

On E-Learning in Cloud and Social Networks

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Given that cloud computing brings more advantages than disadvantages in every area that they have been implemented, starting with the cost efficiency, going through flexibility and ending with scalability, we will discuss how cloud technologies could be used in combination with e-learning platforms and what these platforms might gain by implementing and using cloud based technologies. Many issues related to the limitations and problems that affect e-learning platforms could be solved with the help of cloud technologies, thus we shall discuss problems like technological limitations or service uptime problems that can be solved by cloud technologies. After addressing the matter of cloud computing in e-learning, we also intend to discuss how cloud based e-learning platforms might be able to interact with social networks so as to contribute to lifelong learning. Our analysis will be based on literature review regarding recent developments in cloud computing in relation to e-learning. E-learning and social networks, in our opinion, will have to work hand in hand so as to enable a faster and more efficient passing of information towards the person that interacts with either the social network, with the e-learning platform or a combination of those two. A efficient e-learning platform, which can be obtained through the implementation of cloud technologies like SaaS (Software as a Service), IaaS (Infrastructure as a Service) or PaaS (Platform as a Service), could be combined with a social network, either well known social networks or more localized and specialized social networks that refer to specific users, for example a social network that can be accessed only by students of a certain college / university.

Keywords: cloud technology, e-learning, social networks, ontology

As technology advances, so does the means of using it for educational purposes advance. Conventional ways of teaching and learning are slowly becoming obsolete in a digital world where the new generation of students are being called Digital Natives (Prensky, 2001). This means that the as new generations of students come, it is necessary to keep up with the fact that they are native speakers when it comes to new technologies, especially in IT&C, thus conventional means of teaching have to move forward with new technologies. One of the most efficient way of dealing with the generation's need for digitized learning means is the use of e-learning platforms which combine various themes, techniques and technologies to bring a digitized completion, if not alternative, to conventional face-to-face teaching.

When we refer to all forms of electronically supported learning and teaching we include here online means such as e-learning platforms, which we shall cover in a few moments, or offline means of e-learning such as electronic courses on CDs.

In present times, e-learning platforms are gaining more and more influence due to their benefits that affect both trainers and students. These benefits come at a cost though, either a cost in time, maintenance or in actual technology that was used for the platforms, which, at first were considerable, but as Cloud Computing advances a means for affordable digital solutions and resources for Web 2.0 platforms, the cost of e-learning platforms can be reduced considerably and the quality of service can also improve.

Another aspect that has to be taken into consideration is the fact that the digital natives use technology to interact with each other through Social Networks. Definitions for social networks depend on the perspective of the research literature (Mazman. & Usluel, 2010), one definition that we abide to is that which refers to Social Networks as „a web-based services that allow individuals to (1) construct public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within” (Boyd & Ellison 2007).

Now taking into consideration that digital native speakers have the tendency to interact more through technology instead of conventional ways that imply face-to-face communication, the use of social networks such as Facebook, Twitter, Tumblr and other like these could be combined with e-learning methods that are using Cloud Technologies, or just simple e-learning platforms.

E-learning and Cloud Technologies

When it comes to implementing e-learning platforms that are either used in a university for academic courses, or at a company for professional improvements of the employees or in other such environments, there are a number of factors that are taken into consideration when trying to implement this kind of teaching method.

First of all, we discuss some of the benefits that e-learning platforms bring as opposed to conventional teaching methods:

- Benefits regarding *time*, which means that online study can be made at any time the student decides on. Students are not compelled to attend classes or go to courses at a given time. Also the fact that many e-learning platforms include downloadable content such as PDF courses or that they include audio/video streaming of recorded courses help the student learn without the constraint on his or her schedule.
- Benefits regarding *location*, which is translated in the fact that students are not restricted to any given location, e-learning platforms being accessible with the use of an internet connection. This means that students can learn „on the road”, either when they are in a public space which has a wireless connection, or at their workplace, or even at home.

- Another advantage of e-learning platforms would be that of *communication* as some authors state (Bora & Ahmed, 2013), referring to the fact that students using e-learning platforms are encouraged to discuss topics with fellow students or with trainers. We do not agree with this advantage in the context of conventional e-learning platforms due to the fact that the vast majority of platforms are Moodle based. This means that communication between themselves or with their trainers/tutors is mostly restricted to forums and not live discussions. In regards to this matter conventional means of teaching still have, in our opinion the upper hand, although e-learning platforms that have or might be combined with social networks can bring such an advantage due to their IM (Instant Messaging) system of communication or live video streaming, and due to their popularity and use amongs students and tutors alike.
- E-learning platforms are more *cost efficient* than conventional means of teaching. This is the result of the fact that courses are accessed online without the need of the tutor being present at a certain time in a certain place to teach the students, the number of tutors decreases due to the fact that online courses are mostly based around written material or recorded material which means there is a decrease in the number of tutors that have to be present in front of the students to explain the courses. Cost efficiency is also related with the reduced number of material needed for courses, due to the fact that everything is digital there is no need or little need for conventional books, whiteboards, space in which courses are held etc.
- Another benefit is the *increase in productivity*, but this is applicable only when e-learning platforms are used by companies to train their employees during downtimes. In addition to this, in today's society life long learning is a must, so companies use e-learning platforms as a means to increase their employees knowledge base so as to help with productivity matters.

These are some of the benefits that e-learning platforms bring, although there are some downsides to using an e-learning platform such as:

- ✓ Learners that have a low motivation for learning in general or that have bad study habits might fall behind in learning while using this training method.
- ✓ Isolation from other students or from instructors. This is, how we mentioned earlier, a problem that classic e-learning platforms have when it comes to community interaction.
- ✓ Students that have beginner-level computer skills might find using an e-learning platform difficult due to the manner in which they have to find the courses, attend webminaries, take online tests/exams.
- ✓ Initial investments for some educational institutions might be hard to withstand, although this problem, as we will explain later on, can be solved with the use of cloud computing.

These are just a few of the problems that conventional e-learning platforms have encountered, there are many others to add to this small list, although we will not be discussing them due to the fact that we merely wanted to show that e-learning platforms have their drawbacks as well.

As we mentioned before, cloud computing can be used as a means to increase the performance of e-learning platforms, decrease the costs related to such a platform such as power costs, maintenance costs etc. The three basic services that cloud computing brings can each be used separately or combined in order to bring out the best cost/performance ratio.

The three basic services that are brought by cloud computing are :

- ⇒ *Infrastructure as a Service* (IaaS) – Provides the consumer with the capability to provision processing, storage, networks and other fundamental computing resources, and allow the consumer to deploy and run arbitrary software, which can include operation systems applications.
- ⇒ *Platform as a Service* (PaaS) – Provides the consumer with the capability to deploy onto the cloud infrastructure, consumer created or acquired applications, produced using programming languages and tools supported by the provider.
- ⇒ *Software as a Service* (SaaS) – which uses the web to deliver third-party managed applications whose interface can be accessed on the clients' side. Most of these applications can run directly from a web browser, without the need for additional downloads or instalations although some may require small plugins so they could function. Examples of SaaS are : Google Gmail, Microsoft 365, Cisco WebEx etc.

As shown above, cloud computing offers many possibilities for use in e-learning, especially when it comes to IaaS and SaaS. The use of IaaS can reduce the costs of maintenance and eliminate the hardware investment that is usually required when starting an e-learning platform, thus the need for a server to hold the database is eliminated, the need for a storage server is eliminated etc.

For IaaS (Infrastructure as a Service), the fact that the infrastructure is that of a third-party and does not require a big initial investment reduces costs. For SaaS (Software as a Service), the third-party can provide an e-learning software/solution of its own which in turn lowers the cost on maintaining the software. And as for PaaS (Platform as a Service) there is a possibility of developing an e-learning software/solution using the provider's interface, which in our opinion is not something that can be cost-effective as opposed to the first two possibilities.

The main advantages that e-learning has from the use of cloud computing can be represented by the following:

1. As we first mentioned, the low cost of the infrastructure, the maintenance and everything that is tied to having your own machines. Organizations would benefit from this due to the fact that the service is externalized and they only pay per use, depending on how much resources their platform needs or on what services they acquired;

2. Security related issues are solved easier when in a public cloud model (Zissis & Lekkas 2012) due to the fact that third-party providers have a variety of means to deal with potential security threats regarding loss of data or hacking. Although public cloud has an increased security, they are prone to DDoS (Denial of service) attacks;
3. Performance increase due to the fact that the third-party provider has the financial means and interests to keep their machines and services at a competitive level.

On e-learning and social networks

To be able to discuss e-learning that combines the use of social networks we must find a means of turning social networks information output in a manner that can be considered *formal learning*. As we know, *formal learning* consists of learning that occurs within an organized and structured context which is designed for learning and that brings formal recognition (either a diploma, or a certificate etc.) (Lee, 2013); as for *non-formal learning*, it consists of learning embedded in planned activities that are not explicitly designed for learning, but which contain an important learning element. In both cases the learning is intentional from the learner's point of view.

With regards to social media and social networks being a source of learning, although it is *non-formal*, it brings advantages due to the impact that it has on the learner. Thus the learner gains information that helps him in the process of life long learning, although (s)he knows that no formal recognition will come for the intentional learning acquired by use of social media (blogs, Youtube tutorials etc) or social networks (Facebook, Twitter, MySpace).

The advantages that social networks could bring to e-learning are still untapped due to the lack of means or interest to turn big social networks in formal learning hybrids that combine the social interaction and impact that these have with the courses and training that e-learning platforms bring. As more and more people interact with the use of social networks and exchange data/information, more and more information that has learning potential shall be transferred between people. This learning potential could be used in a formal manner with the use of combined e-learning platforms that use cloud technology with SaaS or PaaS to relate with the social network on given topics of interest.

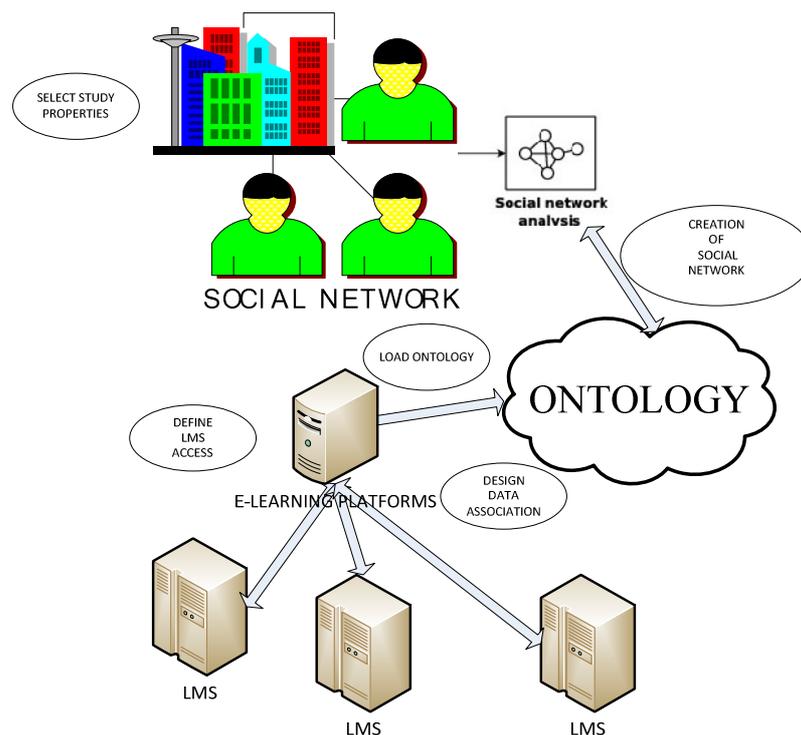
For this to work on a large scale we must first mention that in theory, localized social networks could combine such elements. For example, a social network that connects all the students of a certain domain of interest, which combines a hybrid cloud computing model or even a public cloud computing model can utilize all the services that cloud computing has to offer (SaaS, IaaS and PaaS) in order to link information regarding users of that social network such as interests, behaviour, friends etc. and combine these to find person orientated content and courses for that user. This combined with the social network's friendly user interface and with its easy method of communication, through IM's with the added support from trainers that are working on those specific courses, not necessarily for a specific e-learning platform or university,

could provide enough basis for a e-learning social network for future generations to use.

We intend to approach the way e-learning platforms interact with social networks. One of the aspects I consider essential with regard to the connection and cooperation between social networks and e-learning platforms is in terms of determining the educational offer appropriate for each user automatically based on behavioral profile the users provide within these social networks. The content of teaching materials provided should be adaptable, based on interest and specific parameters set by the user within the social networks.

In order to conduct an adequate analysis on students, teachers and study materials provided by various LMS platforms, we need to have common key frameworks that would represent the actors and the social networks. For this, we need to consider that an ontology structure as common framework through which the classrooms and positions held by people who wish to learn should be customized, based on the profile within the social network, taking into account the social relations among teachers and students and resources. From the perspective of the way this ontology should work, we propose the following procedures and key frameworks from the perspective of e-learning platforms, as shown in the figure 1.

Figure 1. Common Framework for social network interaction and e-learning process



For any object that is to be defined in accordance with this ontology, a hierarchical interaction structure needs to be set, which will lead to generating personalized content based on features of the user in the social media; the area currently used by advertisements may be used in the social networks to provide customized educational materials with a high dynamics, as result of the user's activity within that particular social network.

Conclusions

The use of cloud technology together with e-learning platforms contributes significantly to reducing costs generated by maintaining e-learning systems of high quality both in terms of way of functioning and of options made available to users, and in terms of the diverse and high-quality supply of educational products made accessible and accessed by the users.

Due to the way the educational materials are developed and presented, of the distributed form they are accessed, these materials can be continuously updated, making available the latest information to the user, customized based on the user's specific features.

By inter-connecting social networks with e-learning platforms, we hope that the educational supply have a higher level of customization based on the user's needs, performed automatically, without requiring user's intervention.

A common ontology is to be developed, able to adjust to the needs of each user, providing only appropriate content for each user, thus maximising the quantity of information acquired.

This research will be continued, we intend to study and make proposals of architectures of such systems and propose a common ontology model.

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References

- Bora, U. J., & Ahmed, M. (2013). E-learning using Cloud Computing. *International Journal of Science and Modern Engineering*, 1 (2), 9-11.
- Boyd D. M., Ellison N.B. (2007), Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, 13 (1), 210, doi:10.1111/j.1083-6101.2007.00393.x
- Lee, B. (2013). Social Media as a Non-formal Learning Platform. In *Procedia – Social and Behaviour Sciences*, 13th International Educational Technology Conference (p. 839).
- Mazman, S. G., & Usluel, Y. K. (2010). Modeling educational usage of Facebook. *Computers & Education*, 55 (2), 445, doi:10.1016/j.compedu.2010.02.008
- Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon*, 9 (5), 1.
- Zissis, D., & Lekkas, D. (2012). Addressing Cloud Computing Security Issues. *Future Generation Computer Systems*, 28 (3), pp. 583-592, doi:10.1016/j.future.2010.12.006