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Implementation of mobile learning: Universidad Tecnológica de Bolívar, Colombia

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Abstract

This article describes a technological model approach applied to the learning process of the Universidad Tecnológica de Bolívar (UTB). It discloses the use of mobile devices as tools to get information, education and training. It also shows the different stages of the plan work performed and visions. This research is the result of the UTB academic community needs.

Keywords: education; training, mobile devices; mlearning; educational contents;

1. Introduction

Technology is a medium that provides and facilitates interaction between participants in any educational process. The Colombian government has proclaimed the educational model of the XXI century [1] as “Educación flexible con calidad para todos” [2] (Flexible education with quality for everyone). In our context, are the university academics communities prepared to implement this? Can this proposed model bring flexible education and quality to all the participants in the process? Some quick solutions to increase the coverage of education have been proposed by some universities, also known as technology-based learning models, such as: technology-supported education (Blended Learning - bLearning), virtual education (Electronic Learning - eLearning) or education using mobile devices (Mobile Learning – MLearning). Consequently, two questions have arisen related to the technological tools available for this purpose; do they meet the educational model of the XXI century? Are the teachers prepared to create virtual contents based on this new technical learning field?

The research data is based on the use of mobile devices like iPods, iPads, Android or Blackberry phones by the UTB academic community [3] regarding to access class virtual contents; this article describes an improvement on this purpose.

2. Background and Related work

2.1 Mlearning trends in education

There are several theories about the use and impact of mobile devices in education [4]. Since the introduction of mobile devices as a potential educational tool [5], they have turned into a cutting-edge proposal for education; with the right use, they allow mobile devices owners a better interaction and learning process than traditional Internet access devices such as desktop computer or laptops. Besides there are some other advantages for learning process (see Fig 1) when using mobile devices such as:

- Students build their own knowledge in a flexible learning environment without time or place restriction.
- Mlearning promotes student's interactions.
- Students work at own pace and are aware of their advance along the learning process. Participating and collaborating in the virtual learning community.
- Mlearning improves student's research skills along the competences associated to their own learning field of study.
- Mlearning enhances personal relationships since virtual interaction demands respect, self-control and tolerance for others' opinions and views.

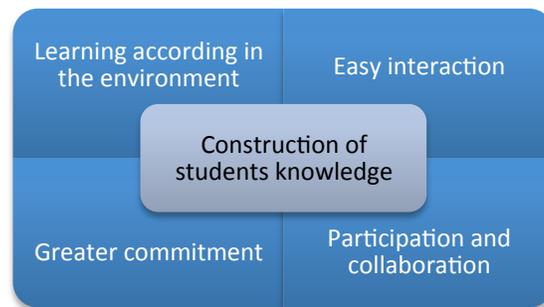


Fig. 1. (a) Construction of students knowledge model

2.2 Cases in other universities and companies

There are many experiences worldwide involving MLearning implementation with good results:

In the University of Salamanca, Spain [6] during the adaptation of content in ClayNet (Virtual Campus USAL) several changes were originated on the technological and educational levels. As consequence of this change, a new hierarchical and pedagogical structure was developed along with the creation of a simple and easy to use graphical interface. Besides these changes, the access to the class contents was enhanced throughout certain adaptative service, which displayed easily contents no matter the technical capabilities of each user device. Finally, university of Salamanca proposed in a near future a project to adapt clients' application to other platforms like moodle or devices which do not support J2ME and in this case transferring the content according to SCORM standard. Currently, University of Salamanca runs several MLearning projects such as creating Web App of the University of Salamanca with the Android OS

The University of Castilla - La Mancha [7] proposal applies the Mlearning model in a different context, visits to museums or other places of public art and implies mobile guides as a learning strategy and new forms of interaction, communication and connection among participants. It emphasizes collaborative learning activities tend to develop collaborative knowledge construction taking into account disagreements, mutual agreements to internalize and reflect a theme critical contrast views and opinions. It also reveals as a limitation or disadvantage in the use of mobile devices for learning, the screen size, which is solved with the design of specific applications to these devices including the design of appropriate interfaces and data entry in a clear, short and concise way.

The University Tecnológico de Monterrey - Mexico City [8]. They designed a supportive system for its participants, designing strategies, organization and delivery of educational resources and an integral application to facilitate the educational process involving teacher and students. The pilot project was developed

in the areas of physics and applied mathematics where design specifications for the mobile workforce as well-defined objectives in terms of what they want and how they will get student learn, design and deployment action, fun, challenging and should refer to aspects of everyday life of the student. The duration of action not as much of 5 minutes, and the action should focus on the purpose of study, etc. They also suggested that before carrying out the design of mobile resources, the instructional design work will be developed involving 8 aspects among these pedagogical facet, administration, evaluation process, etc. and stressed that the use of resources for mobile devices help students alike but the learning process is different for each student; therefore, it is important to analyze the learning styles of the students' group before implementing the action which is also suggested to the academic communities that implement this type of project to develop a bank of such varied resources on topics that addressed the learning style of students.

More and more universities introduced MLearning in their academic processes. U.S. and Canada are the most advanced markets in mobile learning, followed the Scandinavian countries and Britain, countries like Spain and Latin America are still developing [9].

In Spain, according to studies from Cegos Observatory notes that about 3% of professionals have been trained through mobile phones in their organizations. The main methodology remains the face-to-face approach followed by elearning.

According to a study by a group of students of the Master of Human Resource Studies Institute Cajasol (2010) there are projects in Spain related to the use of the modality mlearning:

In private companies: Ferrovial. It is a company which develops a training MLearning program for people; this company works locally and internationally in USA, Poland, England, Ireland, Italy, Greece, Chile, Canada with potential for expansion to India, Australia and New Zealand.

AENOR: Spanish Association for Standardization and Certification signed agreements with the Training Institute Online (IFO) to work together on the development and marketing of online courses and training using MLearning.

ASISA: A private healthcare company in Spain leading the process of training their employees in MLearning platform, it manages e-doceo which is a leader in MLearning.

Business schools: IE - Enterprise Institute. It uses MLearning to teach languages and applications used in the Master in Management and Architectural Design imparted 70% online classes and 30% as the traditional face-to-face educational with an only Toshiba's tablet support where students declare that they use about 2.5 hours of this tablet and they have decrease 70% in paper consumption.

IESE International Graduate School of Business. Implements the use of tablet in groups of Executive MBA in Barcelona, these devices are delivered in the third quarter to some of the participants of these groups to compare their progress and behavior with the same ones in the previous two quarters and with groups who are not using these devices. Educational content to work for the groups receiving tablet correspond to case studies tailored to multimedia formats with links and videos, besides they are allow to write on the tablet and also to share with the rest of their companions, to search the internet and so on.

EOI-School of Industrial Organization. This Educational Institution proposed, as part of the key model in its strategic plan in 2020, learning mobility and networking, as a need to have profound changes in all aspects of the teaching – learning process: In the forms of internal work, in the management process in the production and dissemination of educational content, organization of teachers, in the redesign of physical spaces, in the redevelopment of the syllabus, in training practices and evaluation projects, etc. They claim as technological solutions in the implementation of this process Android for mobile devices, Moodle Learning Platform, Wordpress Blog, LifeRay and Drupal for the Web and Fedora commons for content repositories. It is emphasized that this project has been working since 2009 and that from the beginning it was decided to adopt a 3G shared school students at no cost and an open structure and collaborative approach (hardware and software).

Open University of Madrid - UDIMA. It is the first online center which chose to implement a pilot project to study a program through an ipad that is delivered to students. This pilot began with 50 students during the first semester of 2010 to 2011 allowed substitute books and other teaching materials in paper format for electronic books and develops connection to the classroom from anywhere.

EMadrid project. Coordinated by the University Carlos III of Madrid in partnership with other universities among which the region of Madrid, Complutense de Madrid, Polytechnic of Madrid, King Juan Carlos and UNED where they developed a website in which you can find numerous materials developed with the MLearning.

In Latin America MLearning mode is very limited, the discussion continues regarding the real impact of the mode MLearning in public and private sector because of the lack of dissemination of the media of a significant amount of case studies, although is an important issue for all the reality is that companies are still involved a lot, but American experts are studying projects in other countries MLearning are showing projects in several Latin countries, such as:

Kantoo Project for All. It has been driven by major mobile phone companies of the Telefónica group in several countries: Companies such as initiatives aimed at Movistar in Peru to allow users to practice English through interactive text messaging, in Brazil through VIVO.

Costa Rica is working in this direction through to evaluate the company TIGO. In order to evaluate 18,000 students through their cell phones regarding the quality of education and feedback this to the respective parents through their phones.

In Chile, has the first mobile library service in Latin America. This mobile portal automatically detects the device type and provides the format that works best for each device. This service was driven by an institution of higher education available to DuocUC students and it is always innovating, improving its services and products to its users.

2.3 Elearning Platforms

Among the worldwide popular operating systems on these devices include Android, iPhone OS, BlackBerry Os; Google one of the leading companies in the market placed on Android as the second most used BlackBerry behind and ahead of iOS [10]

There are tools developed to provide access to traditional eLearning platforms for example, if you have Blackboard [11] platform they have some applications ready for the different operating systems and formats, these are basically 2 major problems, the first tools are easy to implement but possibly closed to further development and adaptation for the academic community and the second disadvantage is you have to do large investments of money to access these, limiting the resources to produce educational content in institutions with limited investment capacity.

Moodle since its version 2.0[12] has implemented in the own core a technical capacity to differentiate the device from which the users access, classified in 3 groups, desktop browser, mobile phone and table format, each of them is assigned a different visual template from which we can rewrite the displayed options and tools available.

3. Local Environment in the University

3.1 Academic community and tools

The Universidad Tecnológica de Bolívar is the first private institution of higher education located in Cartagena, Bolivar. It was the first University with High Quality Accreditation in Cartagena and Bolívar state (The only one now), issued by the Ministry of National Education of Colombia. It has combined 36 academic programs among undergraduate programs, masters and specializations. Currently the University has a population of 6375 students, 393 teachers and 192 administrative staff.

The institution provides various services, the most used are: Corporate website [3], website of virtual education [13], academic system platform, virtual education platform, email and network applications (provide for Google Apps). The content publishing services are built on the Drupal platform and the virtual learning platform Moodle, developed with the PHP programming language, running on Linux, on the other platform SCT Banner academic record is built with Java Enterprise Edition and running on Solaris servers.

3.2 Statistical analysis of web access to the institution.

All web services of the University have a detailed trace log, one of these is Google Analytics, which allowed us to analyze UTB users' records providing valuable information [14]. Records show an average of 5000 unique visitors with about 1 million page views a day in each of the platforms, see Fig 2.

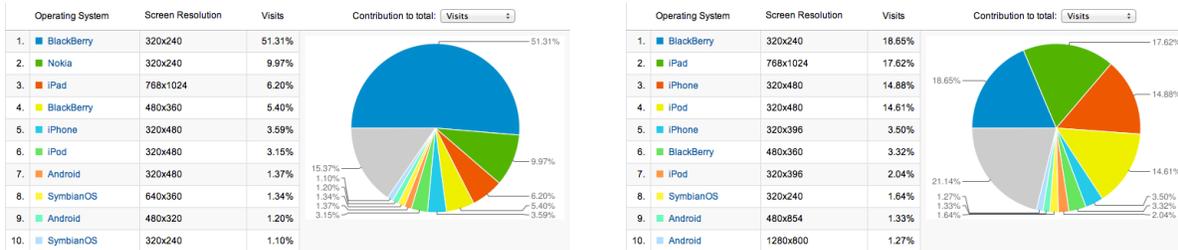


Fig. 2. (a) Mobile traffic in the University website; (b) Mobile traffic in the virtual University site.

5% of the visits recorded, it comes from mobile devices, which is no less interesting, as none of the institutional portals sites are promoted as capable of being visited by mobile phone or tablets, the only service with these capabilities is the email service company that provides Google apps.

The resolutions used in the devices visitors from platforms, see Fig 3a. Common resolutions are 320x480, 320x240 and 320x396 used for different devices like IOS, Android or Blackberry sized mobile phone with a total of approximately 61% of visits, following closely with 14% type resolutions tablet for example iPads [15].

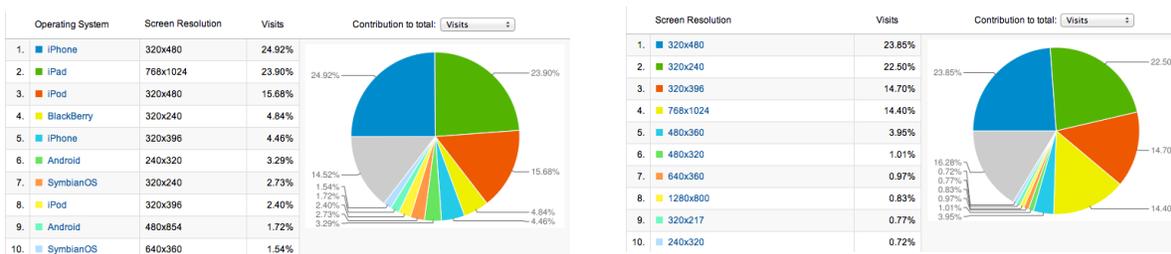


Fig. 3. (a) Mobile traffic in the SAVIO - Moodle website, (b) Screen resolution in the Mobile devices that visited the web sites.

According to other statistics taken from the platform of virtual classrooms, the percentage of devices with touch screens that visit web sites is approximately 32% followed by entry type currently undetermined by the Google analyzer; it should be noted that devices using wheel and cursor (eg. blackberrys) are in the order of 7% of hits, knowing this information will be given priority to access news and information to non-tactile devices and access to more complex learning objects to touch devices (eg Android or iOS) see Fig 3b.

4. Research Challenges

A project of this type generates a lot of expectation and challenges, both in the student community as teachers and with the additional staff involved to generate content and an approach based on the pedagogical model which will permeate the institution it is not easy and takes hard work and dedication of everyone involved.

The big challenge is to promote successful integration of technological tools with the same pedagogical model of the university, making the model base elements such as research, innovation, learning to learn, flexibility, creativity converge in when students are using mobile devices it is an interesting task, which requires the creation of an orientation course for content producers (teachers and administrators) and a basic course for the users of the approach; spaces for interaction with new tools and very good guides to reach the objectives proposed.

The technologies used in these environments cannot be ignored, for instance, HTML5 and CSS3 [;Error! No se encuentra el origen de la referencia.] standards have been well received and placed in the technology market-most of the web browsers in new mobile devices are using them- even though there are not final versions of them.

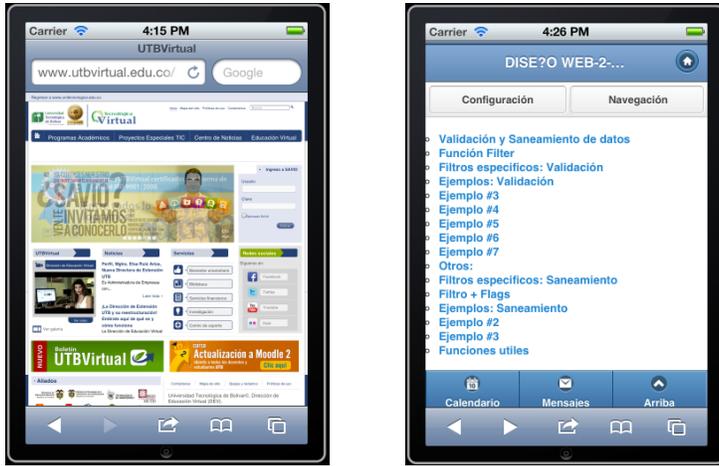


Fig. 4. (a) Actual website of virtual education, (b). Example of actual contents in the moodle platform

There is no denying that online education portal can be viewed on a normal mobile device, see Fig 4a, but there is not a real adaptation of the contents displayed, or a way to display the information in a comfortable and visually appealing as well as the contents displayed in the virtual learning platform moodle. In order to have a superior mlearning experience it is necessary to bring the support team and users the possibility to personalize the interface (including all of the institutional information and background), as well as the information could be shown neatly including better contents and more tools to interact taking advantages of all of the benefits of mobile devices, see Fig 4b.

5. Proof-of-Concept implementation

After a survey it was determined to use jQuery Mobile [16] that provided greater opportunities for reuse of HTML code from legacy applications (jQuery is also used in Moodle 2) and the ability to create new components without having to rewrite large numbers of modules in news portals and virtual education institution.

Various stages were developed in the first phase of the project; the first was the invention of a mobile application to access information, using Blackberries mobile devices which have very limited tools for web searching, from the web of virtual education and institutional; the second is to provide a usable interface (see Fig 5a) from mobile devices to access virtual classrooms on the platform moodle 2 + and last but not least, the generation of resources and content to be displayed on the platforms independently of whether it is a desktop browser or a phone, see Fig 5b.



Fig. 5. (a) Moodle interface adapted to mobile, (b) Presentation example.

The process is ongoing, there is long way to go and is challenging the implementation and operation, to achieve the collective consciousness of the advantages that these technologies provide no easy task, but it gives great satisfaction to achieve compliance with a clear goal.

6. Conclusion

At the beginning of implementation of the project, there is evidence of an impact in the academic community and satisfaction to researchers and staff.

Teachers and students reflect the application of one of the basic principles of the pedagogical model of the university, the approaches to learning, information technology and communication always evolving rapidly and it is quite important that a continuous academic curriculum updating process should be kept in order to make mlearning appealing to the whole learning community.

The institution has a work plan led by its academic core, this ensures that technology tools are improved and extremely tied to its own institutional academic model, offering broad access to information, education and training, without limitation of time or space, being flexible and promoting individual and/or collective learning.

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