Use of Virtual Classroom: Summarized Opinion of the Stakeholders in the Learning-Teaching Process

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Abstract: Nowadays, the use of ICTs in education is proof of innovation, quality, and ease of access. Aware of this challenge, higher education institutions are making efforts in line with technological advances by incorporating tools that promote more and better learning results. The aim of this investigation is to determine how much backing Moodle virtual classrooms provide to support classroom work at the university in the case study. Moodle can be used to improve, renovate and motivate the teaching-learning process in the classroom. To confirm this hypothesis, we conducted a summary of previous research carried out from the perspective of students, teachers and authorities, and considered the agreements and disagreements among these groups. We evaluated perceived usefulness, ease of use and other variables to validate the Technology Acceptance Model (TAM) of the investigation. The results show that Moodle virtual classrooms are an accepted tool in terms of obtained benefits. We also determined that it is necessary to implement training in using Moodle, as well having policies and incentives to increase its use.

1 INTRODUCTION

The context in which higher education develops, the use of Information and Communication Technologies (ICTs) in education have become proof of innovation, quality, inclusion and access to education without the limits of time or space (Dias et al., 2014; Lee and Im, 2014).

Therefore, ICTs are a worldwide trend that promote digital literacy needed to obtain dignified jobs and lead fulfilling lives (UNESCO-UIS, 2014). Higher Education Institutions (HEIs) should be the first to fulfill these social requirements in line with technological advances and development goals, and should include teaching tools to motivate students and to obtain more and better learning results.

Governments are aware of these shortcomings, but do not allocate the funds needed to solve them (Lee and Im, 2014). HEI clearly identify this problem and take action to remedy it to the best of their abilities.

This research is a contribution to the inclusion of ICTs in the teaching-learning process at Escuela Politécnica Nacional (EPN) Ecuador's, top engineering university, but where the use of ICTs is minimal. The investigation considers the opinions of EPN students, teachers and authorities regarding the use of virtual classrooms as a support tool for on-campus learning (Penafiel and Lujan-Mora, 2014b).

The objective of this research is to demonstrate the intended use of virtual classrooms on the part of the aforementioned participants as support tools for classroom work. We considered ease of use and perceived usefulness as the main variables that will allow us to answer our research question.

We present a summary of the research indicating the positions of those involved and highlighting the agreements and disagreements identified in order to make recommendations for improvement.

To accomplish this, we propose the following structure for this paper: Theoretical framework, Material and Method, Results, Conclusions and Future work.

2 THEORETICAL FRAMEWORK

Below is a short review of the literature according to the subject under an agreement on the terminology used.

2.1 Online Learning

Online learning and e-learning are interchangeable terms used to refer to technology-mediated learning. Online/e-learning emerged from the tradition of distance education and the inclusion of technology (Dias, 2014).

Its development is based on the advancement of technology but also maintains characteristics of organization, planning and guidance similar to on-campus learning (Kruger-Ross, 2013). Online learning uses Internet-based electronic technologies to facilitate student learning (Sunal, 2012).

The use a variety of technology tools allows elimination of barriers of time and space, representing relevant changes in the teaching-learning process.

2.2 Definition of e-Learning

As much as the term e-learning is widespread, it is not clearly defined. Generally, it is used to indicate that teaching-learning processes are mediated by technology, but technology is a constantly changing component (Thalhammer, 2014, Penafiel et al., 2015).

E-learning 1.0 was mentioned when technology was used for the exchange of information on the net, now e-learning 2.0 uses web tools mainly associated with social networks to mediate teaching-learning, and e-learning 3.0 is used for mobile devices and augmented reality, as tools for both formal and informal teaching-learning (Thalhammer, 2014).

2.3 Modalities of e-Learning

The modalities of e-learning differ depending on the amount of time spent online with teaching-learning activities.

It is to say that e-learning is carried out 100% online. B-learning is carried out in the classroom and online, so the best of both learning environments can be taken advantage of. B-learning is also called mixed learning because in addition to combining learning modalities, it encompasses various activities, methods and tools as supplements to traditional teaching (Thalhammer, 2014).

Many educational institutions have opted for learning through ICTs (Dias, 2014, Gonzalez, et al., 2013, Oproiu, 2015), using B-learning because it is the one that best fits their contexts and needs.

2.4 Learning Management System

One of the most utilized tools to stimulate all forms

of online learning is the virtual classroom, conceived through a variety of platforms called Learning Management System (LMS).

An LMS is a web-based software application used to create opportunities for formal and non-formal learning. It enables planning, implementation and evaluation of a particular learning process (Awang, 2012).

These teaching-learning enviroments or so-called virtual classrooms have become one of the most used tools (Kruger-Ross, 2013, Costa, 2012) to demonstrate the use of ICTs in higher education (Lee and Im, 2014). This is even more evident when these platforms allow for organized and systematic planning of a course, taking advantage of resources and activities provided by this type of platform, such as a face to face classroom.

Additionally, another advantage of using these teaching-learning platforms is that many of them are free of charge, currently the most popular LMS is Moodle. Moodle is the official LMS at the EPN.

2.5 Modular Object-Oriented Dynamic Learning Environment (MOODLE)

Martin Dougiamas began developing Moodle in 2002 (Moodle.org, 2015). It is an Open Source LMS adopted by many universities around the world (Goh, 2013).

According to the latest data, Moodle has 63,122 active sites in 222 countries. Specifically, in the country that this study takes place there are a total of 456 registered sites, one of them being the virtual platform of the university in this study (Moodle.org, 2015).

Moodle, as many other LMS, offers a wide range of features such as: creation, organization, management, communication, collaboration, evaluation, and reuse of online courses through virtual classrooms (Costa, 2012). It provides resources, activities and functionalities for its effective and efficient development.

To supplement this information, it is important to know some of the Online Learning Environment models available for implementation.

2.6 Online Learning Environments Models

Online Learning Environments (OLEs) comprise several organizational and structural educational models and represent how educational processes are developed. A rating of the most-used relevant OLE models according to (Dias, 2014) is summarized

below:

- Salmon's e-moderator focuses on the development of online teaching-learning through control of the e-moderator;

- Anderson's pedagogical model for OLE is based on the interaction with the principals involved;

- The Siemens model defined in Connectivism provides an ecological view of learning and understanding of learning as a process of networking.

- The Mishra and Koehler Technological Pedagogical Content Knowledge (TPACK) is focused on the interaction and the complexities of the different types of knowledge.

- Zagenczyk and Bosman's social media in the classroom is based on Blum's levels of taxonomy for obtaining higher-order knowledge; in addition to the emotional side, its use is based on social networks.

- The Bates and Sangrá Integration of Technology, Organization and Pedagogy model (TOP), relates the Integration of technology, organization, and pedagogy symbiotically for achieving innovation in education.

- Redecker's iLANDS 2.0 model: Learning (L), Achieving (A), Networking (N) Embracing Diversity (D) Opening up to Society (S) focuses particularly on areas of social computing applications as support for innovation in learning.

3 MATERIALS AND METHODS

This research is part of a project to implement virtual classrooms at the institution mentioned in this study; therefore, its main function is to support the improvement of teaching-learning processes mediated by ICTs.

3.1 The Sample

This study will analyze the results of previous investigations that have gathered information regarding the use of the virtual classroom as a tool to support classroom work from the perspective of students (Penafiel and Luján-Mora, 2014a), professors (Penafiel et al., 2015) and university authorities (Penafiel et al., 2016).

3.2 The Method

We worked with the Technology Acceptance Model (TAM) (Davis, 1989), ease of use and benefit obtained variables in order to verify the acceptance of virtual classrooms through Moodle.

The TAM is based on two essential characteristics:

- Perceived Usefulness: the extent to which a person believes that using a particular system would enhance their performance at work.

- Perceived Ease of Use: the extent to which a person believes that the use of a particular system would reduce their workload (Wang, 2013; Goh, 2013, Scherer, 2015; Liaw, 2013; Shaffiei, 2011; Varela et al., 2010).

We have used TAM to explain the reasons for the acceptance of virtual classrooms by those involved, since the perception as to the usefulness and ease of use of virtual classrooms will redound in their intention of using virtual classrooms.

In addition, there are external variables that were used in this study: structure, organization and classroom support. They directly influence the participants both in regard to perceived usefulness of virtual classrooms and perceived ease of use. This direct influence between the usefulness and ease of use leads to the intended use and will result in actual use in the classroom.

3.3 Data Collection Process

The Data collection process was different for each one of the stakeholders and is described below

Students. The survey of students was carried out at the university (Penafiel and Luján-Mora 2014a) selected in the case study, which has about 10,000 regular students per semester. This survey was conducted in two phases: the pre-test survey conducted at the beginning of the first period in January 2014 (2014A) was answered by 186 students and the post-test survey answered by 175 students in the second period in July 2014 (2014B).

In order to obtain relevant information from students regarding professors' improving the teaching-learning process in the classroom, we considered some questions hoping they will be a significant contribution to the virtual classroom.

Educators. We conducted a survey of the recently renewed group of (Penafiel and Luján, 2014b) professors at the aforementioned university (Penafiel et al., 2015) in January 2015. The survey was sent online and 199 of the 383 full-time professors answered.

In light of this, the hypothesis for this paper that the majority of professors support the use of virtual classroom with Moodle was already proven in the investigation. We now want to cross-reference this

information with their counterparts: the academic authorities, educators who influence decision-making at the university. Therefore, we selected only those questions that contribute to recommendations for educational improvement.

Authorities. The third group surveyed at the university is the academic authorities, educators in academic management positions: president, vice president, deans, assistant deans, department heads, directors, commission coordinators or representatives. The survey, conducted in July 2015 (Penafiel et al., 2016), was answered by 77 authorities. We take an interest in their opinions because they will lead to effective policies.

4 RESULTS

The results are going to be used to promote and enhance the use of virtual classrooms at the EPN. First, we present them from a summary of the variables used to validate the acceptance of Moodle virtual classrooms with TAM. Then, we will point out specific information from each of the participants, cross-referencing data to obtain relevant information. Ease of use and perceived usefulness are the variables in the respective investigations.

Ease of Use. This variable is essential in demonstrating the model (Figure 1). It shows that those surveyed unanimously agreed that the used tool is easy to use.

Perceived Usefulness. This variable was confirmed in the research considering two sub-variables: time and effort, which support and confirm the global variable (Scherer, 2015). Therefore, if those surveyed claim that the use of this tool will result in the optimization of time and effort, we can confirm perceived usefulness. Figure 2 shows that both students and authorities equally perceive the tool's usefulness. In the case of professors, we can see slight greater differences, but overall the perception of perceived usefulness is over 70%.

We can conclude that while ratification of the previous two variables allows us to validate our assumption, we carried out explicit confirmation through the express question. The result can be seen in Figure 3, confirming and ratifying the participants in the teaching-learning process in using virtual classrooms.

These results contribute to the main objective of this research: to support the implementation of virtual classrooms in the university's b-learning modality. Although currently used, ICTs do not have the desired effect according to current requirements, producing
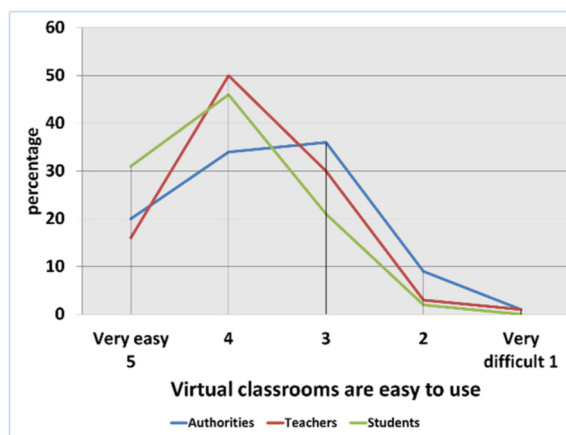

Figure 1: Ease of use from the perspective of authorities, teachers and students.
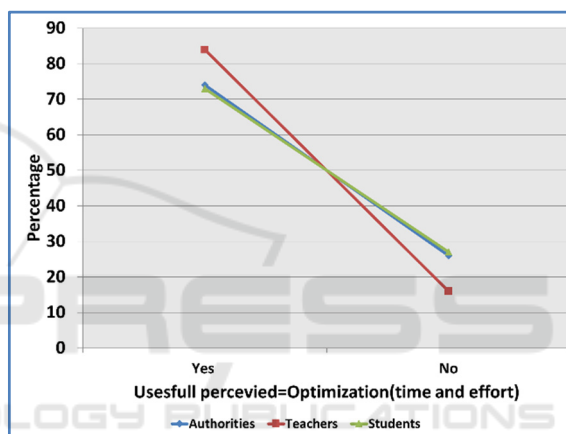

Figure 2: Perceived usefulness from the perspective of authorities, teachers and students.

substantial changes in the ICT-mediated teaching-learning process.

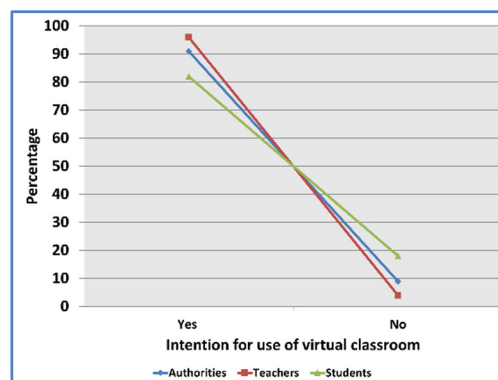Furthermore, it is essential to highlight the information which transcends recommendations for improvement.

Figure 3: Moodle virtual classrooms as ICT tools to support classroom work.

Students. Since students are the core of the teaching-learning process, they furnished us with relevant data showing that it is an important medium for professors for feedback and improvement:

In terms of resources and number of classroom activities, students consider them adequate overall: 45% consider the resources to be appropriate and 31% consider them average. Similarly, 49% consider the classroom activities adequate and 31% say they are average. The students feel that these activities and resources indeed contribute to learning.

As for the communication of information, 17% consider it very useful, 47% useful, and 30% somewhat useful, and the two lowest categories of the scale are a combined 6%.

Regarding the process of accompaniment in the classroom, the results are similar to the previous values: 16%, 45%, 30% and the two lowest a combined 9%.

With regard to activities that encourage collaborative work, the results are 16%, 43%, 29% and the two lowest categories combine for 12%.

Finally, the results on the relevance of evaluation activities are: 17%, 57%, 21% and the two lowest categories a total of 5%.

With these results we can clearly see that students appreciate the work carried out by the professor (activities and resources in learning, communication and evaluation) as they generally remained at above the average values.

Professors. The university faculty has undergone a radical change regarding professors' ages (as can be seen in Figure 4) State policy dictated generational change, forcing the retirement of over half the faculty. The result has been advantageous for this investigation: younger professors more open to change and willing to invest time and effort in order to be involved in the requirements of our current information society.
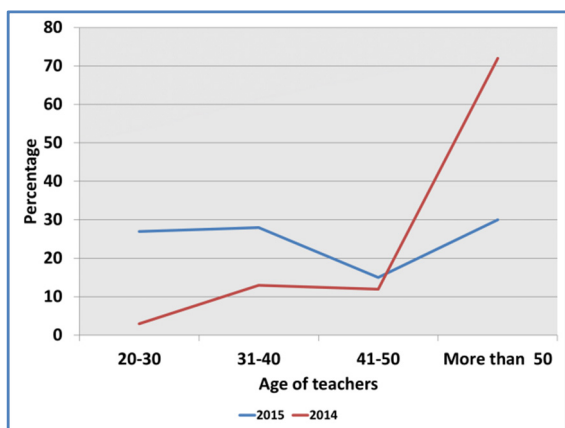

Figure 4: Age of teachers.

Authorities and Professors. The information obtained is basically in regard to the two key purposes of the virtual classroom: communication and general use. Table 1 and Table 2 show results in regard to communication tools in the classroom:

Table 1: Relationship between communication tools and their use in the virtual classroom (authorities).

	Comuni-cation	Solve Doubts	Case Studies	Content	Feed back
Blog	5	10	31	45	17
Chat	30	22	3	1	10
Mail	22	17	8	17	21
Forum	22	34	32	14	36
Videoconf.	18	13	18	18	10
No answer	3	4	8	4	5
Total	100	100	100	100	100

Table 2: Relationship between communication tools and their use in the virtual classroom (teachers).

	Comuni-cation	Solve Doubts	Case Studies	Content	Feed back
Blog	9	3	19	33	11
Chat	15	17	3	2	9
Mail	38	34	20	20	29
Forum	16	25	25	13	20
Videoconf.	3	5	7	5	7
No answer	19	16	26	27	24
Total	100	100	100	100	100

In terms of virtual classroom communication with the student, the authorities say the best tool is chat, while for professors it is email.

As for resolving doubts, the authorities consider the forum to be most appropriate while professors believe it is email.

In presenting case studies, both authorities and professors prefer the forum as the most suitable means.

For socializing, both authorities and professors consider the blog to be the medium of choice.

Lastly, regarding feedback, the authorities consider the forum to be the appropriate method, while the majority of professors prefer email.

Another important factor concerns the uses and the frequency with which the platform is utilized in the virtual classroom: education, instruction, communication and assessment. Figures 5 and 6 exhibit information on the most frequent uses of the

platform from the mindset of the authorities and professors.

These results clearly indicate that virtual classrooms are mostly used to assign homework, organize information and resources as well as distribute materials. Since the use of this tool is minimal, beginning to use it this way is not bad. However, it is noteworthy to mention that the tool has many activities and resources being wasted and therefore, it is being underutilized. Figures 5 and 6 show the low current use of the platform.

According to the study (Penafiel et al. 2015), this confirms that teachers need training to become familiar with Moodle in all its aspects, not just for sending information. The most important aspects of Moodle are communication and teaching.
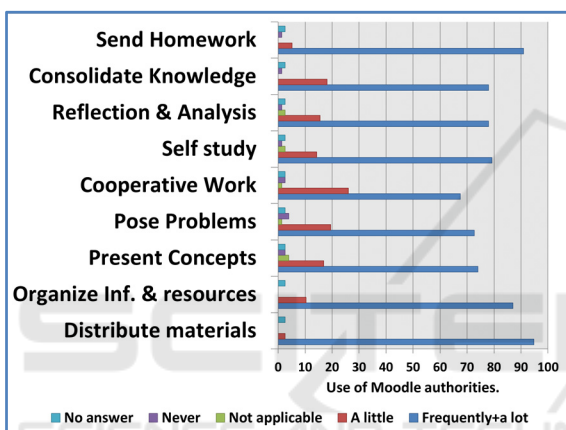

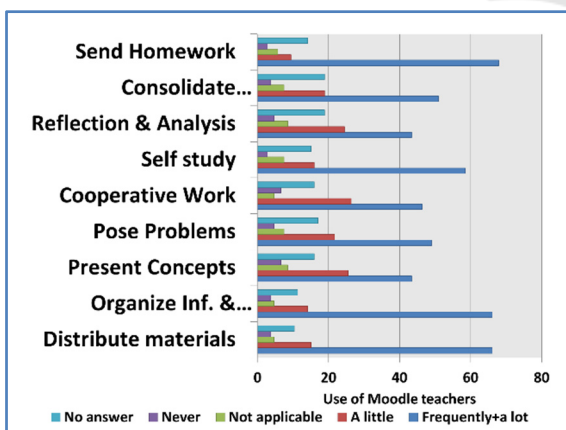Figure 5: Use of Moodle platform from the perspective of the authorities.

Figure 6: Use of Moodle from the perspective of the teachers.

5 CONCLUSIONS AND FUTURE WORK

The results of this research have shown that Moodle is a support tool for on-campus work accepted at the university in this case study, as well as at other higher education institutes (Wang et al., 2013).

The results of surveys for students using virtual classrooms indicate that the percentage of students who answered the survey is only 1.8%, causing a limitation in this study This is indicative of the low number of virtual classrooms found at the university, and consequently the few students using them. These problems confirm the imminent need for concrete actions to support the use of ICTs at the university.

We can assert that there is a commitment on the part of professors to use ICTs. What is missing are institutional policies and incentives to convert this commitment into reality. Another key element is the necessary training to discover the tool's potential and therefore reap its benefits (Qizhong, and Qing, 2012).

It is evident that the authorities are fully aware of the urgent need to define policies for resources and regulations that define the use of Moodle virtual classrooms. The aim is to meet the requirements of society, the state and our social responsibility for life training (UNESCO, 2014), according to the goal of education for everyone (EFA) by 2030.

This phase of the research pertains to a preliminary study of an overall project to include ICTs at the university; consequently, it was vitally important to analyze their current situation and the opinions of those surveyed. The teachers, authorities and students now propose continuing progress on this project, developing methodology to employ virtual classrooms in engineering, creating a teacher training plan and a strategic plan for mass implementation.

The results are going to be used to promote and enhance the use of virtual classrooms at the EPN. Besides, the results can also foster the use of virtual classrooms in other universities.

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