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A Review on Mobile Cloud Learning In Higher Education

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ABSTRACT
Versatile cloud taking in, a blend of portable learning and distributed computing, is a moderately new idea that holds significant guarantee for future advancement and conveyance in the instruction parts. Distributed computing offers portable realizing some assistance with overcoming deterrents identified with versatile processing. The principle center of this paper is to investigate how distributed computing changes conventional versatile learning. A contextual analysis of the use of Moodle in the cloud by means of portable learning in Khalifa University was directed.
Keywords: Cloud computing; mobile learning; mobile cloud learning; Moodle; higher education

I. INTRODUCTION

The quick advance of versatile innovation turns into a capable pattern in the improvement of portable learning (Bai, Shen, Chen, and Zhuo, 2011). Nonetheless, because of the high expenses of cell phones, systems, low system transmission rate, and restricted training assets, versatile learning is not generally sent (Li, 2010). With the nonstop fast improvement and across the board uses of new data advances, distributed computing is bringing significant changes and new leaps forward in educating and learning. It is turning into the predominant strategy in which portable, on the web, and different sorts of uses work (Rao, Sasidhar, and Kumar, 2010).

Distributed computing is "a model for empowering universal, advantageous on-interest system access to a common pool of configurable processing assets (e.g., systems, servers, stockpiling, applications, and administrations) that can be quickly provisioned and discharged with negligible administration exertion or administration supplier connection" (Mell and Grance, 2009). It has two inalienable qualities: versatility (asset scaling up) and asset pooling (running different free administrations) (Hirsch and Ng, 2011). Distributed computing makes up the insufficiencies of versatile learning and prompts an upheaval in portable learning. Distributed computing can store a tremendous measure of instructive assets and give framework, stage, and application administrations for clients as opposed to giving clients a chance to save them in their gadgets (Li, 2010). It can likewise give boundless processing energy to the finishing of different sorts of use (Chen, Liu, Han, and Xu, 2010).

Versatile cloud learning is an amalgamation between distributed computing and portable learning (Hirsch and Ng, 2011). It coordinates the distributed computing into the portable environment and overcomes impediments identified with versatile registering (Dinh, Lee,

Niyato, and Wang, 2011). In this paper, we analyze portable cloud learning and investigate how it can be utilized as a part of advanced education. We accomplish this through a brief contextual investigation of the usage of Mobile Moodle in Khalifa University, Abu Dhabi, and UAE.

II. BACKGROUND
Definition of Mobile Cloud Learning

Versatile cloud learning (Figure 1), a novel unification of distributed computing and portable learning, is a generally new idea that holds awesome guarantee for future advancement of instruction (Hirsch and Ng, 2011).
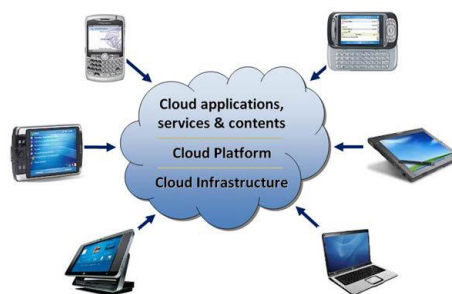

Figure 1.The concept of mobile cloud learning (Hirsch & Ng, 2011).

Portable learning has been developing, from the early meanings of "learning with cell phones" (Harris, 2011; Kossen, 2001) to the present wording that underscores learner portability, coming about because of the utilization of cell phones. The movement of the portable taking in definition changes the center from cell phones to versatile learners, and requires planners not to outline guidelines for another class of portable advancements, yet to expand their points of view of what portability for the learner involves in connection to learning. Strictly when perceiving this center movement in outline can creators distinguish a dichotomy of rules with one set

concentrating on the innovation and one set concentrating on the learner. What's more, portable taking in exploration from versatile learners' points of view require the investigation of "… how the portability of learners expanded by individual and open innovation can add to the procedure of increasing new information, abilities, and experience" (Sharples, Arnedillo-Sánchez, Milrad, and Vavoula, 2009). This multidimensional perspective of portability enormously advances the talk in versatile learning furthermore postures new bearings for innovative work in this field.

Versatile learning empowers learners to secure learning content whenever anyplace by means of convenient gadgets. Be that as it may, low preparing force and memory requirements of cell phones, costly system association expenses, moderate system transmission, and restricted instructive assets on a very basic level farthest point the improvement of versatile learning (Li, 2010). Versatile cloud learning coordinates distributed computing into portable learning. The benefits of distributed computing, for example, huge information stockpiling, elite figuring, and simple access overcome impediments identified with portable learning (Dinh, Lee, Niyato, and Wang, 2011). Figure 2 demonstrates the engineering of versatile cloud learning. In portable cloud learning, learners can get to substance, for example, content based records, sound, and video documents, over the Cloud through their cell phones associated with the Internet, (for example, GPRS, UMTS, HSPA, WiFi, WiMAX, or LTE) (Rao, Sasidhar, and Kumar, 2010; Kitanov and Davcev, 2012).
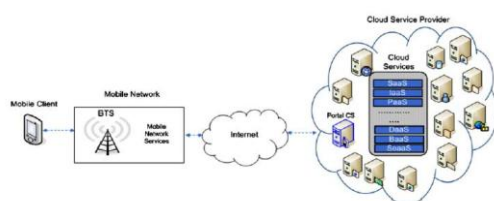

Figure 2.Mobile cloud learning architecture (Khan, Kiah, Khan, &Madani, 2012).

Benefits of mobile cloud learning.

Customary portable learning must manage the accompanying disadvantages—high gadget and system costs, low system transmission rates, and restricted training assets accessible. Consolidating the benefits of portable learning and distributed computing, versatile cloud learning is acquainted with understand these restrictions (Kitanov and Davcev, 2012). Weber (2011) contends "more noteworthy availability between concentrated server-side applications and minimal effort/low processor limit cell phones could give better get to,

more control, and more prominent flexibility for e-learners" (p. 565).

Portable cloud learning has various advantages to both the substance suppliers and the learners. As a matter of first importance, it costs less. For substance suppliers, it spares the vast introductory cost, spending on equipment and programming caused when introducing a wide range of frameworks (Freeman, 2000). By paying normal month to month charges, even little schools and colleges, which can't legitimize the arrival on-speculation for the high starting setup expenses can give versatile cloud learning administrations without spending substantial set-up expenses for foundation (Hirsch and Ng, 2011). Also, they don't have to in a flash keep up and redesign equipment or programming. In the interim, since all processing, stockpiling, and redesigns are finished on the cloud side, cell phones serve for showcase just (Mohamudally, 2011). Therefore, clients can use electronic applications on their cell phones with little memory spaces in light of the fact that there is no requirement for programming stacking and archive sparing (Rao, Sasidhar, and Kumar, 2010). They can utilize variable cell phones to get to learning content without buying, introducing, or upgrading any product.

Second, versatile cloud learning can likewise be effortlessly gotten to the length of a portable system is accessible. Palmer and Dodson (2011) bring up that rustic understudies, who don't have entry to fast broadband Internet associations, can get to educational modules content effectively by means of 3G portable advances. They can utilize administrations from the cloud server farm for learning chose points over their cell telephones notwithstanding when they are in a little town or remote range (Rao, Sasidhar, and Kumar, 2010). Albeit one might require a membership, versatile cloud learning is open access to everyone. The way that individuals may get to such a project through their cell phones makes it helpful for them in any part of the world to get to learning assets (Woodill, 2010).

Third, since learning assets put away in mists are shared crosswise over various schools and colleges, more instructive assets are accessible for portable cloud learning clients. Also, novel applications and administrations, which enhance joint effort, can be executed, for example, cooperation instruments between understudies of various organizations, social groups, and then some (Hirsch and Ng, 2011).

At long last, versatile cloud learning is additionally adaptable and considers conformities, contingent on learners' needs. Since it is gotten to through membership, the client does not have to know

where the learning sources are (Rittinghouse and Ransome, 2009).

Characteristics of mobile cloud learning.
Versatile cloud learning has the accompanying qualities.

1) Storage and sharing: Learning results and assets can be put away in the "Cloud," which gives verging on boundless store and calculation limits. Reports can be usually altered and partook in the "Cloud, for example, administrations gave by GoogleDocs, Live Skydrive, and Office Live.

2) Universal availability: Learners can think about the length of they have entry to the system. Versatile cloud adapting additionally makes an ease access terminal conceivable, in light of the fact that product, applications, and information are all worked in the cloud servers. This enhanced openness can extraordinarily advantage creating locales.

3) Collaborative communications: Learners can coordinate anyplace in the "Cloud." From social learning points of view, they can cooperatively manufacture normal information through regular and helpful connections.

4) Learner focused: Mobile cloud learning is intensely individuals situated, which meets the individual needs of learners. Learners in the "Cloud" select suitable assets and can track their learning advancement and results.

Given the above qualities, portable cloud learning is generally used to empower correspondence in the middle of instructors and understudies, deal with the educating and learning procedures, and add information to intrigued and willing clients, used among learners, et cetera. (Chang, Bacigalupo, Wills, and De Roure, 2010).

The reactions of learners to utilizing this learning technique are amazing. Most studies share the finding that right now youngsters locally convey through the dialect of cellular telephones, the Internet, and informal organizations. Today's learners have all the more promptly grasped learning and instructive advances contrasted with other customary learning strategies, as these new learning techniques permit them to share their insight and encounters through online destinations. Learners have additionally been recognized as showing better learning practices, while utilizing these learning advancements, since they are an adaptable, "fun" approach to learn, and reasonable (Sharif, 2010).

In a late study of understudies in a UAE college, an extensive rate of learners (around 80%) use portable PCs, cell telephones, or both consistently for their learning purposes. Kennington, Olinick, and Rajan (2010) discovered most learners uncovered that devices, for example, tablets and cell telephones, are unquestionable requirements and that Internet access is totally vital. Moreover, learners need learning situations to be more liberated and more agreeable than classrooms. They lean toward casual places as opposed to formal ones. Portable cloud learning gives such an open door, permitting learners to check their timetables, acquire guide's notes/assignments, complete research, and even take in a whole course utilizing the same procedure (Kennington, Olinick, and Rajan, 2010).

The Use of Mobile Cloud Learning in Middle Eastern Regions
Despite the fact that distributed computing has been presented everywhere throughout the world, created nations use it more than their creating partners. Among the nations in the Middle East, some are exceedingly created, while others are still immature. These nations are in a Muslim area and have very distinctive ways of life and view of issues contrasted and non-Islamic nations. In any case, Islamic and non-Islamic nations have the same requirements for cutting edge advancements, including the training area (Eze and Onyegegbu, 2006). More individuals, including young ladies and ladies, are getting to be taught today than various years prior in these Islamic nations.

Despite the fact that numerous nations in the Middle East are Islamic nations, each is remarkable. Huge difficulties originate from the heterogeneous way of their economies, geology, legislative issues, and societies. The district has differing dialects, societies, and religions, in spite of the fact that the broadly honed religion is Islam. Subsequently, uncommon alternatives must be considered during the time spent planning and creating propelled innovation applications, for example, portable cloud learning. For instance, the economies of the nations in this district are not at the same level. A few nations are exceptionally rich because of the oil business, while others are poor because of their areas in a dry to semi-bone-dry territory (Jaatun, Zhao, and Rong, 2010). Accordingly, a unique mix of arrangements about innovation redesigns must be made to guarantee the immature nations can bear the cost of the expenses. Also, the innovation levels of the nations in this locale are not the same. A few nations, for example, UAE, are more exceptional than different nations, which are as yet attempting to embrace the constantly evolving innovation (Al-Zoube, El-Seoud, and Wyne, 2010).

By (2011), there is a broad lack of qualified data and correspondence innovation (ICT) experts, preparing programs, and prepared e-learning instructive staff in the Middle East and North African locale. Some Middle Eastern nations, for example, Saudi Arabia, Bahrain, and Yemen, are encountering the thundering of dispute identified with late political changes in a few North African nations. The general public and instructive activities in Middle East nations are without a doubt disturbed. In this way, leasing PC stages and adaptable force turns into a sensible alternative for instructive foundations in this locale to manage the risk of potential devastation of equipment. Portable cloud learning can be planned fittingly for a particular gathering of individuals or a particular district. Without utilizing additional offices, the data innovation (IT) authorities might outline the learning procedure to meet the necessities of individuals in remote regions or the individuals who are not prosperous. For instance, rather than having a one-time membership, they might present a learning procedure where one can get to the cloud through groups. For Islam nations, the procedure might be intended for a percentage of the Middle Eastern dialects among others. This innovation is additionally alluded to as a borderless learning technique, which implies proficiency can contact unique individuals in profoundly remote regions where there are no libraries, guides, and/or schools (Xu, Wang, and Li, 2011).

III. MOODLE IN THE CLOUD

Moodle is a broadly embraced open source learning administration framework (LMS), otherwise called a course administration framework (CMS) or a virtual learning environment (VLE) (Bamiah, Brohi, and Chuprat, 2012), which bolsters both little and extensive organizations (with a few destinations well past a large number of clients) and incorporates course administration instruments, different Web 2.0 advances, online evaluations, joining with written falsification identification apparatuses, reconciliation with stores and electronic portfolio programming, and different elements normal to learning administration frameworks. As Xhafa, Caballé, Rustarazo, and Barolli (2010) contend, "Moodle recognizes for simple arrangement and upkeep and in addition content course creation. An incredible favorable position of utilizing Moodle is the effortlessness of substance creation, including discussion, surveys, assignments, wikis, talks, and so on" (p. 207). By Statistics, Moodle is available in 223 nations, at 70,736 locales, facilitating 6,790,797 courses, and 63,218,611 clients and 1,290,273 teachers. The main 10 nations utilizing Moodle by enlistments are appeared in Table 1.

Table 1

Country	Registrations
United States	12,087
Spain	6,143
Brazil	5,088
United Kingdom	3,949
Germany	2,962
Mexico	2,897
Portugal	2,163
Colombia	1,940
Australia	1,720
Italy	1,692

Top 10 Countries Using Moodle by Registrations

The normal way of setting up Moodle is to install it on a Windows or a Linux server in a data center, and manage it as part of an IT system. The setting up requires large investments in hardware and software. If Moodle is hosted in the Cloud, no big investments are needed.

Take Azure of Microsoft as an example of a platform in the cloud. First, the original Moodle must be converted to operate on Azure. Moodle on Azure, an open source tool, can achieve the conversion automatically, while making minimal alterations to the original Moodle. It is used to migrate locally hosted Moodle to the cloud/Azure environment. The current version of Moodle on Azure, open for public download, is capable of converting original Moodle 2.2. It is composed of patches and support extensions that make Moodle run well on Azure, either as a new installation or as a reinstallation.

Then, the operation of Moodle on Azure will generate a package ready for uploading to Azure for deployment. The download and upload processes are necessary because this is the method to ensure that customized Moodle works on Azure. However, the uploaded package can be installed only on one virtual server on the cloud (Morgado& Schmidt, 2012).

Now Moodle running in the cloud is ready for learners to access. Mobile learning learners can visit learning resources inside the Moodle stored in the cloud. In this way, education institutions do not need to purchase expensive web servers to host their learning management systems. They do not need to hire an information technology team to maintain and update these systems. For learners, they do not need to buy mobile devices that have huge storage space and strong computation ability. In this case, Moodle is running in the cloud and

data are stored in the cloud too. All they need to do is access the learning materials with their mobile devices via the Internet.

Implementation of Mobile Moodle in the Cloud at Khalifa University

The greatest advantages for Khalifa University to move Moodle to the cloud are that speculations and assets to work its own particular servers are spared. Thus, KhalifaUniverstiy can concentrate on supporting learners and educators/teachers as required. Another advantage to moving Moodle to the Cloud is off-grounds clients can get to it by means of cell phones, for example, keen cellular telephones and iPad.

Khalifa University as of now runs Moodle Version 1.9. To execute Moodle on the cloud, Moodle was moved up to Version 2.0 on the grounds that more up to date renditions can bolster advanced mobile phones accurately. The applications presented by Moodle 2.0 are the prevalent worldview for portable advancement. Some Moodle 2.0 applications are alluring, for example, myMobile and mBot. In view of Moodle 2.0+ and JqueryMobile, myMobile is tweaked and streamlined for supporting advanced mobile phone gadgets and tablets. As an Android application for Moodle, mBot recollects certifications, logs and pages clients visit and records assignments. It can likewise open Microsoft Office reports and even add clients' cohorts to their Google contacts. Moodle Apps 1.0, which can be redone too, has a few alternatives to address clients' issues and prerequisites.

What's more, Banner, an understudy data framework, is coordinated with Moodle in Khalifa University. In spite of the fact that they both work on the nearby/in-house Active Directory Server, their validation components are distinctive. At the end of the day, even with the same username and secret word, clients must logon to the two frameworks distinctively or ONE BY ONE. They can't get to the two frameworks with a solitary login. Lamentably, moving Moodle to the cloud does not alter this issue. As Hirsch and Ng (2011) attest, reconciliation is still one of the difficulties for versatile cloud learning.

Innovation coordination in Khalifa University is based upon sound pedagogical establishments. Taking after social constructivism, the joining of Moodle and Banner means to encourage an understudy focused learning environment. Another goal of the reconciliation is to encourage correspondences among understudies, in the middle of understudies and instructors, and also in the middle of understudies and assets.
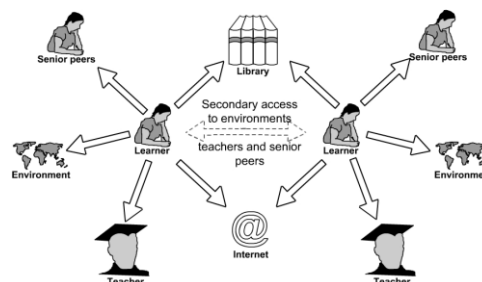

Figure: 3. the learner centered collaborative environment.

Moodle in the cloud encourages joint effort too. Learning through social cooperation is a vital piece of social constructivism. Learner-focused learning cooperation gave by Moodle in the cloud enhances learner engagement, as well as creates individual acumen and comprehension of the substance. Learners have entry to a more extensive scope of assets, because of the coordinated effort between Khalifa University and across the nation and worldwide instruction segments. For educators and instructors, working together with different specialists gets to be advantageous. Besides, the contact in the middle of teachers and learners grows off grounds.

IV. DISCUSSION

In spite of the fact that Moodle is generally utilized as a part of the training segment the world over, a few educators and understudies are unwilling to acknowledge this innovation. Despite the fact that Moodle is moved to the cloud, the issue of acknowledgment still exists. Ambraziene, Miseviciene, and Budnikas (2011) contend that the expectation to absorb information for mastering Moodle is high for educators and understudies. In this manner, they don't utilize it all the time—just for instructive purposes. Understudies are unwilling to utilize Moodle in light of the fact that it doesn't have elements to bolster their dynamic correspondences and coordinated efforts. Since social correspondence is an imperative perspective for learning (Mason, 2008) joining some person to person communication devices for instruction with Moodle might be useful to encourage learning and educating.

Both Google and Microsoft offer free cloud email and joint effort administrations to instructive organizations. Microsoft Live@edu, a cloud-based email framework that contains specialized apparatuses, for example, texting alongside contact administration and timetable programming, has a free module for Moodle. Instructors and understudies can utilize Live@edu email administration, and additionally different administrations, for example, distributed storage of 25GB, information synchronization, texting, and

Microsoft Office applications in the program (Ambraziene, Miseviciene, and Budnikas, 2011).

Khalifa University can coordinate Moodle with Live@edu email framework by utilizing an attachment as a part of from Education Labs. Along these lines, Moodle can serve as the primary entry of learning assets for understudies, whether they are on-grounds or off-grounds. Moreover, the joining of Moodle and Live@edu gives understudies a solitary sign-on to their email accounts, distributed storage space, and Moodle. Since Moodle transforms into a piece of understudies' dynamic correspondences and joint efforts, it is much less demanding to be acknowledged by clients.

Then, the difficulties in portable cloud learning ought not be neglected.

1) Versatile system condition. Portable cloud learning relies on upon learners' remote association. The nature of the versatile systems won't not be sufficient for conveying attractive client experience by means of the coordinated effort between cell phones and cloud administrations (Hung, Shih, Shieh, Lee, and Huang, 2012).

2) Control of utilizations. Learning materials are put away on the cloud and calculations are performed on the cloud; learners are no more in full control of utilizations (Hung, Shih, Shieh, Lee, and Huang, 2012).

3) Security and protection. Learners' delicate data and their protection can be effectively disregarded when cloud suppliers use client information for asserted purposes (Dinh, Lee, Niyato, and Wang, 2011; Hung, Shih, Shieh, Lee, and Huang, 2012).

V. CONCLUSION

Portable cloud adapting emphatically impacts the learning process, as seen from both instructors and learners. In spite of the fact that it might be more unwieldy for some to get to the system than others, it makes it less demanding for more individuals to get information through their cell phones without agonizing much over other equipment. As it were, versatile cloud learning conveys the classroom to the understudy dissimilar to other conventional strategies. It is of advantage to the learners as well as to the teachers in their classroom administration. In the interim, learners must run the dangers, for example, losing control of uses and harm to individual data security and protection, to exploit portable cloud learning.

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