events of Instruction model", "Analysis, Design, Develop, Implement, and Evaluate (ADDIE) model", "Dick and Carey model", "Bloom's Taxonomy Revised model", "Merrill's Principles of Instruction (MPI) model" - used by the E-learning designers for creating effective E-content.

Keywords: Instructional design models, E-content, Digital learning, MOOCs, Higher Education

Introduction
In the present scenario technology has the potential to provide solution to many of the challenges in education. It increases the flexibility in imparting education so that learners can access knowledge at any time and where ever they may be. The highspeed Internet connectivity along with gadgets like Smartphones and Personal Computers as well as applications and softwares like Facebook, WhatsApp, Blackboard, Canvas, etc. influenced the learning style of the students. The various information sources, such as Wikipedia, YouTube, etc. have found a place within modern higher education, but there are some uncertainties regarding the quality of the content in these sources, i.e., whether it is reliable or not. Also, not all students are able to afford the facilities like high-speed internet connectivity, gadgets, etc. The quality and equity are two facets of education and hence, it is very important to ensure that every student has equal chance for quality education. The Sustainable Development Goal (SDG) of United Nations Educational, Scientific and Cultural Organization (UNESCO) aims to achieve worldwide education by 2030. Around 263 million children are needed to be educated by 2030 and 69 million teachers are required to fulfil this goal. Digital technology offering online education has the potential to reach every child, efficiently that no other technology can accomplish. Digital technologies allow easy adaptability, interactivity, networking and user control that a good educational learning experience demands. To ensure the effective usage of technologies in digital learning, the International Society for Technology in Education (ISTE) provides various standards for students, educators, education leaders, coaches [1]. It includes parameters regarding effective communication and collaboration, critical thinking, problem solving and decision making, research, digital citizenship, etc.
Digital Technology can support independent learning even in the absence of a teacher, if the learner has the provision to interact with the other learners. However, there is a condition for this: it is only possible if the learners can experience 'well- organized' and 'well- designed'

learning that can a teacher would have provided. Knowledge acquisition, doubt clarification, practice, collaboration and feedback are the main activities of teaching and learning [2]. Unique properties of digital learning includes; learning content in video, animation and multimedia to engage the learner and keep motivated; the provision of inquiry, through which the learner can search the web for necessary high quality sources and tools; networking with groups and forums for exchanging ideas with others and learn from others through discussion; for motivating learners, digital authoring to present their learning [3].

The low cost of online education, a young population, rise in disposable income, rise in internet penetration, increase in smartphone penetration, digital initiatives by Government, employability quotient, and easy access to quality education, etc., helps the Electronic-learning (E-learning) sector in the world to grow exponentially. This rise in E-learning all over the world is perceived by policy makers as a means to overcome the challenges of education system while companies and start-ups perceive it as a rising opportunity to invest.

In this study, we discuss about E-learning through Massive Open Online Course platforms, Instructional Design of Electronic-content (E-content) in MOOCs, various Instructional Design models used for designing and developing E-content.

Massive Open Online Courses (MOOCs)

E-learning is considered as a feasible method to overcome the challenges faced by education system in the developing countries [4]. There are various types of E-learning tools used and the methods in which E-learning is delivered. E-learning can be classified based on extent of technology use (blended learning or online learning), difference in time period of interaction between students and teachers (synchronous or asynchronous), based on the technology used (mobile-based learning, social media-based learning), etc. E-learning is provided through online courses or Massive Open Online Courses (MOOCs).

MOOC is a specific E-learning method, which was initially considered as a substantial advancement for extending educational training in developing countries. Transformation of learning experience and teaching experience is obvious with the large-scale learning and anytime learning. This enables provision high quality content made available to the desired learners by the highly qualified professionals across the globe [5]. MOOCs have to be carefully designed and other resources are necessary, if this has to replace 7 class teacher and provide support to the learner [6].

Quality higher education in the developing countries could be reinforced by blending MOOCs into higher education curriculum. So, there is a necessity to explore how MOOCs could provide large-scale learning in a way that is both efficient and sustainable for Higher Education Institutions, MOOC Providers and Faculty. Studies related to MOOCs in all world around have been reviewed and found that these online courses have changed the scenario of education system. As the technology has changed over the years, the face of distance learning with the addition of MOOCs ignited the minds of learners. MOOC platforms like The Open University [7], Open Learning [8], Coursera [9], Udacity [10], etc. provide some free online courses for distance learners. Many Higher Education Institutes offer most of their regular courses online, either partially or entirety. Some universities offer free online courses or course materials. For example, Massachusetts Institute of Technology (MIT) offers MIT OpenCourseWare online platform and it contains all their academic course materials for free access. The courses are digitalized versions of the offline courses. However, MIT does not award certificates or degrees for taking the courses online. There is also no support from teachers and no synchronous or asynchronous communication between students or with the instructor. The learning is self-motivated and without any social elements [11]. Harvard Extension offers close to 800 courses that award fully accredited Harvard credentials that include becoming a member of the Harvard Alumni Association. It is possible to obtain graduate certificates, as well as undergraduate and graduate degrees [12]. Thus, the use of MOOCs is the only way higher education can ensure large scale learning. Learning at large scale is possible via digital technology because MOOCs reaches very large numbers of learners who has basic internet connection and willing to learn, which brick and mortar institutions cannot deliver due to resource constraints. The learning content in MOOCs can be designed and developed within the planned fixed cost and this fixed cost does not vary much despite huge number of learners accessing it. Thus, MOOCs have provided the proof that online learning is possible at very large-scale. MOOCs platform capture the analytics automatically and that gives us the insight into the way learners behave while learning. For those who have difficulty in accessing quality education in brick-and-mortar institutions, MOOCs provides an opportunity to pursue quality education from anywhere at any time. Specifically, MOOCs have the potential to provide quality higher education to the countries of Global South where supply is limited and demand is high.

Instructional Design (ID) of E-content

The course materials in digitized form which help the E-learning process is called E-content [13, 14] . The content may be in the form of "Audio, Text, Video, Images, Animation" or blended form of these [15]. Well organized and quality E-content is required for effective E-learning process. The development of E-content is a dedicated profession which requires a team of skilled professionals like subject experts, website designer, multimedia editor, and instructional designer. The keys steps involved in the development of E-content for a E-learning course are:

1. Defining the learners
2. Framing the learning objectives
3. Designing the course
4. Evaluation

The primary step is an analysis stage where we need to identify and define the target audience. Then, the learning objectives of the course are formulated based on the primary analysis. Next step is to choose an appropriate Instructional Design method for designing, developing, and implementing the course content. Finally, the effectiveness of the E-content and E-learning processes are evaluated. Instructional Design (ID) or Instructional System Design (ISD) is quite a young discipline, where, the word "instruction" means a set of events that enable learning process and the word "design" means a creative pattern. It is an organized procedure by which instructional materials are designed, developed to make the E-learning process more engaging, efficient and effective. ID mainly focuses on developing contents based

on learner-centred approach rather than the teacher-centred approach. The steps involved in the systematic approach of instructional design are: "fixing an instructional goal, goal analysis, learning domains, learning outcomes, prepare criterion referenced test questions, and a clear instructional strategy" [16].

Instructional designs are developed based on the Cognitive Theory of Learning (CTY) [17] and this theory explains the interpretation and processing of the things as humans learn. This theory can be briefly categorised into two specific theories depending on the type of learners and they are: Social Cognitive Theory (SCT) [18] and Cognitive Behavioural Theory (CBT) [19]. Social Cognitive Theory states that new encounters are to be assessed by the student by means of analysing his past encounters with similar determinants. As a result, learning can be of a careful evaluation of the past experience versus observational learning, reproduction of the subject, self-capability can manifest in learners of all age groups. Aaron Beck developed the theory of Cognitive Behaviour and this theory describes the significance of cognition in determining the behaviour of an individual. It states that concepts that affect the behaviour they display. These concepts can be positive or negative and can be affected by a person's environment. It also states that the behaviour patterns and learning are affected by three different factors, the self, world/environment and the future.

Instructional Design Models

The Instructional design models give guidelines or outlines to organise and structure the development of making instructional activities [20]. There are many varieties of instructional design models available. In this study, we discuss about five ID models which are more popular and widely accepted among the E-Learning designers. They are "Gagne's Nine Events of Instruction model", "Analysis, Design, Develop, Implement, and Evaluate (ADDIE) model", "Dick and Carey model", "Bloom's Taxonomy Revised model", "Merrill's Principles of Instruction (MPI) model".

Gagne Model

Robert Gagne proposed an instructional design model framework which is created by studying the behaviourist approach to learning [21]. This is a flexible model that can be modified for diverse E-learning scenarios. This model contains nine steps as shown in Fig 1. Even though this model is very systematic and easy to follow, it may limit a learner's ability to explore their own learning style. This design model is often employed in medical online learning course platforms [22, 23].

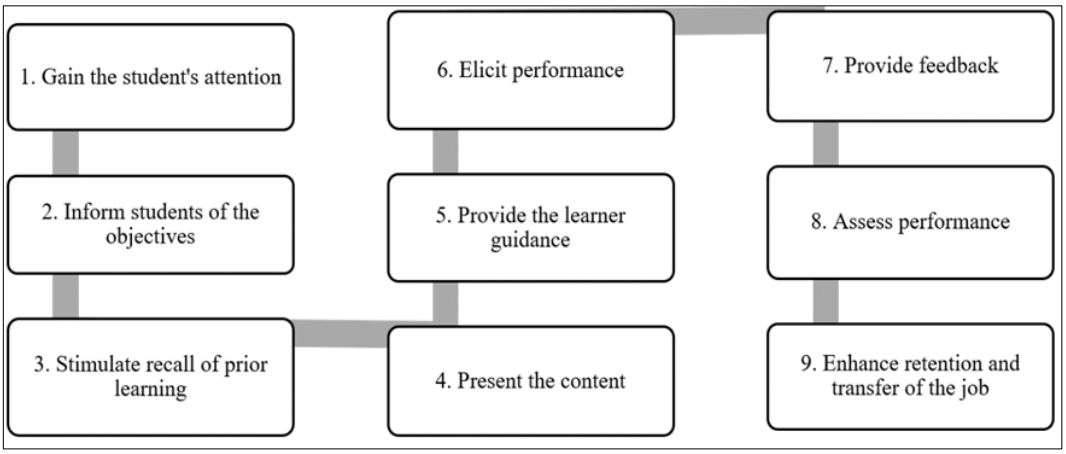

Fig 1: Gagne Model

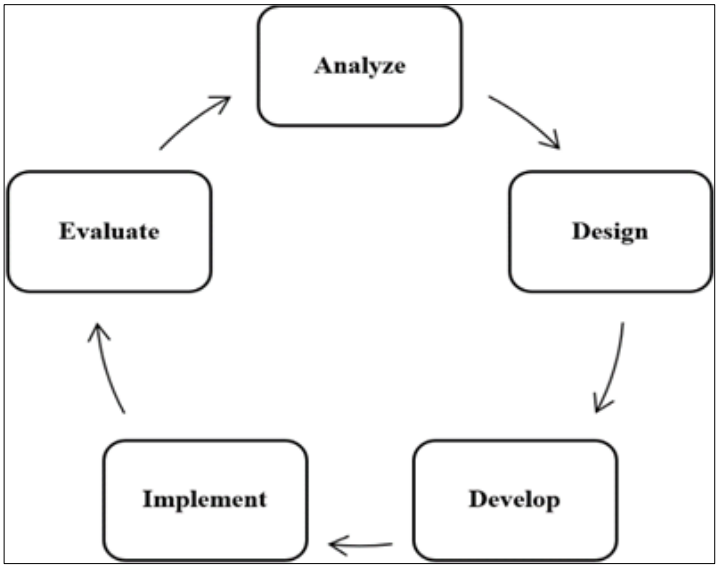

Fig 2: ADDIE Model

ADDIE Model

ADDIE model is the one of the basic standards for an instructional design. This model consists of five phases: Analysis, Design, Development, Implementation and Evaluation [24, 25]. The model follows a cyclic approach where each phase has an output that is provided into the subsequent phases as shown in Fig 2. This model is flexible, structured and versatile, but it takes more time to implement the model. The online technical education platforms [26], the distance learning platforms for physical and sports [27], etc. used this instruction model for their content development and learning delivery process.

Dick and Carey Model

Dick and Carey instructional design model emphases on the inter-relationship between components in the design process [28]. It is a systematic approach model, and the design process in this model is depicted in Fig 3. The implementation of this model is time consuming since many steps are involved in this model. This instruction design model is used for project based online learning platforms [29] as well as for developing materials for interactive reading [30].

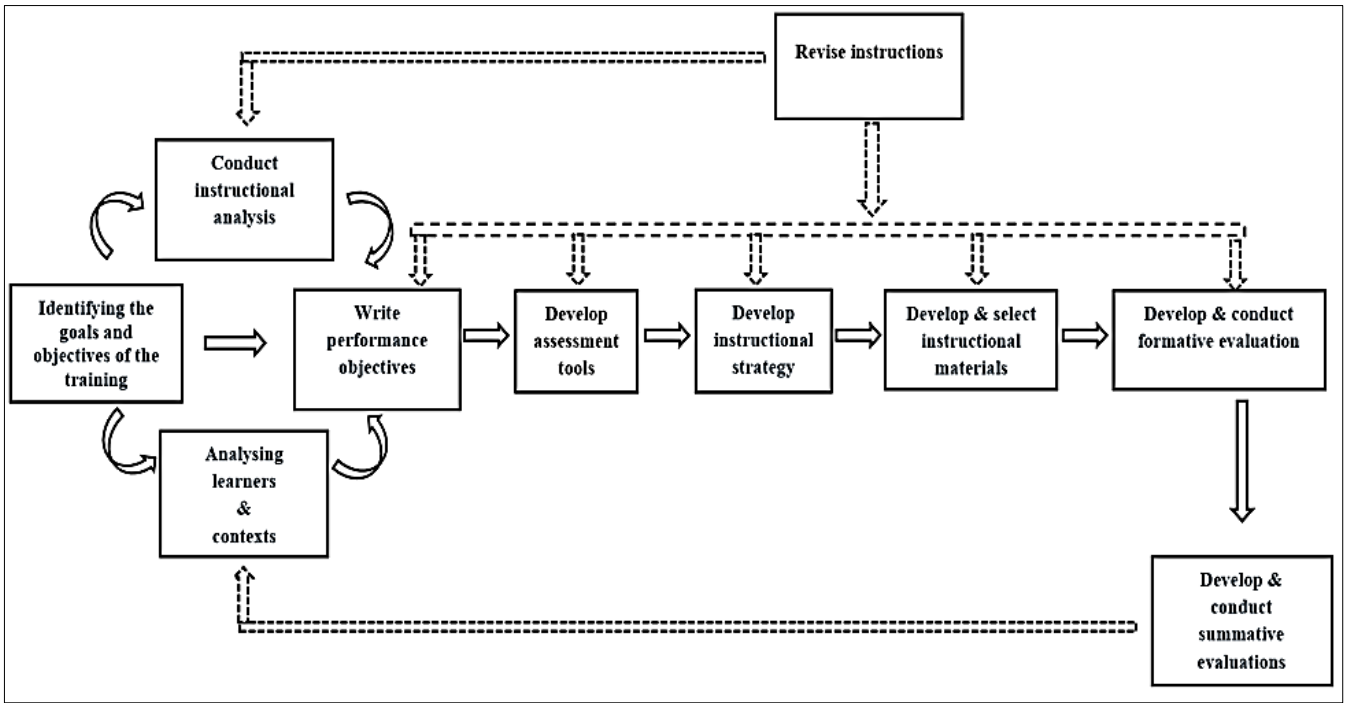

Fig 3: Dick and Carey Model

Bloom's Taxonomy Revised Model

Benjamin Bloom created a taxonomy model of measurable verbs to define and form the various stages of cognitive learning [31]. Anderson and Krathwohl revised this model to define the six stages of cognitive learning [32] as shown in Fig 4. This model makes the learners to remember and understand new information, then to apply and analyse it, evaluate its relevance, and then to create solutions for the problems. This model is simple to follow, but gives a false impression that learning is a hierarchical process. This instructional model is used for designing online English class activities [33], digital learning of Mathematics and Informatics in higher education [34], etc.

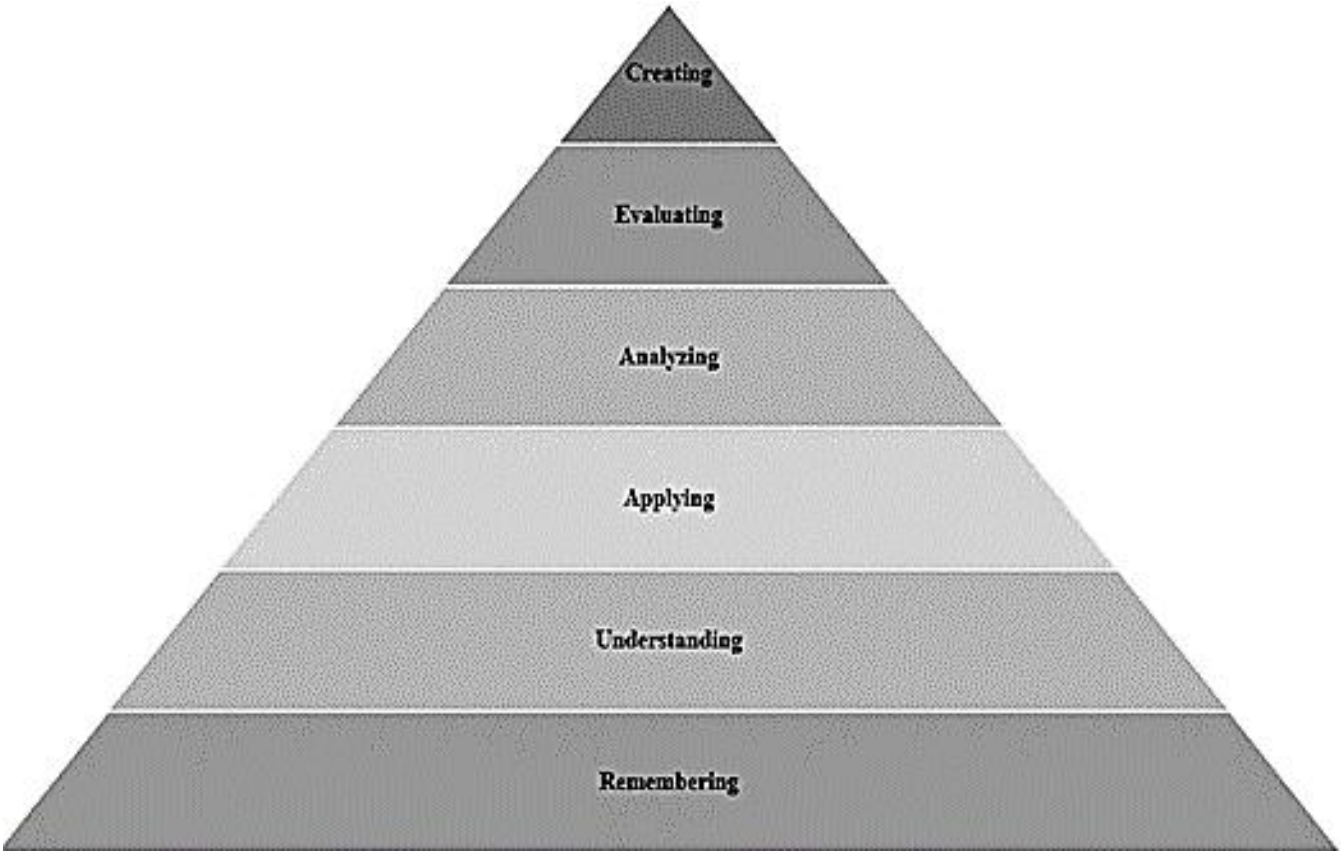

Fig 4: Revised Bloom's Taxonomy model

Merrill's Principles of Instruction (MPI) Model

Merrill's Principles of Instruction (MPI) Model is proposed by David Merrill [35] and it integrates five principles of learning as shown in Fig 5. This model aims to develop an instructional design model to help the students to solve real-world problems. Learners may face difficulties to follow this model to attain new knowledge, if they have no prior knowledge [36]. This model is used for designing online graduate courses [37], online Human Resource (HR) training programs [38], etc.

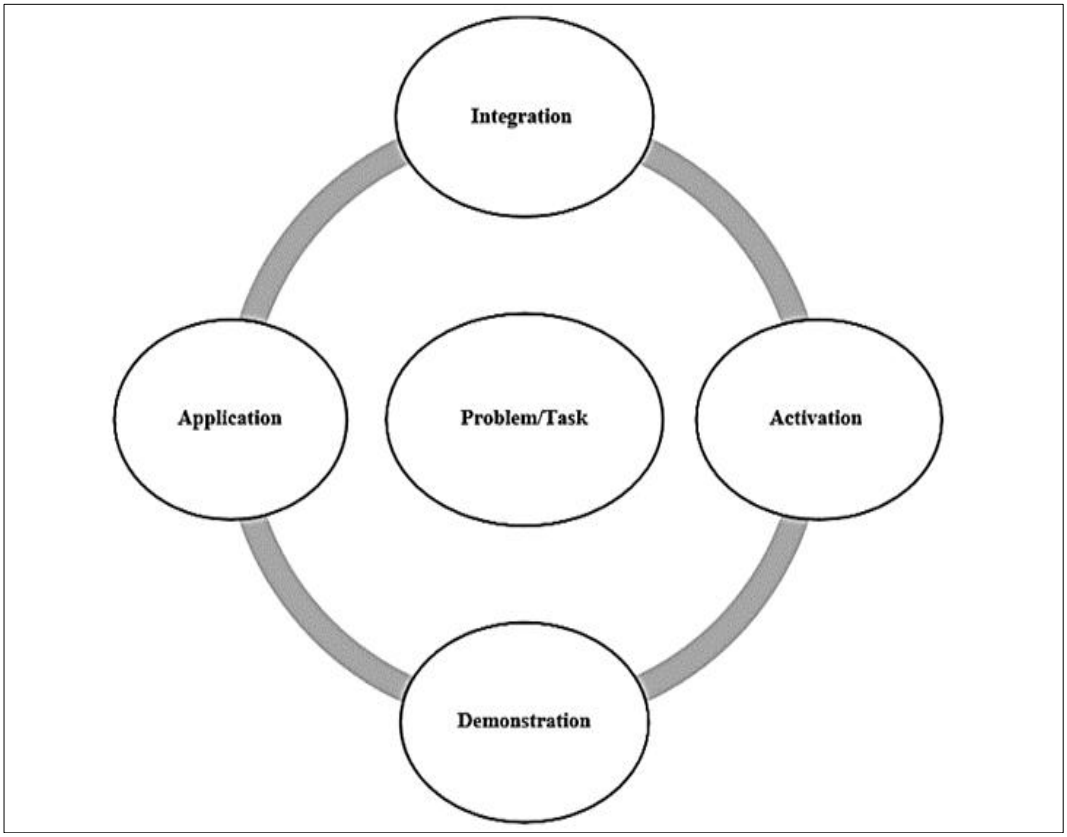

Fig 5: Merrill's Principles of Instruction (MPI) Model

Conclusion

In this paper, we discussed about the MOOCs and its relevance in the Higher Education Institutes. It is clear that MOOCs in various institutions and companies associated across the world are supporting the system of education. Anyone, anytime and anywhere can learn through smartphones or personal computers, and the young aspiring minds are showing enthusiasm towards MOOCs. Thus, the use of digital learning platforms in higher educational institutions has numerous advantages for students: choice of flexible time and location for learning, utilization of vast amount of data, use of discussion forums, better interaction among the learners, efficient communication between students and teachers, able to more attention to the specific portion of a course, etc. Also, these platforms help to compensate for shortages of faculties, lab instructors and other associated staffs. These platforms should not be just considered as substitutes to traditional learning method, but as a means to improve the quality of the overall learning process. Also, during the peak time of COVID-19 pandemic, these platforms helped the students to continue their education.

In this paper, we also discussed five most widely used instructional design models: Gagne's Nine Events of Instruction model, ADDIE model, Dick and Carey model, Bloom's Taxonomy Revised model, MPI model. Each of this instructional design model has its own strengths and weaknesses. So, depending upon the requirements, the instructional designers can incorporate appropriate models for designing and developing E-content in MOOC platforms for an efficient E-learning process.

Acknowledgment

The research leading to this work has received funding from the Research Council (TRC) of the Sultanate of Oman under the Block Funding Program BFP/RGP/ICT/19/283.

References

1. The ISTE Standards [Internet]. [cited 2022 Jun 6]; Available from: https://www.iste.org/iste-standards
2. Laurillard D. The educational problem that MOOCs could solve: professional development for teachers of disadvantaged students. Res Learn Technol. 2016;24:527-32.
3. Sharples M, Adams A, Ferguson R, Gaved M, Mcandrew P, Rienties B, *et al*. Innovating pedagogy 2014: exploring new forms of teaching, learning and assessment, to guide educators and policy makers. The Open University, 2014.
4. Abdon B, Raab R, Ninomiya S. E-learning for international agriculture development: Dealing with challenges. Int J Educ Dev Using Inf Commun Technol. 2008;4(1):80-94.
5. Carlson S, Blumenstyk G. For Whom Is College Being Reinvented? Chron High Educ, 2012.
6. Kennedy E, Laurillard D, Horan B, Charlton P. Making meaningful decisions about time, workload and pedagogy in the digital age: the Course Resource Appraisal Model. Distance Educ. 2015;36(2):177-95.
7. The Open University [Internet]. [cited 2022 Jun 6]; Available from: https://www.open.ac.uk/
8. Open Learning [Internet]. [cited 2022 Jun 6]; Available from: https://www.openlearning.com/
9. Coursera [Internet]. [cited 2022 Jun 6]; Available from: https://www.coursera.org/
10. Udacity [Internet]. [cited 2022 Jun 6]; Available from: https://www.udacity.com/
11. MIT Open Course Ware [Internet]. [cited 2022 Jun 6]; Available from: https://openlearning.mit.edu/courses-programs/mit-opencourseware
12. Harvard Extension [Internet]. [cited 2022 Jun 6]; Available from: https://extension.harvard.edu/
13. Anaraki F. Developing an Effective and Efficient eLearning Platform. Int J Comput Internet Manag. 2004;12(2):57-63.
14. Nichols M. A theory for eLearning. J Educ Technol Soc. 2003;6(2):1-10.
15. Lee BC, Yoon JO, Lee I. Learners' acceptance of e-learning in South Korea: Theories and results. Comput Educ [Internet]. 2009;53(4):1320-9. Available from: http://dx.doi.org/10.1016/j.compedu.2009.06.014
16. Dasari S. Using Instructional Design in Developing Instructional New Media Materials. In: Proceedings of national seminar on e-learning and its technologies, Eletech India, 2001.
17. Levine M. A cognitive theory of learning: Research on hypothesis testing. Lawrence Erlbaum, 1975.
18. Conner, M., & Norman P. Predicting Health Behaviour: research and practice with social congnition model. Open University Press, 2006.
19. Hupp SD, David Reitman, JDJ. Cognitive-behavioral theory. In: Handbook of clinical psychology, 2008, 263-87.
20. Kopcha RMB, TJ. Instructional Design Models. In: Handbook of Research on Educational Communications and Technology: Fourth Edition. Springer, New York, 2014, page 77-87.
21. Woo WH. Using gagne's instructional model in phlebotomy education. Adv Med Educ Pract. 2016;7:511-6.
22. Saima Ali LA. Efficacy of Gagne's nine events of instructions in improving the performance of undergraduate final year medical students. Adv Heal Prof Educ. 2016;1(2).
23. Wong YL. Utilizing the principles of gagne's nine events of instruction in the teaching of goldmann applanation tonometry. Adv Med Educ Pract. 2018;9:45-51.
24. Muruganantham G. Developing of E-Content Package by Using ADDIE Model. Int J Appl Res [Internet]. 2015;1(3):52-4. Available from: http://www.allresearchjournal.com/vol1issue3/PartB/pdf/67.1.pdf
25. Rajapboyevna XQ, Umarjonovna YG. THE ADDIE MODEL. Gospod i Innow. 2022;21:262-3.
26. Hashim N, Hamidon Z. Blended Learning in Technical and Vocational Education and Training (TVET) Training Institute. Int J Acad Res Progress Educ Dev. 2022;11(1):838-60.
27. Mostafa Hamsea, Said Lotfi MT. Design and Implementation of a Distance Training Device of Physical and Sports Education's Future Teachers : Application of Addie Model. Int J Sci Basic Appl Res. 2022;61(1):70-86.
28. Walter Dick, Lou Carey JOC. The Systematic Design of Instruction. New York: Longmann, 2001.

29. Basuki N. Development of Project-Based ICT and Media E-Modules for Learning During the Covid-19 Pandemic. J Community Res Serv. 2022;6(1):41.
30. Kuning, Dewi Sri, RS. Learning Material Development of Interactive Reading Subject through Dick and Carey. Budapest Int Res Critics Inst Humanit Soc Sci. 2022;5(2):12439-51.
31. Bloom BS, Engelhart MD, Furst EJ, Hill WH, Krathwohl DR. Taxonomy of educational objectives, Handbook I: Cognitive domain, 1956.
32. Krathwohl DR. A Revision of Bloom's Taxonomy: An Overview. Theory Pract. 2002;41(4):212-8.
33. Frijuniarsi N, Hapsari FS. Online english class activities designed according to revised bloom taxonomy. In: UICELL Conference Proceeding, 2022, 128-39.
34. Kovacheva Z, Kaloyanova K, Naydenova I, Saranova E. Effective Methods for Teaching Mathematics and Informatics in Higher Education in the Digital World. TEM J. 2022;11(2):876-81.
35. Merrill MD. First principles of instruction. Educ Technol Res Dev. 2002;50(3):43-58.
36. Badali M, Hatami J, Farrokhnia M, Noroozi O. The effects of using Merrill's first principles of instruction on learning and satisfaction in MOOC. Innov Educ Teach Int [Internet]. 2022;59(2):216-25. Available from: https://doi.org/10.1080/14703297.2020.1813187
37. Cai Q, Moallem M. Applying Merrill's First Principles of Instruction to Redesign an Online Graduate Course through the Rapid Prototyping Approach. Tech Trends. 2022;66(2):212-22.
38. Idris AY, Razak RA, Rahman SSA. The design framework of training system for professional development (TASPOD). JuKu J Kurikulum Pengajaran Asia Pasifik, 2022;10(1):25-30.