

A Study on Various Learning Approaches towards u-Learning Development

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Abstract: Nowadays, learning was shifted from the traditional classroom-centered towards being learner-centered and oriented. Learning has evolved from the classic electronic learning (e-Learning) to mobile learning (m-Learning) and now towards ubiquitous learning (u-Learning). This paper deals with the study on the various approaches in learning to outline the significance of u-Learning in the present and in the near future generation. Various significant learning approaches such as computer-based learning, e-Learning, blended learning, distance learning, online and web-based learning, m-Learning, and u-Learning will be discussed to outline the u-Learning model based on the theory of connectivism.

Keywords: u-Learning, m-Learning, blended learning, e-Learning, Connectivism learning theory

1. Introduction

The traditional learning approach has been revolutionized by the emergence of information and communications technology (ICT) that has evolved from the implementations of electronic learning (e-Learning) to mobile learning (m-Learning) and currently to ubiquitous learning (u-Learning). The significant impact of learning enhanced by converging technologies have been a hot issue being discussed and demonstrated by researchers and educators in the past decades. The integration of ICT in learning has been proven to make learning easier and more effective that could provide a lifeline for remotely secluded and helpless learners.

In u-Learning, learning can be everywhere, people can learn anytime and anywhere even in the confines of their homes, even in workplaces, libraries, as well as in their everyday interactions with society. Not all things can be learned just in the four corners of the classroom and the most convenient way is to learn them through user-friendly interfaces. People become eager to be educated and become

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professionals even without attending formal school. These new innovations in educational technology were of paramount importance in achieving learners' goals and needs.

This paper deals with the study of various learning approaches, namely, computer-based learning, e-Learning, blended learning, distance learning, m-Learning, online and web-based learning, and u-Learning. The discussions explain how these learning approaches are evolving since the past decades and the significance of u-Learning based on the theory of connectivism to the present and near-future generation of learners was highlighted.

The remainder of this paper is organized as follows: Section 2 outlines the various approaches to learning; Section 3 details the theory of connectivism; the u-Learning system based on connectivism learning theory was highlighted in Section 4; and Section 5 concludes the study.

2. Learning Approaches

Learning is considered to be the acquisition of new, or modifying existing, knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information [1][2]. Learning may be viewed as a process, rather than a collection of factual and procedural knowledge [2]. The various approaches to learning that have significant importance to the evolution of the present u-Learning systems were outlined in the next subsections.

2.1 Computer-based Learning

Computer-based learning (CBL) [3] refers to a specific software program designed to teach. It is a program that provides self-paced student instruction, and tests or learning feedback with very little or no involvement by a teacher. It can give more direct and individualized feedback, and correct misconceptions more quickly and easily. Most of them do little pop quizzes throughout the program, and can also give interactive demonstrations.

Computer-based learning software programs are also referred to as instructional software or courseware, computer-based instruction (CBI), computer-based education (CBE), and computer-assisted learning (CAL).

2.2 e-Learning Systems

e-Learning refers to a formalized teaching system supported by electronic resources such as computers and the Internet as its major components [4]. e-Learning can be implemented either in or outside of the classroom or both. The transfer of skills and knowledge can be networked as ICT serves as the specific media in the implementation of the learning process [5][6].

As e-Learning applications and processes may overlap with other learning approaches, the major difference can be determined through its implementation which will be based on different theories of learning such as behaviorist, cognitive constructivist, and social constructivist, and the theory of connectivism.

2.3 Distance Learning

Distance learning is also known as distance education refers to a field of education that focuses on teaching methods and technology with the aim of delivering teaching, often on an individual basis, to students who are not physically present in a traditional classroom learning setting [7]. Traditionally, distance learning usually involved correspondence courses wherein the learners or students corresponded with the school via e-mail, electronic forums, videoconferencing, chat rooms, bulletin

boards, instant messaging, and other forms of computer-based communication. Distance learning is indicated at the top of the hierarchy of learning approaches as depicted in Figure 1.

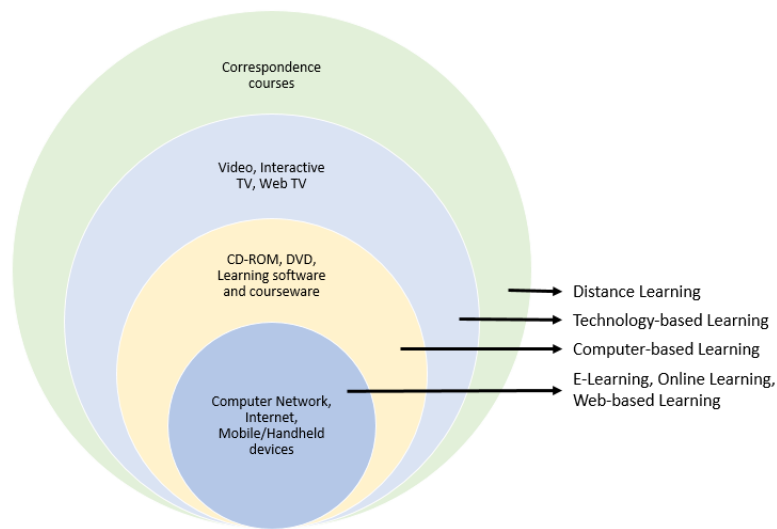


Figure 1. Hierarchy of Learning Approaches

A correspondence course is provided by an institution and is responsible for distributing instructional materials and evaluation tools for students being separated from their instructors. Generally, distance learning is offered to both undergraduate and graduate degree programs. The current distance learning programs involve online education and even its combination with the traditional face-to-face classroom learning evolving the approach into blended learning.

2.4 Online and Web-based Learning

Online learning is accessible through an online learning community that aims to cater to the learning needs of its members by facilitating peer-to-peer learning [8]. Learners in this community generally share common objectives through social networking and computer-mediated communication. In online learning, learners share skills and knowledge through discussions via the Internet. Online learning and web-based learning supports the conventional teaching scenarios of traditional face-to-face classroom learning. In addition, online learning can refer to a form of distance education that is taught via the Internet.

On the other hand, Web-based learning (WBL) [9] may be seen as Web-enhanced CBL. The main difference between these two is the method of delivery, that is, while CBL is typically delivered via some hard disc media (*e.g.*, compact disc – read only memory (CD-ROM), digital versatile disc (DVD)), WBL is rather (but not exclusively) delivered via the Web. In addition, WBL adds another important aspect to the learning process, that is, the ability to interact and cooperate with other learners through the Internet using the metaphor of a virtual classroom.

2.5 Mobile Learning

Mobile learning or m-Learning is related to e-learning and distance education that mainly focuses on learning across multiple contexts and learning implemented through the use of mobile and handheld devices [10]. The m-Learning platform usually involves a learning environment where the learner is not situated in a fixed location but is taking advantage of the features offered by wireless and mobile

technologies that enable learning anytime and anywhere [11]. This learning environment addresses the limitations imposed by other learning environments when it comes to location issues.

The m-Learning environment focuses on the learners’ mobility and utilizes various portable technologies such as handheld computers, notebooks, and mobile phones making learning accessible virtually anywhere. It is a collaborative learning environment that allows flexibility and self-paced learning, better time management, and improved virtual communication and collaboration.

2.6 Blended Learning

Blended learning refers to a learning system that is implemented in blended learning environments. The traditional face-to-face classroom style of learning is integrated with state-of-the-art computer-assisted activities as shown in Figure 2. This strategy can be more effective as this method enables an integrated approach for both teachers and learners [12].

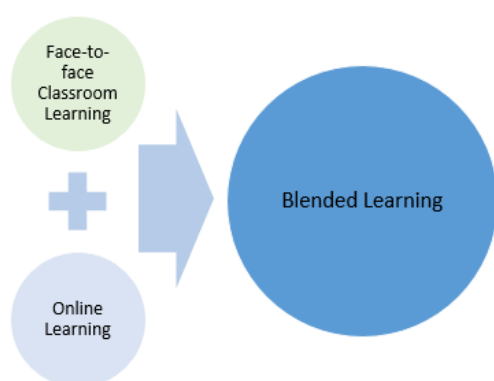


Figure 2. Blended Learning

Table 1. Advantages and Disadvantages of Blended Learning [13]

Advantages	Disadvantages
Different learning approaches can be simultaneously implemented with different learning levels.	Specific course development is required.
Offline activities and collaborative works allows the utilization of visual, auditory, and interactive contents.	Requires a significant amount of technology resources such as hardware, software, and user training.
Implements online modules to supplement face-to-face classroom learning through learning management systems (LMSs).	Highly efficient communication technology infrastructure is required.
The geographical and time constraints will be eliminated.	Requires frequent supervision to keep remotely located learners’ motivated.
Allows self-paced learning.	Can require more one-on-one coaching for slow-paced learners.

Blended learning has enabled greater quality and quantity of human interaction in a mixed learning environment [14]. The learners' community supported by computer-mediated educational tools is allowed to interact at anytime and anywhere. In blended learning, educators are definitely adjusting the learning environment based on the collaborative works of learners in learning communities online. Relevant contents can be integrated that was difficult to comprehend outside the Internet domain. Learning activities and products can also be changed to use technologies in a classroom that uses blended learning.

Blended learning can be more flexible, adaptable, and engaging for learners as this approach allow instructors and teachers better learning style to the unique needs of their learners [13]. The advantages and disadvantages of blended learning were identified in Table 1.

3. The Connectivism Learning Theory

A learning theory is an essential component in designing a learning approach and environment. It describes how students receive, process, and retain knowledge during learning [15]. Understanding the different learning theories helps teachers, educators, and educational institutions define necessary techniques to cater to the different kinds of learning. The educational learning theories that educators may utilize to enhance the learning environment for their students include behaviorism, cognitivism, constructivism, humanism, and connectivism. The evolution of learning theories is depicted in Figure 3.

For the u-Learning of the present and near-future generation of learners, connectivism learning theory can be the most appropriate to utilize as most learning approaches that we have discussed focus on the collaboration of learners. Connectivism learning theory refers to the concept that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks [16][17]. It shares with some other theories a core proposition, that knowledge is not acquired, as though it were a thing. In this learning theory, knowledge is defined as the set of connections formed by actions and experience [17].

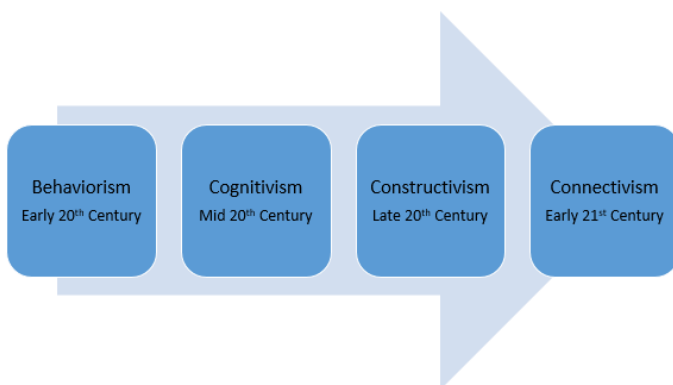


Figure 3. Evolution of Learning Theories

Connectivism learning theory focuses on the idea that people learn and grow when they form connections [16]. This can be the learners' connections with other learners or connections with their roles and obligations in their life. Connectivism can be utilized to help learners make connections to things that excite them, helping them to learn. For teachers and educators, they can use digital media to create better connections to learning. Moreover, they can cultivate good connections with their students and peers to enhance learning motivations.

From the article of George Siemens [18], connectivism is defined as the integration of principles explored by chaos, network, and complexity and self-organization theories. He discussed the following principles of connectivism:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.

4. u-Learning for the Present and Near Future Generation of Learners

Ubiquitous learning is also known as or u-Learning is equivalent to some form of simple mobile learning wherein the learning environments can be accessed in various contexts and situations. As compared with e-Learning, the ubiquitous learning environment (ULE) utilizes a more efficient context awareness technology in providing context data to the learners. ULE may refer to any pervasive or omnipresent learning setting. Learning can be anywhere and all around the learner even though they might not notice the learning process (*i.e.*, from the concept of ubiquitous computing). Learning data can be found anywhere and embedded on the things or objects within the learning environment where students are not even required to do anything in order to learn [19][20].

u-Learning is considered to be a learner-centered paradigm characterized by providing intuitive ways for identifying the right collaborators, the right contents, and the right learning services in the right place and the right time based on the student's surroundings. The right learning collaborators that could effectively cater to the learners' needs, the learning resources and services available, and the time and location for the learning to take place are determined by u-Learning [20].

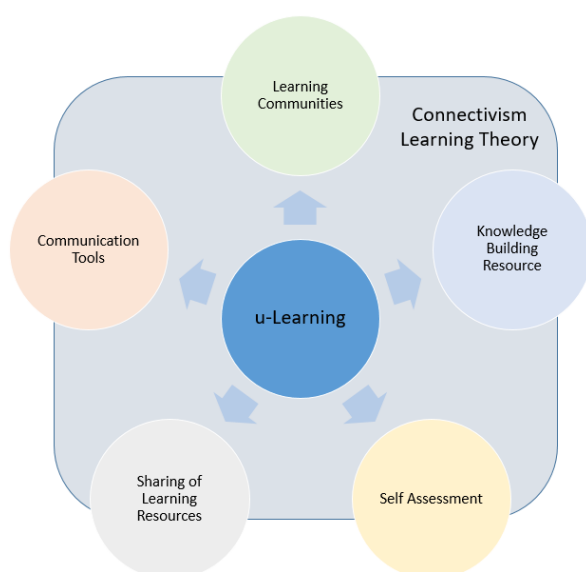


Figure 4. The u-Learning Model for the Present and Near Future Generation of Learners

The u-learning model is depicted in Figure 4. It involves creating learning activities, tasks, projects, and resources that encourage students to self-discover learning automatically and independently. It is an adaptive learning paradigm that takes place in a ubiquitous computing environment that enables learning the right thing at the right place and time in the right way [21]. It is an expansion of previous learning paradigms as we move from conventional learning to electronic learning to mobile learning and now to ubiquitous learning (thus, the meaning of “e” is not just limited to “electronic” but expands to “everywhere,” “extending,” “enhancing,” and “enabling.” In addition, u-Learning enables us to change our current learning processes to become more efficient and more effective, thus, learners also become productive.

5. Conclusion and Future Works

This paper has outlined the various learning approaches that revolutionized the development of u-Learning for the present and near-future generation of learners. These learning approaches include computer-based learning, e-Learning, blended learning, distance learning, online and web-based learning, m-Learning, and u-learning. The connectivism learning theory was also discussed wherein it plays a vital role in enhancing the learning strategies to better cater to the needs of the learners in a u-Learning environment. It integrates the creation of connections between learners, teachers, educators, and the learning resources for a better grasp of the learning process.

In the future, converging the different approaches to enhance a flipped learning approach will be studied. The integration of innovation in the four C’s in education (*i.e.*, critical thinking, collaboration, creativity and communication) will also be studied.

References

- [1] R. Gross, “*Psychology: The Science of Mind and Behaviour*”, 6th Edition, United Kingdom, Hachette UK, 2010, ISBN: 978-1-4441-6436-7.
- [2] “*What is Learning?*”, igi-global.com, www.igi-global.com/dictionary/an-overview-of-learning-and-teaching-from-the-past-to-the-present/16813 (accessed June 10, 2020).
- [3] D. Ifenthaler, “*Computer-Based Learning*”, in *Encyclopedia of the Sciences of Learning*, N. M. Seel, Eds., USA, Springer, Boston, MA, 2012, doi: 10.1007/978-1-4419-1428-6_499.
- [4] “*Definition of E-learning*”, [economictimes.indiatimes.com, www.economictimes.indiatimes.com/definition/e-learning](http://economictimes.indiatimes.com/www.economictimes.indiatimes.com/definition/e-learning) (accessed June 10, 2020).
- [5] D. Tavangarian, M. E. Leypold, K. Nölting, M. Röser, D. Voigt, “*Is e-Learning the Solution for Individual Learning?*”, *Electronic Journal of e-Learning*, vol. 2, no. 2, 2004, pp.273-280.
- [6] A. Yacob, A. Z. A. Kadir, O. Zainudin, A. Zurairah, “*Student Awareness Towards E-Learning in Education*”, *Procedia - Social and Behavioral Sciences*, vol. 67, 2012, pp.93-101.
- [7] “*What is Distance Education*”, igi-global.com, www.igi-global.com/dictionary/distance-education/7981 (accessed June 10, 2020).
- [8] “*Online Learning - What Is It and How Does It Work?*”, [educations.com, www.educations.com/study-guides/study-online/](http://educations.com/www.educations.com/study-guides/study-online/) (accessed June 10, 2020).
- [9] W. C. Poon, K. L. Low, D. G. Yong, “*A study of Web-based learning (WBL) environment in Malaysia*”, *The International Journal of Educational Management*, vol. 18, no. 6, 2004, pp.374–385, doi: 10.1108/09513540410554031.
- [10] H. Crompton, “*A historical overview of mobile learning: Toward learner-centered education*”, in *Handbook of mobile learning*, Chapter 1, Z. L. Berge, L. Y. Muilenburg, Eds., Florence, KY, USA, Routledge, August 2013, pp.3-14.

- [11] J. Claudill, “*The growth of M-learning and the growth of mobile computing: parallel developments*”, The International Review of Research in Open and Distance Learning, vol. 8, no. 2, 2007, pp.1-13, doi: 10.19173/irrodl.v8i2.348.
- [12] “*Teaching with eLearning*”, challengeengineering.com, www.challengeengineering.com/teachwel/Module2/M2-1-1.html (accessed June 10, 2020).
- [13] “*Why Blended Learning is Effective*”, lambdasolutions.net, www.lambdasolutions.net/blog/why-blended-learning-is-effective (accessed June 10, 2020).
- [14] T. O. Singaravel, “*Blended Learning Gives Congenial Learning Environment*”, Shanlax International Journal of Education, vol. 2, no. 3, June 2014, pp.54-58.
- [15] “*The five educational learning theories*”, wgu.edu, www.wgu.edu/blog/five-educational-learning-theories2005.html (accessed June 10, 2020).
- [16] “*What is Connectivism*”, igi-global.com, www.igi-global.com/dictionary/ensuring-quality/5367 (accessed June 10, 2020).
- [17] S. Downes, “*Connectivism and Connective Knowledge: Essays on meaning and learning networks*”, National Research Council Canada, 2012, ISBN: 978-1-105-77846-9.
- [18] G. Siemens, “*Connectivism: A Learning Theory for the Digital Age*”, International Journal of Instructional Technology and Distance Learning, 2004, www.itdl.org/journal/jan_05/article01.htm (accessed June 10, 2020).
- [19] V. Jones, J. H. Jo, (2004). “*Ubiquitous learning environment: An adaptive teaching system using ubiquitous technology*”, In *Beyond the comfort zone*, Proceedings of the 21st ASCILITE Conference, R. Atkinson, C. McBeath, D. Jonas-Dwyer, R. Phillips, Eds., Perth, December 5-8, 2004, pp.468-474.
- [20] H. J. Kim, R. D. Caytiles, T. H. Kim, “*Design of an Effective WSN-Based Interactive u-Learning Model*”, International Journal of Distributed Sensor Networks, vol. 8, no. 1, 2012, doi: 10.1155/2012/514836.
- [21] S. Yahya, E. A. Ahmad, K. A. Jalil, “*The definition and characteristics of ubiquitous learning: A discussion*”, International Journal of Education and Development using Information and Communication Technology (IJEDICT), vol. 6, no. 1, 2010, pp.117-127.