Moodle as a Support Tool in Higher Education

Academic Authorities Opinion

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***Abstract*—The aim of this paper is to determine the intention of supporting the use of a Learning Management System (LMS) under Modular Object-Oriented Dynamic Learning Environment (Moodle), in the creation of virtual classrooms as support tools for on-campus work in higher education. We used as a case study the points of view of academic authorities from the National Polytechnic School. The opinion of this group was considered as they are responsible for policies in educational institutions: they lead and make decisions at the university. To prove this objective we considered perceived usefulness and easy usage. The Technology Acceptance Model (TAM) was applied; this helped to confirm that the hypothesis of virtual classrooms used as support tools in on-campus study is backed by academic authorities, and is in concordance with global, regional and local trends. The results of the research show that age influences the acceptance of new technologies. It is interesting to know that the perception of quality backed by technology is high and that, based on the TAM model, the ease of use and obtained benefits were determining variables in accepting Moodle as an on-campus support tool. This is important because they prove the current state of the use of Information and Communication Technologies (ICTs) at the university.**

Keywords-Moodle; virtual classroom; higher education; authorities.

I. INTRODUCTION

The use of Information and Communication Technologies (ICTs) in education is a coveted trend if we are to expand access, eliminate exclusion and increase the quality in education [1]. In general, ICTs are a set of different technological tools and resources, used to communicate, develop, spread, save and manage information. Within the educational context, ICTs promote digital literacy by generating essential skills and abilities for life [1].

Considering its transcendence and linkage with the teaching-learning process, ICT and education are two elements that must merge, in order for ICTs to be immersed in the teaching-learning process through a curriculum; complement, so as to provide dynamics and motivation necessary in the traditional teaching-learning process; and feed off, in order to mutually grow based on updating, renewal and innovation.

This investigation's objective is to determine the intention of using Moodle to develop virtual classrooms as support for on-campus learning. We used the views of the academic authorities of a University in Quito - Ecuador as a case study, a higher public education institution renowned for its engineering programs.

Regarding the authorities, the information desired is their perception of quality, ease of use and perceived usefulness of ICTs in the teaching-learning process, specifically in the use of virtual classrooms.

To achieve this goal, the paper is organized as follows. In Section II, we show the importance of using ICTs through Moodle as support tools for teaching-learning in higher education institutions. In Section III, we analyze the use of Moodle as an example of an ICT tool in education. Then, the used materials and methods are presented in Section IV. In Section V, the main results of the surveys answered by the academic authorities are presented. Finally, the main conclusions and future work are discussed.

II. USING ICTS IN EDUCATION AT GLOBAL, REGIONAL AND LOCAL LEVELS

A. Global and Regional Context

The inclusion of world policies supporting ICTs in education has been desired and expected for quite some time. The first policy referring to the integration of ICTs was declared explicitly in the Millennium Development Goals (MDG), described in goal 8F: "In cooperation with the public sector, provide access to benefits in new technologies, especially information and communication" [2].

In 2000 at the World Education Summit held in Dakar, Senegal, governments of 164 countries established eight objectives and twelve strategies in order to achieve Education for All (EFA) with a 2015 deadline. According to UNESCO´s follow-up report for EFA [3], the objective has not been reached but the number of children and teenagers without educations has decreased. A lot has been achieved in gender parity and government care for quality education,

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although financial support has not been available in the use of ICTs [1].

A tool to accomplish this is mentioned in strategy number 10: "Harness New Information to Help Achieve EFA goals" [3], but these policies have yet to be developed with regard to ICTs in education. However, the World Bank and UNESCO have supported the realization of global annual symposia on ICTs, and UNESCO has supported initiatives [4] that are a guide of ICT goals to achieve better results in education.

The World Summit on the Information Society (WSIS), held in 2003 and 2005, established a serious commitment between governments in pursuit of an inclusive information society. In the latest meeting in 2015, WSIS mentions two guidelines related to education in which Latin America and Caribbean sectors have to be included in their action plan. The inclusion of the ICTs is explicitly mentioned to reach this primary objective [5].

Meanwhile, in Latin America and the Caribbean, governments have circumscribed in their agendas the inclusion of ICTs in education as a priority theme, although, in real life, it does not have the same priority, mainly due to economic index factors that show obvious inequalities [5].

eLAC is an action plan for Latin America and Caribbean Information Society which states ICTs as tools designed to promote economic development and social inclusion [6][7]. Therefore, the Action Plan regarding Information and Knowledge Society of Latin America, sets the following policies regarding education:

"Develop and implement information technologies and communications for inclusive education," taking advantage of ICTs in the teaching-learning process with active participation of those involved.

"Universalize access and expand the use of information technology and communication for education" through broadband connection, ICT teacher training, using teacher learning networks, and regional educational portals [5].

B. Local Context

Within local context, the regulatory framework that promotes the inclusion of ICT in Ecuador's educational system is mentioned in the Academic Regulations Regime issued on November 21, 2013. It is the mandatory instrument for all the Higher Education Institutions, public and private, issued by the Council on Higher Education (CES). CES functions include planning, regulating and coordinating the Higher Education system which mentions the inclusion of ICTs in the curriculum, learning activities, learning modalities, digital literacy transversely into higher education, etc., as mandatory, in articles 15,26,27,28,37,38,42,43,45 [8].

C. Institutional Context

The National Polytechnic School (Escuela Politécnica Nacional EPN) where this study was carried out is considered the nation's top public institution by virtue of being a High Education Institution (HEI) benchmarked for its technical engineering, with an A institutional accreditation level [9].

According to the Regulation of Academic Regime (RAR), the University is aligned with current regulations and in light of these new state regulations, internal regulations have been updated considering government policies and following local, regional and global trends to support the use of ICTs.

This research wanted to consider the opinion of University academics responsible for this case study of using virtual classrooms that use ICTs in the teaching-learning process.

This information is relevant since the academic authorities are responsible for making decisions inside HEIs, and they also must answer global development and ICT trends. There are numerous investigations regarding the opinion of the students [10]-[14] and teachers [15]-[20], but not of university academics authorities [21]-[24].

III. USE OF MOODLE IN EDUCATION

As we have seen, using ICTs in the teaching-learning process is one of the requirements made at all Higher Education Institutions at global and local level. They are valued and recognized as being an indicator of quality in higher education [25] so as to promote student intellectual qualities of higher order thinking, problem solving, communication skills and a profound knowledge of the teaching and learning tools [16].

From this perspective, promoting the imminent use of ICTs in the classroom using support tools such as blogs, wikis, virtual classrooms, etc. needs to strengthen students' digital skills [15][26]. It also requires teachers to develop their skills in using ICTs as 21st century competencies to face the challenges in changing scenarios and teaching methodologies [15][27][28].

The 2015 NMC Horizon Report for Higher Education [26], researches new technologies that will support the teaching-learning process in higher education. Among these technologies, we mention: mobile applications, cloud computing, open content, collaborative environments, adaptive environments, semantic applications, augmented reality, blended-learning, massive open online courses (MOOCs), game-based learning, etc.

Many of these technologies use educational platforms based on e-learning as support mainly at educational institutions that need organization in learning. They consider essential educational foundations in the teaching-learning process mediated by LMS in order to foster relevant learning, encourage critical thinking, collaborative and cooperative work [15][17][19][18][29][30][31].

A major change with the use of virtual classrooms through Moodle is where the learning environment changes and evolves the roles of the participants in the teaching-learning process. In this change the teacher ceases being the center of the process, giving prominence to the student, who becomes an active participant in his own learning process under the guidance of the teacher as facilitator in the cycle [7].

Another transformation is evidenced when the work space becomes a timeless space, thereby adapting to all the settings of teaching-learning in an open and accessible

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structure, according to the needs of the digital age in which we live.

Virtual spaces expand the boundaries between formal and informal education, producing effective learning in which teachers, experts and students contribute.

A. *Educational Trends of Virtual Spaces in Higher Education.*

Among the current trends in higher education we cite: new pedagogical models for teaching-learning; virtual learning tools to promote intelligent education, i.e. with the maximum potential; online universities for formal and non-formal learning saving time, space and money. In addition, we can mention e-learning support centers for universities, teacher training, as well as providing infrastructure and methodology; globalizing e-learning in order to include all regions by certifying qualifications; Open Educational Resources (OER), given their accessibility, efficiency and quality; and finally MOOCs, which encompasses all the advantages of e-learning and is massively supported by the best educational institutions in the world [31]. According these world trends, this research supports e-learning in the EPN; therefore, the investigation as previously mentioned, uncovers the support of the University´s authorities in using virtual classrooms under Moodle to support teaching-learning.

B. *Moodle as Tool to Support the Teaching-learning Process.*

There are many tools to support learning using ICTs, one being the virtual classroom. The virtual classroom is used both for full online learning (e-learning) and as support for on-campus or hybrid learning (b-learning).

The use of virtual classrooms is widespread today, but it is important to determine what their true function and use is in education.

This will allow us to determine what resources are used in the classroom, means of communication used by the participants, the types of materials used, etc. It will be considered that, while the tool plays a fundamental role as a vehicle in the educational process, it is not an end, and for this educational component, it is essential. [32].

There are numerous platforms for online course management, but EPN chose Moodle for its recognized advantages such as: being a General Public License (GNU) open source system, its fundamental teaching bases in social constructivism and a great learning community [33]. These make it a unique LMS. The ease of use for online course management and the availability of a variety of continuously updated resources and activities (such as mobile devices) make it the required worldwide platform. EPN has used several versions and currently it uses version 2.6 in graduate courses.

IV. MATERIALS AND METHODS

This investigation was carried out considering as a case study the EPN, a public institution referenced nationwide. An online survey was sent to the academic authorities and professors of the university who are responsible for making decisions within their academic units. Out of 383 teachers, only 77 (20%) answered as being authorities of the institution.

The survey was conducted with nineteen questions using the Likert scale [34]. The first part consisted of informative questions and the second part was concerned with previous experiences of virtual classrooms. Finally, we discovered the acceptance variables in the use of the tool. Only the relevant questions will be considered for the investigation; the questions used can be seen in Table 1.

TABLE I. QUESTIONS IN THE SURVEY

	Description	
Q.1	Select your gender	Female Male
Q.2	Your age	20-30 30-40 40-50 >50
Q.7	Have you ever taken online classes?	Yes NO
Q.8	How many classes have you taken?	No answer 1-3 4-6 >6
Q.9	What is your general perception about the quality of online classes?	Excellent Very good Good No good no bad Bad No answer
Q.10	What percentage of teachers at the University do you believe include the ICTs in their teaching practice?	>76% 51-75% 26-50% <25%
Q.11	Do you think University has to include online education in its study modes?	Yes No
Q.12	Which learning mode you consider more relevant in addition to the classroom in order to use it for a subject?	B-learning e-Learning no answer
Q.14	Do you think virtual classrooms will allow optimization of teacher's time and efforts?	Yes No
Q.16	Rate the usability of Moodle used at the University in order to implement it in virtual classrooms.	5 very easy 1 very difficult
Q.17	Indicate why you use the following Moodle communication tools?	
Q.18	Indicate what you use Moodle for?	
Q.19	Do you consider virtual classrooms under Moodle to be an accurate decision in order to be incorporated as support tool in the learning process?	Yes No

Prepared by the authors.

A. Metothodology

This study used as methodology the Davis [35] Technology Accept Model (TAM), used for a lot of investigations [15][18][36]-[41] in order to determine the acceptance of the technology now applied to conclude about the acceptance of LMS within Moodle used at the University.

The TAM model is based on the perceived ease of use and the perceived usefulness [15].

The perceived usefulness can be conceptualized as the belief of teachers that this tool will help them perform their duties, which can be seen in the learning outcomes in the curriculum [15].

Many studies on the acceptance of ICTs revealed that perceived usefulness and ease are key for their intended usage [15][19][36][42].

This paper will focus on the degree of acceptance by the academic authorities of ICTs in the classroom, specifically the level of acceptance of virtual classrooms under Moodle as tools to support classroom learning.

The ease of use and perceived usefulness by teachers are the most important factors that will allow us to predict the intention of using virtual classrooms [15]. Benefits such as improvement in performance are expected when these technologies are used.

V. RESULTS

The results obtained are as follows:

Question 1 Your gender? 31% of the authorities are women and 69% are men, which is approximately the promoted gender equality worldwide and is supported at the state level, and therefore the University.

Question 2. Your age? 34% were between 20 and 30 years old; 29% were between 31 and 40 years of age, 11% between 41 and 50 years and lastly, 26% were older than 50 years; this reflects young teachers' participation in the University decision-making process.

This generational change is due to new government policies, and it is important that they are open to the use of new tools such as Moodle.

Question 7. Have you ever taken online classes Question 8? And *how many classes have you taken*?

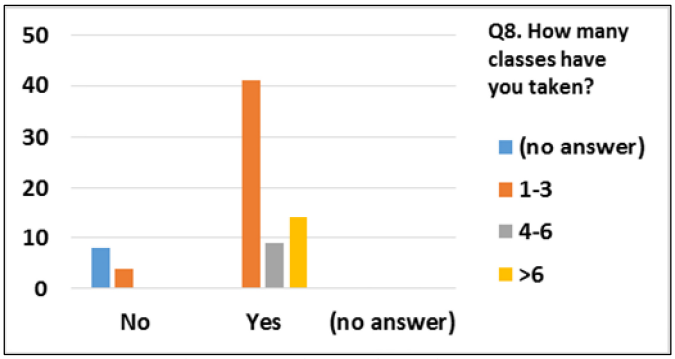

Figure 1. Question 7 and Question 8.

As it can be seen in Figure 1, 84% have taken an online class; the number of classes taken was not representative because they had taken only between one and three online classes. This shows us the reality of this university.

Question 9. What is your general perception about quality of online classes? 80% believed that quality of classes is good or excellent and 20% believed the quality was average or bad.

Question 9. *What is your general perception about quality of online classes?* and Question 8. *How many classes have you taken*?

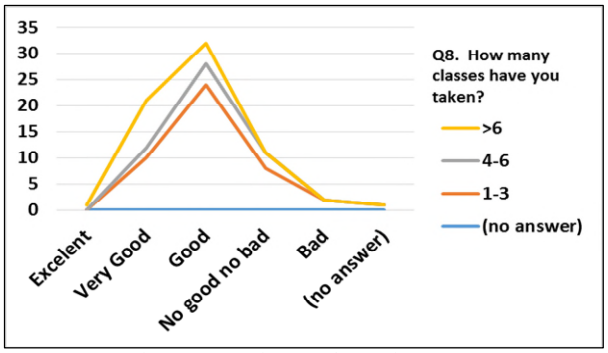

Figure 2. Question 8 and Question 9.

In this case, in Figure 2, a combination is done with the information questions. The results were: the more experience a professor has with the online education, the better the opinion about its quality.

Question 10. Do you think teachers at the University include ICTs in their practice and in what percentage? 49% of those surveyed believed that 25% of the University professors used ICTs; 39% of the authorities believed ICTs are used in 50% in classrooms. This is relevant because we can observe awareness of an existing problem.

Question 11. Do you think the University should include online education within its study modes? and *Question 12. Which learning mode you consider more relevant in addition to the classroom?*

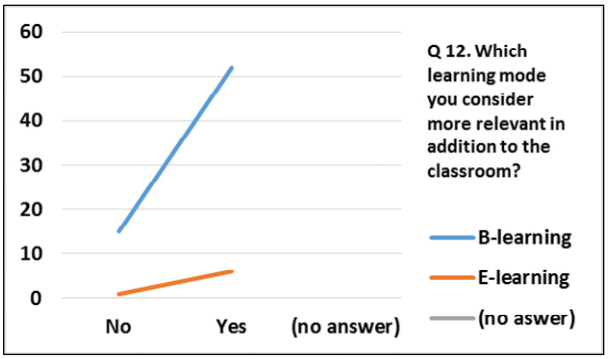

Figure 3. Question 11 and Question 12.

In these questions in Figure 3, 77% believe that virtual education has to be included in institutions, and more specifically 91% consider b-learning as the best option to support classroom work.

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Question 14. Do you think virtual classrooms will allow optimization of teacher's time and effords? 74% answered affirmatively.

Question 16. Rate usability of Moodle to be used in virtual classrooms? Usability is the effectiveness perceived and the possibility of taking advantage of all its potential (1 very difficult- 5 very easy), 75% rated it as having an intermediate level of usability.

Question 17. Indicate why you use the following Moodle communication tools? Table 2 determines why you use the following communication Moodle tools in the classroom from the point view of the authorities: To increase communication frequency, the most used is chat (31%), Solving Doubts (34%), Present Case Studies (34%), Feedback (36%), Promoting knowledge construction (54%), Generate discussion (68) and Encourage participation (43) .They used the forum as a major communication tool in the classroom. For Case studies, the blog was the most used, with 31%. Finally, for Feedback, the mail was the most used with 22%, as seen in Table 2.

TABLE II. WHY YOU USE THE FOLLOWING MOODLE COMMUNICATION TOOLS

	Increase communication	Solve Doubts	Present Case Studies	Feedback	Promoting knowledge	Generate discusion	Encourage participation
Blog	5	11	31	18	24	9	15
Chat	31	23	3	11	5	12	22
Mail	22	18	8	22	0	0	5
Forum	23	34	34	36	54	68	43
Conference	19	14	19	11	9	7	12
No answer	0	1	5	3	7	4	3

Prepared by the authors.

Question 18: Indicate what you use Moodle for? Figure 4 shows that the most common use given to Moodle is to distribute materials (97%), followed by send Homework (93%) and Organize information and Resources (89%), as can be seen in Figure 4.

Question 19. Do you consider virtual classrooms to be an accurate decision in order to be incorporated as support tool in the learning process? 91% answered yes, which corroborates international trends and support in e-learning in Higher Education.

VI. DISCUSSION

The results of the investigation revealed that the inclusion of tools to support learning is just beginning. The efforts of this research are needed as real contributions to include tools such as Moodle to support on-campus teaching-learning.

The results showed the full awareness of authorities regarding the lack of using Moodle at the university; almost 50% of authorities believed that ICTs are used in fewer than 25% of the classrooms.

Awareness is the first step in solving the problem; the second step is the intention of solving the problem. 91% of the respondents supported the use of virtual classrooms as tools for on-campus work.

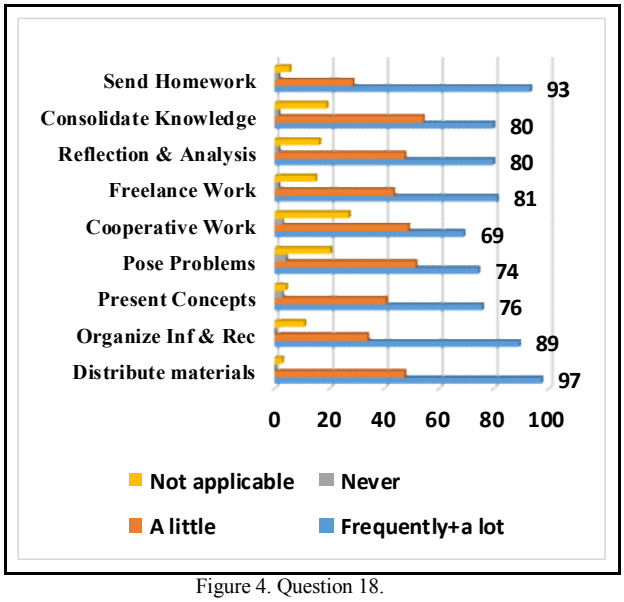

Figure 4. Question 18.

Variables that helped to confirm the research questions of this study were: optimization of professors' time and effort, ease of use, usability and b-learning as the appropriate modality for the research. Moodle reflected the optimization of time and efforts of the teachers in 74%, which will be reflected in their performance benefits [15].

The second variable considered in the study was ease of use; 70% of authorities the believed the Moodle is not easy or difficult to use.

Usability involved implicit sub-variables as effectiveness, efficiency, satisfaction with 75%. All validated variables allow us to confirm the hypothesis presented based on the confirmation of sub-variables involved. These results will encourage the authorities to include policies for the usage and implementation of virtual classrooms under Moodle.

Another important variable was that the most appropriate e-learning mode in the context of EPN is b-learning. 91% regarded it as the most appropriate mode through the use of virtual classrooms.

Another important result in the research that showed the respondents overwhelmingly considered Moodle as a means to distribute information, the respondents had a basic knowledge as to the potential of communication tools that Moodle provides us. These results confirm the underutilization of the platform, therefore it is necessary by the authorities to support training plans for teachers to solve this problem.

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VII. CONCLUSION AND FUTURE WORK

We must consider that more and better ICTs do not mean more and better education; it is essential to promote digital literacy as a new skill for life [15]. One of the most important contributions of this research has been the awareness on the part of the academic authorities on the need to include ICTs in education.

However, there are still many obstacles to be overcome in order for ICTs to have the desired impact on the teaching-learning process. The main obstacle is the will of academic leaders. They have the power in economic and political topics to support these changes which will create transcendence in education as a priority, according to the development of technology in which we are immersed.

In previous research, as well as in this research, there exists information about the perception of the Institution's students, professors and academic authorities. It would be wise to carry out a comparative study with other HEIs to find similarities and differences between participants' points of views in the teaching-learning process of their respective universities in the use of Moodle. After analyzing the stake holders' opinion in the teaching-learning process under Moodle, we propose, as future work a methodological approach for the usage of virtual classrooms, as well as plans for teachers training.

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