

Sustainable Development for Higher Education Sector using Mobile Cloud with Moodle

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Cloud computing generally refers to an Internet-based computing model that various PCs and servers are associated with Internet, operating systems, software and database. These resources can be shared by multiple clients based upon their demands (Chi and Gao, 2011). Cloud computing makes up the inadequacies of mobile learning and leads to a revolution in mobile learning. Cloud computing can store a huge amount of educational resources and provide infrastructure, platform, and application services for users instead of letting users save them in their devices (Li, 2010). It can also provide unlimited computing power for the completion of various types of application (Chen, Liu, Han, & Xu, 2010). cloud learning is an amalgamation between cloud computing and mobile learning (Hirsch & Ng, 2011). It integrates the cloud computing into the mobile environment and overcomes obstacles related to mobile computing (Dinh, Lee, Niyato, & Wang, 2011). In this paper, we examine mobile cloud learning and explore how it can be used in higher education. We achieve this through a brief case study of the implementation of Mobile Moodle at a University in United State.

2. UNDERSTAND OF CLOUD LEARNING

Mobile cloud learning (Figure 1), a novel unification of cloud computing and mobile learning, is a relatively new concept that holds great promise for future development of education (Hirsch & Ng, 2011).

ABSTRACT

Mobile cloud learning, a combination of mobile learning and cloud computing, is a relatively new concept that holds considerable promise for future development and delivery in the education sectors. This paper investigates the use of a cloud computing environment to facilitate the teaching of web development at a university. A between-subjects study of students in a web development course was conducted to assess the merits of a cloud computing environment instead of personal computers. A between-subjects study of students in a web development course was conducted to assess the merits of a cloud computing environment instead of personal computers. The main focus of this paper is to explore how cloud computing changes traditional mobile learning.

KEYWORDS: Cloud Computing; Mobile learning; Mobile Cloud learning; Moodle

1. INTRODUCTION

The concept of cloud computing was jointly proposed by Google and IBM in 2007 (Wang and Xing, 2011). Cloud computing is a computing platform that resides in a large data centre and is able to dynamically provide servers with the ability to address a wide range of needs, from scientific research to e-commerce (Jaeger et al., 2008). Cloud computing generally refers to an Internet-based computing model that various PCs and servers are associated with Internet, operating systems, software and database. These resources can be shared by multiple clients based upon their demands (Chi and Gao, 2011).



Figure1. The concept of mobile cloud learning (Hirsch & Ng, 2011).

Mobile learning has been evolving, from the early definitions of "learning with mobile devices" (Harris, 2011; Kossen, 2001) to the current terminology that emphasizes learner mobility, resulting from the use of mobile devices. The shift of the mobile learning definition changes the focus from mobile devices to mobile learners, and requires designers not to design instructions for a new class of mobile technologies, but to broaden their perspectives of what mobility for the learner entails in relation to learning.

Mobile learning enables learners to acquire learning content anytime anywhere via portable devices. But low processing

power and memory constraints of mobile devices, expensive network connection fees, slow network transmission, and limited educational resources fundamentally limit the development of mobile learning (Li, 2010). Mobile cloud learning integrates cloud computing into mobile learning.

3. BENEFITS

Personalized Learning – Cloud computing affords opportunities for greater student choice in learning. Using an Internet-connected device, students can access a wide array of resources and software tools that suit their learning styles and interests.

Reduced Capital Investment Costs – Cloud-based services can help schools reduce capital investment costs and accelerate the use of new technologies to meet evolving educational needs.

Mobile cloud learning has a number of benefits to both the content providers and the learners. First and foremost, it costs less. For content providers, it saves the large initial cost, spending on hardware and software incurred when installing all kinds of systems (Freeman, 2000). By paying regular monthly fees, even small schools and universities, which cannot justify the return-on-investment for the high initial setup costs can provide mobile cloud learning services without spending large set-up costs for infrastructure (Hirsch & Ng, 2011). As a result, users can utilize web-based applications on their mobile devices with small memory spaces because there is no need for software loading and document saving (Rao, Sasidhar, & Kumar, 2010). While cloud computing has many benefits, it also involves risks, and has privacy and security implications. School authority leaders have an important role to play in making decisions about cloud-based services and in developing guidelines for use. School authority leaders, educators, IT leaders, legal counsel and FOIP coordinators should work together to balance value and risks.

Mobile cloud learning can also be easily accessed as long as a mobile network is available. Palmer and Dodson (2011) point out that rural students, who do not have access to high-speed broadband Internet connections, can access curriculum content easily via 3G mobile technologies. They can use services from the cloud data center for learning selected topics over their mobile phones even when they are in a small village or remote area (Rao, Sasidhar, & Kumar, 2010).

Learning resources stored in clouds are shared across different schools and universities, more educational resources are available for mobile cloud learning users. In addition, novel applications and services, which improve collaboration, can be implemented.

Finally, mobile cloud learning is also flexible and allows for adjustments, depending upon learners' needs. Since it is accessed through subscription, the user does not need to know where the learning sources are (Rittinghouse & Ransome, 2009).

4. CHARACTERISTICS OF MOBILE CLOUD LEARNING

Mobile cloud learning has the following characteristics.

1. Storage and sharing: Learning outcomes and resources can be stored in the "Cloud," which provides almost

unlimited store and computation capacities. Documents can be commonly edited and shared in the "Cloud," such as services provided by GoogleDocs, Live Skydrive, and Office Live.

- 2. Universal accessibility:** Learners can study as long as they have access to the network. Mobile cloud learning also makes a low-cost access terminal possible, because software, applications, and data are all operated in the cloud servers. This improved accessibility can greatly benefit developing regions.
- 3. Collaborative interactions:** Learners can cooperate anywhere in the "Cloud." From social learning perspectives, they can collaboratively build common knowledge through frequent and convenient interactions.
- 4. Learner centered:** Mobile cloud learning is heavily people-oriented, which meets the individual needs of learners. Learners in the "Cloud" select suitable resources and can track their learning progress and outcomes.

Given the above characteristics, mobile cloud learning is mostly utilized to enable communication between educators and students, manage the teaching and learning processes, and add knowledge to interested and willing users, utilized among learners, and so on. (Chang, Bacigalupo, Wills, & De Roure, 2010). Today's learners have more readily embraced learning and educational technologies compared to other traditional learning methods, as these new learning methods allow them to share their knowledge and experiences through online sites. Learners have also been identified as exhibiting better learning behaviors, while using these learning technologies, since they are a flexible, 'fun' way to learn, and manageable (Sharif, 2010).

5. CLOUD WITH MOODLE

Moodle is a widely adopted open source learning management system (LMS), also known as a course management system (CMS) or a virtual learning environment (VLE) (Bamiah, Brohi, & Chuprat, 2012), which supports both small and large deployments (with several sites well beyond millions of users) and includes course management tools, various Web 2.0 technologies, online assessments, integration with plagiarism detection tools, integration with repositories and electronic portfolio software, and other features common to learning management systems. creation. A great advantage of using Moodle is the easiness of content creation, including forum, questionnaires, tasks, wikis, chats, etc." (p. 207). According to Moodle Statistics, Moodle is present in 223 countries, at 70,736 sites, hosting 6,790,797 courses, and 63,218,611 users and 1,290,273 instructors.

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. 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). 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.

Moodle in the cloud facilitates collaboration as well. Learning through social interactions is an important part of social constructivism. Learner-centered learning interactions provided by Moodle in the cloud not only improves learner engagement, but also develops personal intellect and understanding of the content. For professors and teachers, collaborating with other researchers becomes convenient. Furthermore, the contact between instructors and learners expands off campus.

6. DISCUSSION

Although Moodle is widely used in the education sector around the world, some instructors and students are unwilling to accept this technology. Even though Moodle is moved to the cloud, the problem of acceptance still exists. Ambraziene, Miseviciene, and Budnikas (2011) argue that the learning curve for mastering Moodle is high for instructors and students. Therefore, they do not use it very often—only for educational purposes. Students are unwilling to use Moodle because it does not have features to support their active communications and collaborations. Since social communication is an important aspect for learning (Mason, 2008) combining some social networking tools for education with Moodle may be helpful to facilitate learning and teaching.

Google and Microsoft offer free cloud email and collaboration services to educational institutions. Microsoft Live@edu, a cloud-based email system that contains communication tools, such as instant messaging along with contact management and calendar software, has a free plugin for Moodle. Teachers and students can use Live@edu e-mail service, as well as other services, such as cloud storage of 25GB, data synchronization, instant messaging, and Microsoft Office applications in the browser (Ambraziene, Miseviciene, & Budnikas, 2011). Furthermore, the integration of Moodle and Live@edu provides students with a single sign-on to their email accounts, cloud storage space, and Moodle. Because Moodle turns into a part of students' active communications and collaborations, it is much easier to be accepted by users. Challenges in mobile cloud learning should not be overlooked such as mobile network condition, control of applications, security and privacy.

7. CONCLUSION

Mobile cloud learning positively influences the learning process, as seen from both educators and learners. Although it may be more cumbersome for some to access the program than others, it makes it easier for more people to obtain knowledge through their mobile devices without worrying much about other hardware. In other words, mobile cloud learning brings the classroom to the student unlike other traditional methods. It is of benefit not only to the learners but also to the educators in their classroom management. Meanwhile, learners must run the risks, such as losing control of applications and damage to personal information security and privacy, to take advantage of mobile cloud learning.

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