

VIRTUAL LEARNING ENVIRONMENTS: FORMAL ENVIRONMENTS VS INFORMAL ENVIRONMENTS

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Abstract

Society is constantly evolving and has so many repercussions on a social level as well as within personal and professional life. Information Technology (IT) has an increasing impact, bringing new challenges and paradigms to Education, by combining formal and informal environments in the communication that takes place between teachers and students, as well as between themselves.

Nowadays, in education, the use of an informal communication environment is increasingly verified in parallel with the formal environments already implemented. Teachers present challenges in the Learning Management System (LMS), but give students the freedom to use tools in less formal environments, as long as they meet with the stated objectives.

The synergy between these two tools promotes learning environments with a social and interactive presence, one that is able to promote student success in virtual environments.

This article presents an exploratory study of the use of platforms to support traditional teaching, such as social networks and LMS, using methods and pedagogical approaches that value the experimentation, discovery, research and integration of knowledge and skills.

The purpose of this article is to identify the functionalities of each of the tools that promote the improvement of these environments in both formal and informal learning situations. The methodology used to reach the objective, besides the review of the literature, is based on an exploratory study, using research and interviews.

Keywords: Virtual learning, formal environments, informal environments, Education paradigms, LMS, social networks

1 INTRODUCTION

This study, with implications for communication, management and the dissemination of information within the digital environment as part of the process of teaching and learning, is of significance and interest. Society is constantly evolving and has repercussions on a social, personal and professional levels. IT has a growing impact, bringing new challenges and paradigms to Education.

Effectively, the technological revolution has implied changes in society and forms of communication that go beyond the barriers of space and time. [1], [2], [3].

The traditional paradigm of education is not seen as appropriate in this digital age. The transition from this paradigm to the information age has brought pedagogical methods and approaches that value experimentation, discovery, research and the integration of knowledge and skills [4]. Pedagogues advocate meaningful, diverse, integrated and socializing active learning.

In recent years, universities and high schools have adopted LMS as a means of education (e-learning) or in addition to teaching in the classroom (b-learning). Emerging social networks, with complementary characteristics to the LMS, were rapidly absorbed by the teaching-learning process.

The synergy of these two tools promote learning environments with a social and interactive presence of ability to enhance student success in virtual environments.

We sought to develop a study beginning with the analysis of formal and informal learning environments, using LMS and Social Networks. To do so, the students of the authors - largely satisfied with their current use of the technologies - were provided with additional less formal tools in their classroom.

2 METHODOLOGY

This section describes the methodology adopted in this study. We proceeded with the sample characterization, data collection instruments, surveys, and semi-structured interviews, for identifying the functionalities of each of the tools that likely to potentiate formal and informal learning environments. This was followed by the analysis of the perception, needs, and expectations of teachers and students regarding the use of platforms, social networks and LMS, in their communication.

The term methodology is very often used with different meanings, both in everyday language and in the academic world. In this study, we shall use the term to refer to the stages and procedures followed in research, to designate concrete models of work applied to discipline or speciality, and also to refer to the phases of procedures and recommendations transmitted to the student as a curriculum.

This study comprises a) the literature review to do better monitor the problem and to delineate the object of study; b), data collection, data analysis, using descriptive statistical analysis and results/conclusions (Figure 1). In addition, an exploratory study is used as part of the methodology to reach the objective.

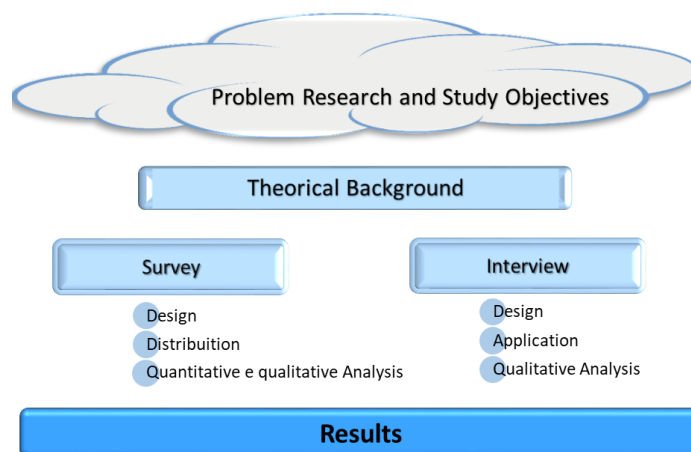


Figure 1 - Investigation Scheme

According to Vilelas [5], the investigation begins with the premise that if we want to know people's behaviour we should ask them directly. It is, therefore, a matter of requesting information from a socially significant group of people about the problem under study, so that by means of an analysis of the quantitative or qualitative nature it can draw conclusions which correspond to the data collected.

This study comprises two distinct phases: the first phase was collecting data on the use of the platform through a semi-structured interview and a paper questionnaire (hard copy). Semi-structured because the interviewee is free to express himself, as Rodrigues explains [6]. The questionnaire, because it allows the collection of measurable and comparable quantitative data. The sampling technique selected for the study was an intentional and opinionated sample - the students were selected from different areas within the institution and were interviewed according to their availability to participate in the study.

As mentioned, the exploratory study was carried out at the School of Accounting and Administration of Porto. The participants were 113 students from the degrees in Advisory and Translation, in Documentation and Information Sciences and Technologies, in International Trade, and from the masters' degree in Digital Business, during the 2017/2018 academic year.

3 BACKGROUND OVERVIEW

We present an approach to the use of Information and Communication Technologies (ICT) in learning as promoting success and motivation for the students of the 21st century.

The use of technologies implies a well-defined methodology at the outset, regarding the success factors that are defined for this.

It is necessary that the methodologies, objectives, and contents are aligned so that there are no deviations or distractions that could endanger the expected success of the learning - that must be inclusive but may occur in a more or less formal way.

We describe the main functionalities of the LMS regarding more formal learning environments - in the teacher and student communication - and also the social network functionalities, essentially used by students in informal environments - student to student communication.

3.1 ICT in education in the 21st century

The increasing evolution of ICT was considered an enormous challenge for education [7], promoting a change in the teaching/learning process. Its use in education has led to a greater diversity of learner-centred learning environments [4].

Students feel involved and motivated in learning processes when the concepts and objectives of learning sustained by technology are supported by appropriate pedagogical methods [4], leading to the development of other attitudes and behaviours regarding learning, preparing them better to live and work in the 21st century [8].

The teaching/learning process that is currently experienced by students, is guided by a constructivist model, where students learn by doing. The students are themselves the builders of their own mental structures [4].

According to this new technological paradigm, the education system in the school is inevitably altered, leading to the integration of new methodologies that embrace the new reality and make effective the management of learning. Thus, if the students are given the possibility of choosing from several tools to learn a given content - provided they are proficient in the available options - they can choose the one that best suits the work to be done as well as their profile, thus building knowledge.

It is important to emphasize the importance, in the first instance, of providing learning community with the tools adequate to the contents and contexts.

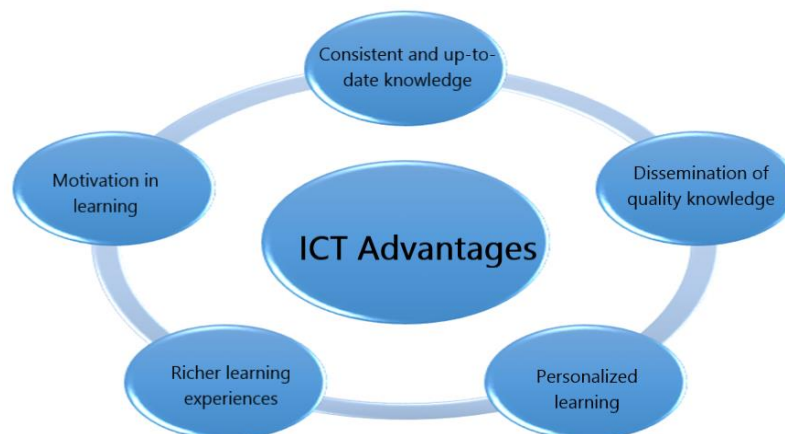


Figure 2 – Advantages of ICT in the learning system

The systematic use of ICT in teaching allows personalized learning and also promotes an updated and accurate knowledge on the contents to be learned, as well as the dissemination of quality learning, a greater wealth of personalized learning experiences. Some of the important advantages of using ICT in learning are presented, as shown in figure 2.

The teachers' capability for acquiring the skills required for this new teaching methods is paramount, as is their aptitude to accept and introduce different digital tools and the open spirit of students to new ways of learning.

3.2 Alignment of objectives, methodologies and contents

It is desirable that the school becomes an institution capable of using information technologies to transform not only the teaching-learning process but also the form and means of making information available to students [2].

Different studies have shown that virtual learning environments reach higher levels of integration, socialization, participation, and learning than traditional ones.

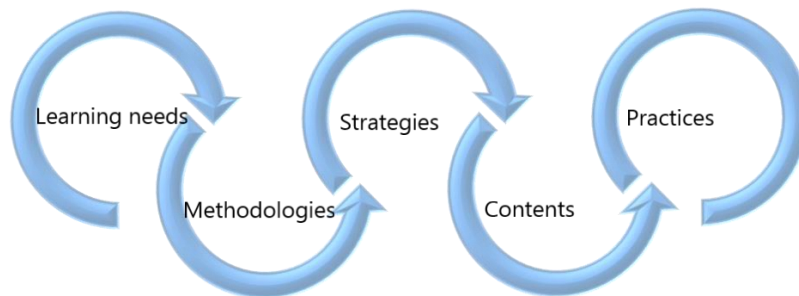


Figure 3- alignment of the learning process with ICT

It is true that the use of ICT adds value to the teaching-learning process; however, strategies, methodologies, practices and contents must be aligned (figure 3)

3.3 Formal and informal learning

The learning environment is not always restricted to the formal method, used essentially between teacher and students.

Communication that leads to learning may take on different characteristics depending on the authors, with a more formal environment in the use of institutional platforms, such as LMS, or less formal characteristics when communication happens among students, often through the use of Network tools Social: informal communication in learning.

The use of ICT is intended to promote inclusive learning, which increases the participation of all students, either through the use of formal environments or informal environments.

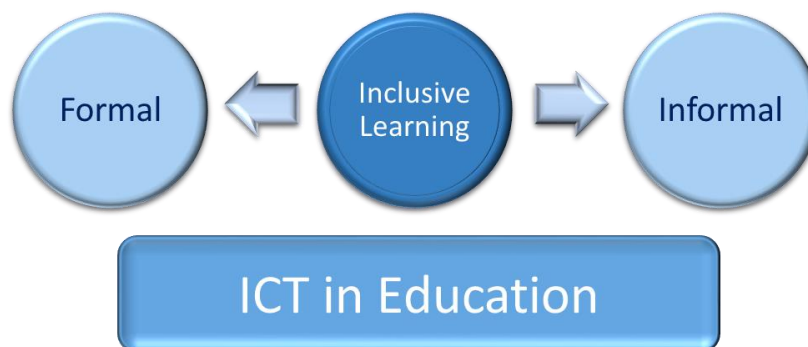


Figure 4– Inclusive Learning with ICT in Education

Informal learning happens on a day-to-day basis beyond what is learned in school and plays a key role in development as it helps to achieve and consolidate the more formal and theoretical learning that takes place in the classroom [9].

3.4 Tools in a different environment and use

Of the many tools used in virtual learning environments, in this study we highlight LMS and Social Networks for their difference and complementarity of use in learning, the first associated with a formal environment established essentially between teachers and students and the following for its great diffusion and use by students in collaborative and cooperative learning environments.

3.4.1 Learning Management System - LMS

The LMS was developed according to a pedagogical methodology that provided virtual teaching/learning. It facilitates the interaction between the teacher and his students through the tools of communication, the tools to support collaborative learning, and the recording of the activities carried out by the students [10].

These platforms, used by almost all public higher education establishments, have great advantages to sharing and building knowledge and offer many resources. They allow different learning environments such as e-learning, b-learning and m-learning, providing new environments, which inevitably imply significant changes in the form of interaction between teacher and student.

The LMS is used as a teaching platform in a formal environment in which the teacher essentially provides content and defines strategies for learning in an environment that we may call formal, as it implies a certain rigidity in communication, given that students can not define resources - this activity and initiative is always the responsibility of the teacher. However, the resources and requests made available by the teacher may indicate freedom for the students to choose how they will solve the requests using means and technologies beyond this environment.

3.4.2 Social NetWorks

The ease of publishing content and commenting on "posts" has made social networks develop very quickly. Posting and commenting have become two complementary realities, which have greatly contributed to developing critical thinking and to increase the level of online social interaction. Among others, they facilitate and, in a way, stimulate the process of social interaction and learning [11]. Due to their characteristics, social networks also promote the grand opening for sharing and collaboration among people who do not otherwise know each other but have common interests resulting in the creation of knowledge in an environment and in a very informal way. For learning, in addition to creating a network for the group to share knowledge, students can, among other things, disseminate information of interest to the community, such as an interesting book, notes on an article, etc.

Many of the best known social networks are *MySpace*, *Linkedin*, *Facebook* and *Virtual Office Hours*. Within social networks, we can talk about virtual worlds such as *SecondLife* and similar environments that have the potential to radically change the way people interact, navigate websites, and business. These virtual spaces have several common features and functions that make them attractive to all users and interesting in learning environments.

One of the main reasons given for the use of Social Networks in teaching is the promotion of different forms of communication among students with a view to fostering better communication in their future professional life, involving concepts, ideas and different practices used in the classroom (formal environment).

4 RESULTS

After collecting data from our research, through questionnaires and semi-structured interviews, we can now summarize the information obtained that conveys the sensitivity of the students of the sample to the problem addressed.

4.1 Surveys

The questionnaire was divided into three parts, the first one focused on the characterization of the individual with biographical data and the indication of the training course and year of the study plan. The second part aimed to analyze the motivation and use of the technologies in its course both by its professors and among the students.

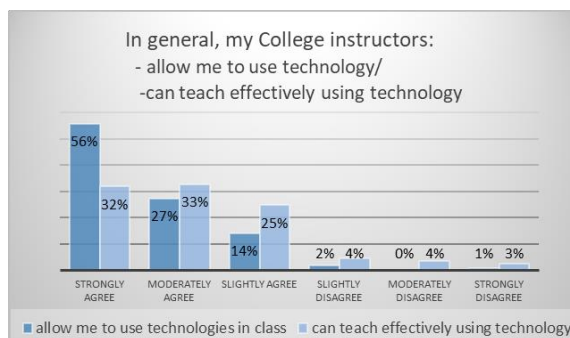
Finally, the aim was to find out which, on the one hand, the tools that teachers used the most within the LMS and beyond, as well as the most used tools between teachers and students and between students and their peers.

The study was based on the responses of 113 individuals divided into four ISCAP courses, mostly of the female gender, with predominant ages ranging from 19 to 21 years old and Portuguese majority (94.7%).

In the sample, there was a predominance of the students of the 2nd year of the degree (65%).

On the general evaluation of the use of computer technologies by the teachers in the courses, the answers given by the students showed the following results: 89% of students evaluate this use between excellent and good, with 6% for excellent, 35% for very good and 48% for good.

Graph 1 – Students use technologies in class/ Teach effectively use technology in class



Regarding the use of the technologies by teachers and their permission to use them in the classroom, we have the following results, according to Graph 1: 56% of the students strongly agree that they are allowed to use the technologies in the classroom, while 27% moderately agree with this, in a total of 83%. A majority of 65% of students report that teachers effectively use the technologies, of which 32% strongly agree with this idea and 33% moderately agree.

Of the respondents, 94% of students said they like the courses in which technology is used and only 3% dislike this learning environment.

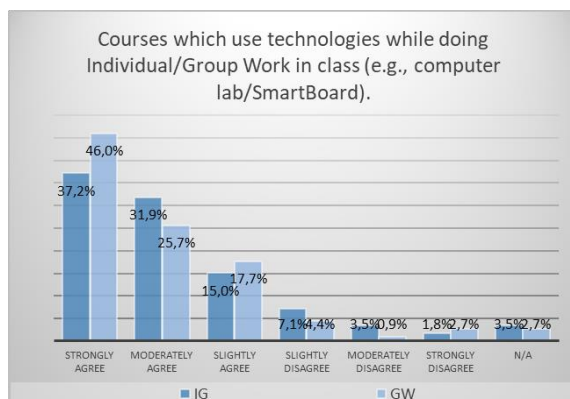
In the opinion of 86% of the students, the necessary technologies for their course are taught by their teachers.

Almost all students (89%) report having good knowledge in the use of ICT. As for the comfort they feel in the use of technology, 90% are very satisfied.

Also, 94% of students said they liked the courses that use the technologies, both in terms of the use of software and in terms of the possibility of using hardware, with 93% responding positively (laptop/tablet).

When confronted with their working conditions satisfaction in a classroom environment using technology, about 69% of students report strongly agreeing (37.2%) or moderately (31.9%) on individual assignments and about 71.7 % of students report strongly agreeing (46%) or moderately (25.7%) in group work, as illustrated in Graph 2.

Graph 2 – Individual/Group work in class without technologies



When questioned about their satisfaction with courses that use only digital books, only 38% are pleased. But if the question arises as to the various resources made available online through LMS, more than 90% show their satisfaction with this process.

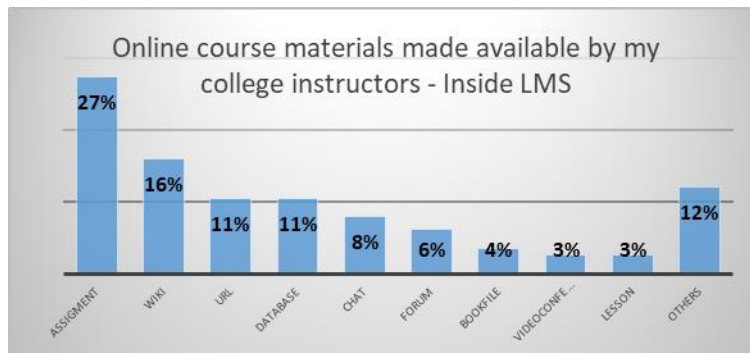
To perform group work, using Social Networks, 90.2% of the respondents refer to use this methodology with pleasure.

When confronted with their acceptance of e-learning courses, only 13.5% are very receptive, and 62% reject this form of learning.

In the third part of the questionnaire, we tried to understand which tools teachers used the most within LMS and beyond, as well as the most used tools between teachers and students and between students and their peers.

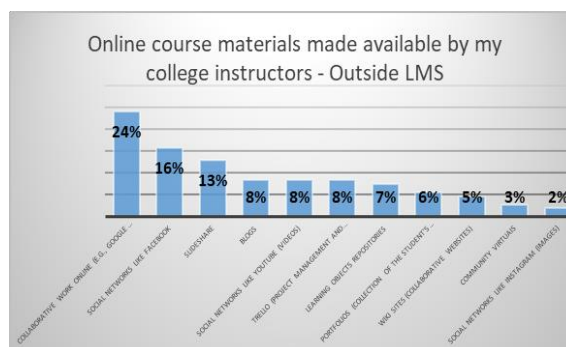
From the analysis of the answers we verified that within the LMS, the most used resources are the assignments (27%), the wiki (16%), followed by the availability of URL's (11%), as illustrated in Graph 3.

Graph 3– use of resources inside LMS



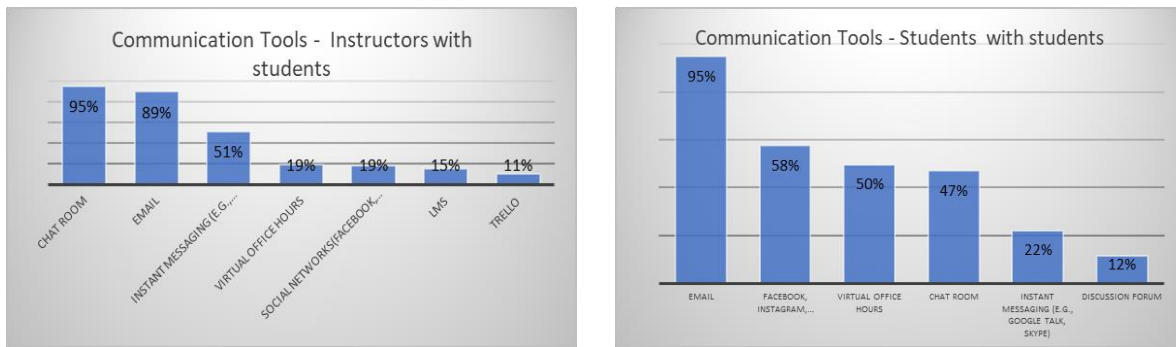
The most commonly used tools are the LMS tools, we find, according to Graph 4, that the collaborative tools are the most used (27%) followed by Social networks with 16% use, followed by SlideShare (13%), blogs (8%), and Youtube (8%).

Graph 4 - use of resources outside LMS



We also questioned the use of various tools used in communication outside the LMS, between teachers and students, and verified that chat is the most used, soon followed by e-mail and instant messaging (eg, Google Talk, Skype), followed by Virtual Office Hours, as illustrated in graph 5.

Graph 5 - Communication Tools - Instructors with students and students with students



Also, according to the previous graph, we can see that the tools communication students use to communicate with colleagues, e-mail is the tool of choice (95%), followed immediately by social networks - Facebook (58%) and Virtual Office Hours (50%), followed by chat (47%), instant messaging (22%) and forums (12%).

We challenged students to refer three suggestions about how technologies could be used in a way that would work better in class or in the College and we got answers that they would like to see more use of the following resources:

- Virtual classes to clarify specific doubts
- Educational videos specific to specific classes
- More practical classes with technologies to support theoretical classes

Many students were satisfied with the current use of the technologies in their classrooms. There is a mix of formal and informal learning. Teachers pose challenges in LMS but give students the freedom to use tools in less formal settings as long as they meet the objectives outlined initially.

4.2 Structured Interviews

The interviews were randomly applied to the students. The students who were subject to the semi-structured interviews were selected, having as criterion to belong to different courses in the institution, and within those, those who were available to participate in the study were interviewed.

Students were invited to participate in the study by the interviewer/researcher in person and informed of the duration of the interview and the research objectives. This guarantees validity and respect for study, as Guerra [12] justifies. The interviews were conducted in the same place for all students in an informal setting. At the beginning of the interview, confidentiality was ensured in the processing of the data, authorization was requested for the recording, and at the end, the acknowledgements for the participation in the investigation were presented.

Based on the results of Figures 5 and 6, a content analysis was performed.

This was an exploratory methodology used to describe and interpret the content of all kinds of qualitative or quantitative data [12].

Communication Agents		Type of Communication	
		Formal Communication	Informal Communication
Student > Student	Functionalities	Information about UC Curiosities of the Course Images and Video Testing Information	Course Knowledge Knowledge of partners / colleagues General information about the course, UC and the Marking of lunches and other gatherings Social Events Class content sharing Sharing contacts Sharing of social experiences
	Tools	Chat Instant Messaging (e.g., Google Talk, Skype, Hangout) Social Network (e.g., Facebook, Whatsapp) Sites Closed groups Email URL's	Facebook Linkedin Instagram Closed group Chat Twitter Instant Messaging (e.g., Google Talk, Skype, Hangout)

Figure 5 - Synthesis of interviews – type of communication between students

Communication Agents		Type of Communication	
		Formal Communication	Informal Communication
Teacher > Student	Functionalities	Sharing of tests, exercises and program content Sharing and presentation of doubts Presentation of Programmatic Content Document management Notices General communication to the Class Submission of works and projects Evaluation of works and projects Surveys / Questionnaires	Sharing of information on UC
	Tools	Video Picture LMS URL's Video Conference Email	Facebook Groups Websites / Search Engines

Figure 6 - Synthesis of interviews – type of communication between teacher and students

The nature of the information shared between the various agents determines the type of tools to use. Whenever a teacher wants to make content available to the students, he preferably uses an LMS (Moodle, in the case) or the school portal.

Already among students, for the same content, is more frequent the use of closed group or even social networks.

The analysis of content allowed to verify that among the agents of student-student communication, the number of tools used, although different, is approximately the same in the two types of communication, formal and non - formal, whereas between teacher-student, there is a greater diversity of tools used in formal communication than in informal communication.

In terms of formal communication, students essentially use e-mail and social networks as well as the chat and discussion forum, consolidating the results found in the questionnaires. In the communication between students and teachers, the use of LMS, supported by image and video distribution tools, as well as video conferencing tools is verified.

As for informal communication, the most used tools are social networks and closed groups, these being common in the scope of communication between students and teachers with students. Students, in addition to these tools, use chat and video conferencing tools.

5 CONCLUSIONS

In this study on virtual learning environments, we focus our attention on different types of communication - formal and informal, and find that the nature of the information shared between the various educational agents determines the type of tools to use. Teachers present the challenges and goals for their students to achieve in a formal setting – LMS - though giving students the freedom to use tools in less formal settings, provided they meet the objectives outlined initially. In the

communication between the students, these mainly resort to the tools provided by social networks, being that they stand out Facebook and virtual office hours.

In both communication agents, the sharing and collaboration tools are essentially used, and students report that they are not much used in classroom environments but that they wish it to be. Thus, we hope to be able to contribute to a better understanding and deepening of knowledge regarding the use of these tools, by the communication agents, in the context of Higher Education. Overall, in addition to contributing to the knowledge available in the area, we want it to be a work base for other researchers who intend, in the future, to deepen the theme presented here.

REFERENCES

- [1] A. Abreu, A. Rocha, J. V. Carvalho, M.P. Cota, "The Electronic Booklet on Teaching-Learning Process - Teacher Vision and Parents of Students in Primary and Secondary Education", *Telematics and Informatics*, vol. 34, nº 6, pp. 861-877, 2017. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0736585316301563>
- [2] A. Abreu, A.P. Afonso, J.V. Carvalho, Á. Rocha, "Electronic Individual Student Process - A Preliminary Analysis" in Á.Rocha, A. Correia, H. Adeli, L. Reis, S. Costanzo (eds), *Recent Advances in Information Systems and Technologies. WorldCIST 2017. Advances in Intelligent Systems and Computing*, pp. 941-951, 2017
- [3] A. Monteiro, *O Currículo e a Prática Pedagógica com Recurso ao B-Learning no Ensino Superior [Ph.D Dissertation]*, Porto: FPCE, UP, 2011.
- [4] A.P.Camarinha, *Tecnologias de Apoio ao Ensino de Português, Estudo de caso no 3º ciclo do Ensino Básico [Ph.D Dissertation]*. Porto: UPT, 2015.
- [5] J. Vilelas, *Investigação: O Processo de Construção do Conhecimento*. Lisboa: Edições Sílabo, Lda, 2009.
- [6] M. Rodrigues, *Ações Para a Qualidade: Gestão Estratégica e Integrada Para a Melhoria dos Processos*. São Paulo, BR: Elsevier Editora, 2014.
- [7] E.Wong, S.Li, Tat-heung Choi and Tsz-ngong Lee, "Insights into Innovative Classroom Practices with ICT. Identifying the Impetus for Change", *Journal of Educational Technology & Society*, Vol. 11-No. 1, pp. 248-265, jan 2008.
- [8] E.O. Chukwu, "*Knowledge and use of Information and Communications Technologies (ICTS) in Teaching and Learning among Teachers and Students of Schools of Nursing and Midwifery in Benue State*", Nigeria, 2011
- [9] S. G Mazman, Y. K. Usluel, "The Usage of Social Networks in Educational Context". *World Academy of Science, Engineering and Technology*, 25, pp. 405-409, 2009. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.259.6931&rep=rep1&type=pdf>
- [10] A. A. Carvalho, *Manual de Ferramentas da web 2.0 para Professores*. Lisboa: Ministério da Educação, DGDIC, 2008.
- [11] S. Cruz, A. Sousa, H. Martins, C. G Marques, P. Ferreira, A. Moura, G. C. Magalhães, *Manual de Ferramentas da Web 2.0 para Professores*. Lisboa: Ministério da Educação, DGIDC, 2010.
- [12] I. Guerra, *Pesquisa Qualitativa e Análise de Conteúdo: Sentidos e Formas de Uso*. Cascais, PT: Principia Editora, 2012.