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Research Learning Theories that Entail M-Learning Education Related to Computer Science and Engineering Courses

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ABSTRACT

This research is outline and discusses learning theories and explains the importance of learning theories concepts. Our paper presents the study of learning theories design and their requirements for the computer science and engineering courses. Computer science and engineering courses are different from other courses; these differences have to be considered during construction of the content. Many learning theories suggested in literature need to be considered before construction of the content is readily adapted to teaching. During the creation of Mobile courses we need to use one or more of the learning theories to work as a group does deliver high quality of knowledge to the learners. This is necessary so that the material will fulfill the specific goals of the course. In the same way for creating the material of a course in M-learning, several learning theories will need to be included. This paper describes the new roles of learning theories in M-learning education.

1. Introduction

The use of the internet higher education is rapidly growing and is an ubiquitous phenomenon. The 2011 research of online Learning shows that the number of learners having at least one online course has now exceeded 6.1 million [1]. Currently nearly one-third of all learners in higher education are having at least one online course [1]. The last three decades have experienced the formalization of E-learning and M-learning as self-discipline. Several theoretical frameworks have been developed in an attempt to cover and describe the actions in learning online. Therefore, the progression of theories in E-learning and M-learning are envisioned as essential for their robustness. In E-learning and M-learning environments there seems to have been a lot of 'noise' among students around what is the most appropriate or most complete concept to explicate the actions within both of E-learning and M-learning [2]. This misunderstanding helps the e-learning community comprehend the fundamentally complicated procedure of learning and how to best framework instructions, educating, training and other knowledge procedures. These fundamental questions are strategic to the area of understanding, a way of considering and discussing and doing research on knowledge.

2. Needs for Learning Theories

Learning theories represents how individuals or people understand new things. Learning theories provides primary techniques that should be used to improve the quest of learning through an appropriate learning exercise according to the learner's need. Moreover, a theory provides people a description to add up of complicated methods and phenomena [3]. Studying the learning theories offer a firm groundwork for lots of techniques and contemplating techniques needed for educational developers to make significant learning systems.

There are two main concerns discussed by advocates and scientists from where and how do people come to know? These concerns offer understanding into the variations between learning theories but also illustrate how each theory performs an enormous portion in E-learning and M-learning. Theories according to powerful research are much more efficient than (theories) according to educational phenomena. So, Learning and gaining knowledge is a procedure which draws together psychological, intellectual, and ecological aspects and encounters in order to obtain, improve, and make changes to an peoples abilities, understanding, principles, and opinions. Learning theories are therefore a try to describe how people learn as shown in Figure 1.

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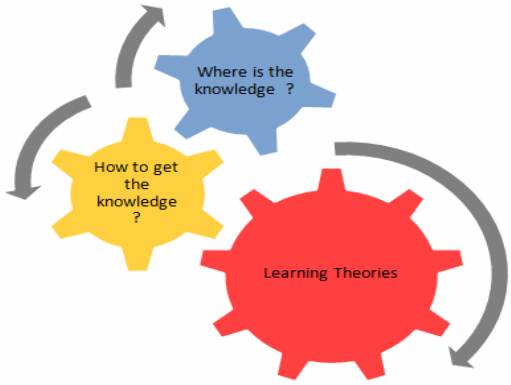

Figure 1. Learning Acquistion

3. Learning Theories

The development of theories in M-learning is seen as important for its durability. An overview of E-learning theories shows that during its earlier development, most E-learning advocates have implemented a natural approach to the development of theories. Their conceptualization details overarching issues such as how to determine its features and how to differentiate E-learning from other types of learning. As various advocates have provided their own theoretical ideas, there has been an important controversy over the suitable theory.

2.1. Behaviorism

Behaviorists believe that exterior aspects only that shape learning rather than distinctiveness of individual student. Behaviorism specializes in a new personality styles being recurring until they become automated. The concept surfaced from work done by Ivan Pavlov in associative studying and traditional training. The concept of behaviorism specializes in the research of obvious habits that can be noticed and calculated [4].

Behaviorism was major theory around the 1950's when educational design first came to exist and was used as a platform for developing many audio-visual components as well as Skinner's teaching devices. For example, some newest designs used in E-learning are computer-assisted instruction (CAI). The key principles used when developing instructions materials, involve the production of visible and measurable outcomes in students to be used for determining the students performance. This is regarded in the analysis of students to identify where instructions should start, the mastering of beginning steps before creating to more complicated stages, strengthening to increase performance, and using hints to make sure a strong stimulus-response organization as shown in Figure 2.

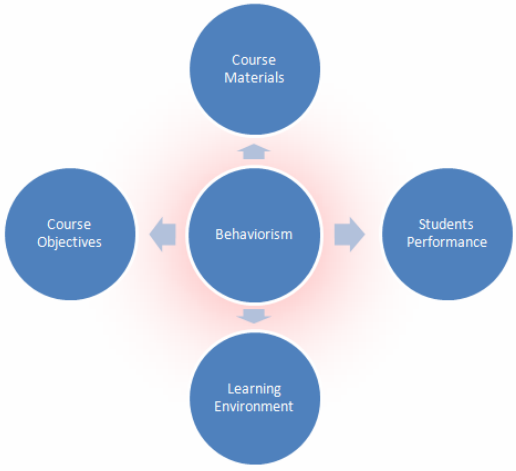

Figure 2. Learning Process under Behaviorism

2.2. Cognitivism

A switch took place in the overdue 1950's toward learning theories and designs from the intellectual sciences. Teachers placed less focus on obvious, visible conduct. They targeted more on complicated intellectual procedures and inner psychological procedures such as data and information acquisition, handling, storage, and memory, which are vital for both learning and learners.

Cognitivists concentrate on how information is obtained, structured, saved, and restored by the mind. Therefore, the issue is not on what students do, but rather on what they know and how they come to obtain what they know. The attention of the intellectual strategy is on modifying the student by inspiring him/her to use appropriate learning techniques [5].

Cognitivism concept represents the process of thinking that happens while someone is in action of learning. While studying, learners usually make an intellectual framework in their memory. Every time learners understand, they will use their entire encounter in studying and shop this new chance to understand in their memory until they want to use it again, to be able to help them in their studying procedure. One of the agencies engaged in cognitivism theory is details handling in E-learning. This concept offers active studying where students definitely get, rebuild and determine understanding in order to make learning more fun. This is because students need a modification in studying and understanding. The theory focused on new understanding and previous understanding. To help students in studying, application designing should take into account processes involved in information processing, so that studying can be more accurate and précised as well as clear and understandable. According to previous analysis, it has been discovered that, in designing learning actions, the intellectual structure of students were given serious consideration as shown in Figure 3 [6].

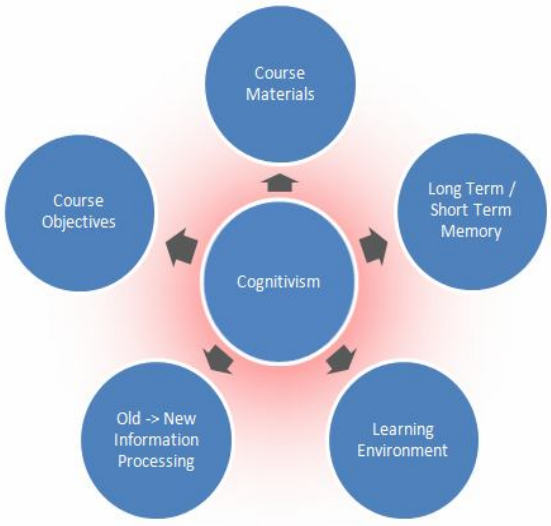

Figure 3. Course using Cognitivism Theroy

2.3. Constructivism

Constructivism represents the philosophical perception that people build their own knowing of reality [7]. Rather than incorporate a body of understanding about your community and atmosphere, constructivists believe we 'construct' significance in relation to our relationships with our atmosphere [8]. Constructivists believe that "knowledge is a operate of how the individual makes significance from his or her experiences; it is not a operate of what someone else says is true" [9]. When creating an online program according to constructivism concept, developers must make exciting conditions that catch students and allow them to come up with knowledge and obtain Knowledge (meaning) for them.

We can say the constructivist concept indicates that studying or learning is a dynamic process in which learners develop new thoughts in relation to their present knowing. Instructions can be made more effective by offering materials with special order that allow learners to develop upon what they already know and arrive at higher levels of knowing through E-learning or M-learning systems as shown in figure-4.

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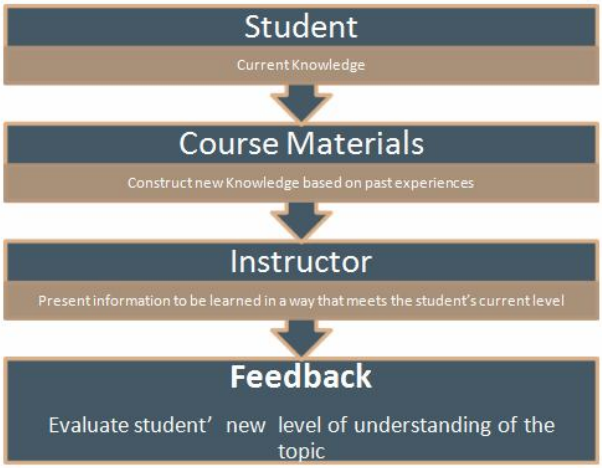

Figure 4. Constructivism Learning Process

2.4. Connectivism

Connectivism is a one of the learning theories that relates to E-learning and E-education. [10] in 2005 developed a new learning theory called Connectivism theory. A concept explaining how learning depending on the epistemological groundwork of connective knowledge happens in a digital age [11][12]. Connectivism is a theoretical structure that helps to comprehend and get the knowledge. It is mainly worried with cognitive progression. Learning starts when students are together in a studying group, and information is then put into action by talking about, discussing, and thinking. E-learning and M-learning lead to simplify the formation of E&M-learning communities and globalizes this process, students; trainers from all over the world can become engaged.

Connectivism is motivated by the understanding that choices are according to rapidly modifying fundamentals. New information is constantly being obtained. The capability to draw differences between important and insignificant information is essential. The capability to recognize when new information varies the surroundings according to choices made last night is also critical [10][12].

Key points of connectivism as shown in Figure 5 [12].

- Learning and understanding set in variety of views. As an example teacher/teacher, teacher/student, student / student can earning the knowledge by have discussion using mobile devices all over the world.
- Learning is a procedure of linking specialized nodes or details resources. By using mobile devices we can reach any specialist anytime any where to get the help, so, we can get help from a group of specialist or teachers to get the right knowledge.
- Learning may reside in non-human appliances.
- Capacity to know more is more crucial than what is currently known
- Taking care of and keeping relationships is needed to assist in constant learning.
- Ability to see relationships between areas, thoughts, and principles is a primary expertise.
- Accuracy and reliability (accurate, up-to-date knowledge) ar the purpose of all connectivist learning actions.
- Decision-making itself is a studying procedure. Selecting what to learn and the significance knowledge that we need to deliver. While it's right information now, it may be updated the next day due to modifications in the information, so, environment impacting the choice [11].

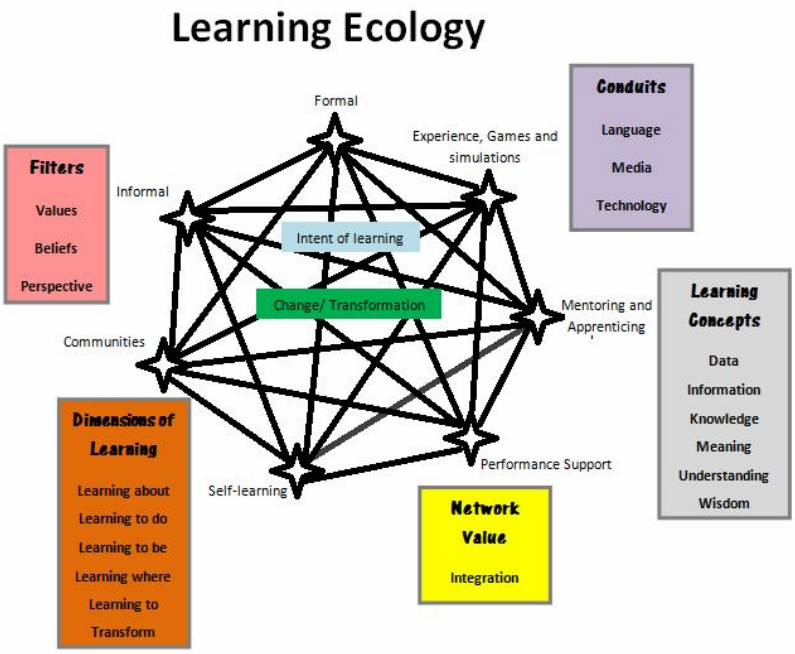

Figure 5. Connectivism : Process of creating network

4. Learning theories in M-learning analysis

[13] represents the procedure of excellent pedagogical style as one guaranteeing that there are definitely no variances between the program we show, the learning theories we use, the studying atmosphere (environment) we select, and the evaluation techniques we embrace. To obtain good reliability, we need to analyze very carefully what presumptions we are making at each level and to arrange those. Thus, we need to start with properly identified designed studying results, we then need to select teaching and learning actions that take a position a pretty excellent possibility of enabling the learners to obtain that understanding, then we need to design evaluation tasks which will truly evaluate whether the results have been achieved. This process is simple to condition, but very challenging to acquire in an informed way[14] .

Each of Behaviorism, Cognitivism, and Constructivism played a historical role in E-learning. A good developer does not stringently utilize only one concept when designing; rather, it is important to consider the particular studying process.

Behaviourism is currently commonly ignored as a serious theoretical base for education and learning, and incorrectly often associated with a teacher-centered model, this perspective is seriously large of the level. Regards to Jonassen conclusion, the introductory knowledge acquisition has better support by Behaviourism [15].

Behaviourism was centrally concerned to highlight active learning-by-doing with immediate feedback on success, good analysis of learning outcomes, positioning of studying goals, educational methods and tactics used to determine and assess learning outcomes.

[16] outlined key aspects when creating guidelines techniques. These include about the college pupil in the learning process, planning and sequencing information to assist in highest possible managing, and creating learning circumstances that allow and encourage learners to make connections with formerly found content. Both cognitivists and behaviorists expose the same goal, which is “communicate or return knowing to learners in the very best, efficient style possible. In both views, knowing can be analyzed, decomposed, and simple into basic fundamentals so that irrelevant information is eliminated; however, behaviorists focus is on a well-designed environment while behaviorists emphasize efficient managing techniques [17].

Cognitivism is a concept that designed in reaction to Behaviorism which concentrates on how the mind procedures and uses information). Cognitivists are considering modeling the mental components and procedures that seem necessary to more completely describe individual behavior [17].

Allen, M.W [17] mentioned in his book, Learning Theories: An Academic Viewpoint, that Cognitive concepts highlight the part of learners' ideas, principles, behaviors, and values (P.17) [17].

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The implementation of cognitivisems concept in E-Learning often includes the use of schema, or psychological charts to help arrange the learning content (P.41) [17]. Cognitivisem also offers with assisting the student tie the articles into current details to help remember the content (P. 6) [17]. This then means that cognitive concepts pay higher attention to learners' particular variations and try to provide them by getting the materials in different ways (P. 5)[18].

Constructivism is now one of the major pedagogies used in education and learning. It promotes learners to build their own understanding according to personal knowledge and apply this right away to their environment. The concentrate in this approach is on learning rather than teaching. Constructivist pedagogy recognizes the college pupil at the hub of the chance to learn rather than the teacher. In the E-environment it is difficult to sustain the conventional part of the teacher, but more than that, that Internet makes the college pupil to definitely practice their studying and gives them such a level of choice, of what to research, where to research, how to research and with whom. By setting the student at the centre of the learning experience we are speeding up the process of learning. During this process knowledge has being built and used according to the student personal experience. Students or learners need to take responsibility for the studying. They have to be active participant and dynamic in their chance to learn rather than an inactive boat to be loaded with details. As a result, Constructivism makes learners to be outdoorsmen looking out for information, making relationships and building knowledge [19].

Connectivism learning theory focuses on the value of training learners to search for, narrow, evaluate and synthesize information in order to acquire knowledge. Connectivism provides an ideological structure that can affect how experts design and create educational resources for higher education programs.

This structure places focus on building the learner’s ability to get around and hook up current information beyond knowledge of the current course. Students within a connectivism model of studying in educational technology sessions should display certain conducts to experience educational success.

In connectivism, the beginning for learning happens when (understanding or knowledge) is motivated through the procedure of learning, the process of a learner connecting to and providing details into a studying group. A group is a collection of related areas of interest that allows for interaction between the group member, so they can share, dialoguing and thinking together. To explore connectivist model, a studying group is described as a node, which is always part of a bigger network-system. Nodes happen out of the relationship points that are found on a system. A system is consists of two or more nodes attached in order to share the network resources. Nodes may be of different size and durability, with regards to the attention of details, data, information and the amount of people who are moving through a particular node [20]. By applying the idea of connectivism, information is allocated across the network system and can be saved in a wide range of different type of digital formats.

[21] describes the value of networked, online social learning in regards to contemporary areas of research such as Educational Technological innovation, in opening Courses learning system, learners had to be able to get into the group themselves and affect the shape of its program as well as their own learning. The part of the trainer in all of this is to provide presenting a current expert group in which learners may participate to offer not just a screen, but an access way into a current studying group.

The researchers claim, the biggest durability of connectivism learning theory; the key to success can be found in enabling learners to become dynamic individuals in developing and building the cannon in their particular areas of research.

5. methodology of m-learning for computer science and engineering courses design

It is commonly recognized that more must be done to link the education/computer science partition and make a truly interdisciplinary way to offer learning design and style, if instructors are to be convinced to perform with this strategy, since the specialized complications engaged are often not recognized by instructors as being appropriate to their needs. The key to accomplishing effective results is Interaction, discovering the right mix of individual and technical components, which is essential to training learners how to learn online. Unique interest should also be instructed to non-traditional learners who have the extra stress of solving time disputes between E-learning, M-learning, perform, and members of the family life [22][23].

6. learning theories correlated to computer science and engineering courses

[24] has mentioned Behaviorism theory in instructional technological innovation that includes Behaviorism theory. He declares that there are many factors of Behaviorism that are positive and that have led to the growth of important instructional technologies innovation. Illustrations of Behaviorism in current developments are instructional software and computer-assisted instructions.

[25] also mentioned the use of tools and exercise tutorials, with individual instructions and feedback tool and practice. This type of learning, where a student is compensated through motivating short message/comment before going on to the next aim level of learning .

Behavior is especially obvious in the use of the video games. Learning actions/behavior is being gradually compensated as each level of the game is achieved. In case of computer science and engineering course the student's learning of basic technological terms, explanations of elements, and understanding technical processes can be carried out through structured programs provided through Mobile application or Mobile website.

We can, therefore instantly see a place for mobile information communication technology in education and learning, both as a source of information and also, if arranged successfully, a perspective or framework for learning simple abilities and ideas [25].

Cognitive theory deals with the intellectual procedures behind learning, storage, and problem solving. It determines, among several methods, an information processing approach to describe how the mind works. In other word of this design, the mind is considered to be portioned into three sections, sensory, working, and long term memory [26].

[27] postulate that the idea of highly effective learning environment has to be along with more particular cognitive theories of instructional design. In particular it has to be assured that highly effective learning environments are developed in positioning with the human cognitive structure and its handling abilities and restrictions. Moreover, it has to be known that all learning techniques such as those that are constructive, genuine, supportive, and self-controlled have a base of the Cognitivism. Therefore, cognitive structures are included in the creation and manipulation of effective learning systems.

The information processing in computer science cognitive information processing theory involves the use of various types of memory. For instance, in Pc Technology, these memories are RAM (Random Access Memory), ROM (Read Only Memory), and permanent/long lasting memory such as hard disks, CDs, and flash drives. In cognitive information processing theory, these memories are known as sensory, short-term, and long-term. Particularly, the cognitive information processing theory can be linked to the computer science approach/mobile device of processing information by using space for storage manipulation as well as the retrieval of information [28]. Sensory, short term memory and long term memory are considered the role of cognitive information processing theory. Sensory memory can be related to the mobile device memory with the transduction of energy (Battery or charger mobile device) and the communication with the network (Mobile, Wi-Fi, GPS, etc...), also short-term memory or working memory related to mobile device memory as ROM memory in computer science. While, the long-term space for storage contains details that may be retrieved upon request. This matched the permanent storage in the server side of the Mobile learning system.

In the constructivist theory, learning is an effective procedure in which students build new concepts or ideas based on both their present and previous knowledge. Students are motivated to be effective constructors of knowledge, with mobile devices now embedding them in a genuine perspective at the same time as providing entry to assisting resources. The most powerful illustrations of the enactment of constructivist principles with mobile technology come from a type of learning terminology 'participatory simulations', where the students themselves act out key areas in an immersive adventure of a active system. For instance, the Virus Game and the Environmental Detectives. Constructivist methods in information technology knowledge place the objectives on learners to discover knowledge by themselves when placed in the suitable situation [28][29]. Constructivism is the main approach used in E-learning. This strategy is used by means of interactions, constructivist action and meeting to allow the student to develop an knowing and the significance of the problems and to create new understanding on the basis for information [30]. Same meaning can be applied to M-learning of computer science and engineering courses. For effective education in m-learning environment, instructors and learners both need to understand the characteristics of the social interaction, the quality of the relations, and the connections will make sure communicative proficiency, such as the exchange of knowledge, information, experience, and the improvement of skills [30].

Connectivism learning theory focuses on the value of training learners to search for, narrow, evaluate and synthesize information in order to acquire knowledge. Connectivism provides an ideological structure that can affect how experts design and create educational resources for higher education programs, for instance, computer science and engineering courses.

[31] based on Siemens Connectivism theory, identified some restrictions about course environment which are showed as one perspective of a topic and provided in solitude. Courses are designed under the supposition that learning only happens in a certain period of time. Therefore, learning is not dynamic, social or complicated. In this perspective, conventional learning environment are not designed beyond the educational class room. [31] points out that connectivism is established in relationships which require that students communicate with components that increase the learning process beyond the educational class room and allow real activities of learning. Under the connectivism concepts education and learning is complete, where harmony between student needs and institutional needs is critical.

7. Conclusion

Behaviorist, Cognitivist, Constructivist and Connectivist theories have provided in different ways to the design of on the internet learning materials, and they will continue to be used to create and design learning materials for E-learning and M-learning. Connectivism provides an ideological structure that can affect how experts design and create educational resources and tools for higher education programs. In addition to the current learning concepts and theories, connectivism with the help of other learning theories should be used to design and development of online learning systems. The use of M-learning objects to advertise versatility, and use of on the internet components in order to fulfill the needs of individual students, will become more common later on. Online learning components will be designed in small consistent sections, so that they can be remodeled for different students and different situations. We now need a strategy to guide the development of M-learning materials for computer science and engineering courses. Teachers should be able to evolve current existing learning theories for computer science and engineering courses, while at the same time using the concepts of connectivism to guide the development of effective learning materials. What is required is not a new theory of learning, but a model that combines the different concepts to of learning theories to guide the design of M-learning materials.

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