Deployment of the Information Technology for Higher Education: A View

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ABSTRACT: *The use of information and communication technologies (ICT) for education has been studied extensively and addressed widely in literature. The ICT has changed the learning process which in turn modified the academic relations. This work has focussed the CCMI Digital project that is used to get achieved within academic communities, with a view to the creation of virtual learning communities supported by the triple relationship and the education of teacher-direction-tutors.*

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1. Introduction

Today we live in an era of so-called digital natives [20]. Today, technologies are present in the school of computers, video projectors, interactive whiteboards, video and animations, educational games, web 2.0 tools, among others. These tools, when used on a tight basis, provide more active creative classes and allow for an improvement in knowledge acquisition and understanding. The use of ICT is an evidence of our society for educational innovation and has been used by various technological resources [23].

The school must be attentive to the technological advances of society and teachers, in particular, must take advantage of their potential [24]. In this context, Goodison [9] points out that a teacher's role is essential for the full integration of ICTs in education, to the extent that they favor communication and the creation of new knowledge. Grilo [10] shares the same opinion and states that ICT allows a continuous enrichment of knowledge.

Information communication technologies evolves much more than a set of technologies or information; one interesting assessment derives when it is considered a collaborative learning instrument that supports and facilitates the construction of the knowledge at the classroom context [17].

The adoption of ICT in a planned and systematic paradigm has several pedagogical potentials as established by some authors [10,17], such as:

– Discovery learning;

– Creativity promotion;

– Autonomy and critical thinking;

– Establishment of formal thinking and reasoning organization;

– Intellectual stimulation;

– Diversification of teaching-learning;

– Catalyzer for students' motivation and curiosity;

– Information availability;

– Interdisciplinarity;

– Detection of student difficulties improvement;

– Collaborative work;

– Educational games;

– Learning through the use of simulators.

Pesqueira and Lorenzo [19] reports that ICTs are facilitators of learning since they allow greater autonomy in performing tasks and allow collaborative work. Also's Coutinho [6], shares the same opinion and adds that ICTs offer quick access to a large repository of information online, as well as facilitating the work of teachers in pedagogical terms. Other authors, mentioned ICTs help teachers in their teaching [3,18]and added that these technologies are in favor of the processes of autonomous and meaningful learning.

ICT promotes and allows the teacher and student approach since they help and complement the practices carried out in the classroom context [7]. In the study by Balanskat et al. [2] The use of ICTs is identified as a motivating element in the teaching-learning process. Besides education technologies approach allows a new dimension of time and space in a traditional classroom, allowing technology to be used as a tool for strengthening and expanding school activities and counseling as an individual, in order to respect the rhythms of learning (13).

Actually, teachers do have reasons for the use of ICT in the classroom, since their students report that they feel more motivated, they have greater interest in subjects and concentration levels are improved [1]. Besides, education technologies allow teachers to help prepare their contents, as well allow them to change at any time and adjust to the needs of the students/ class. It is noted teachers' mostly mention ICT that motivates and help students in their study, as well as promoters their autonomy. These instruments contribute to an increase in teaching efficiency.

This work illustrates an intervention project denominated "School of the Future" developed on local college.

The research carried out for the proposed development and this project aims to study the dynamics between the different actors of the educational community (College board, teachers, students, class representatives, and tutors) through the adoption of technologies, with the In order to build a Virtual Learning Community (CVA), they also want to participate in contexts of use and the collaborative construction of knowledge.

At the end of the project and the associated research will find an answer to the following question: "What is the degree of participation and adoption of actors in Educational Technology within Digital School project? ".

This document is organized into four chapters that are presented as follows: The first chapter is dedicated to the theoretical framework, and which is divided into two sections: the problematic framework and contextual framework. In the first section, an approach is made to ICT in education, the virtual Learning Communities and Learning Management Systems (LMS),

including the Moodle platform. In the second section, the characterization of the context surrounding the project is presented. In the second chapter, "Development intervention", the project design to develop and achieve the research objectives is presented. In the third chapter "Presentation and discussion of the results" the results are presented and, finally, in the final chapter, it is the presentation of the main results, the most obvious limitations of the study and prospects for future work.

2. Concepts Background

2.1 Virtual Learning Communities

Some authors acknowledge and advise for the difficulty of virtual community's definition consensus. Nevertheless, one of them considers broad enough to be used in different contexts:

"A virtual community is a circumscribed group of people that act and interact in cyberspace in a shared, meaningful, and negotiated context, for a stable period of time, while driven by common goals and guided by common norms and values"[1].

Computer mediated communication (CMC) is the emergence of virtual communities [17], since it transforms social and organizational interactions, since it transforms social and organizational interactions [21]. In this field, Negroponte [15] foresaw a change in values, leaving them to be linked to emerging national and community values, regardless of their size. This author foresees socialization in "virtual" neighborhoods, regardless of physics and where time acquires new meanings of space. This line of thinking goes against the concepts of cyberspace and cyberculture developed later by Levy [13] and highlights that collective family intelligence.

Other authors also consider that virtual communities derive from the evolution of traditional communities to cyberspace and, therefore, are not limited to a geographical area [4]. They argue that cyberspace attendees are also social actors, not only to seek information but also membership, support, and affirmation. Therefore, he believes that virtual communities combine information with socialization, in the sense that information acquires value by deriving the circle of sociability of each participant. Also, the interactions in the virtual environment are different from those that occur in traditional communities, through CMC, the extension of social relations that occur in the "real" world, while influenced by them. This gives rise to new forms of socialization, ways of life and social organization.

Virtual learning communities make use of the social characteristics of communities for educational purposes, especially collaboration since this approach allows a team and learn new ways of working and thinking [12]. This field is so fertile for collaborative learning.

2.2. Collaborative Learning

Collaborative learning is the educational use of small groups to maximize the learning of its elements, which work together to achieve common goals [11]. This is one of the most relevant issues to be considered when it comes to the concept of online learning, taking advantage of the emotional and cognitive characteristics of this social aspect of learning.

Learning networks have the collaboration as a source of continuity factor and mode of operation [12,5]; It is the basis of the relationship between the community and its members, with the participation of students, motivating them to participate and promote the social construction of knowledge through interaction [1,11].

In fact, "*In network environments, members of the community, students network's nods, feel that their knowledge its similar to a collective adventure - an adventure where they build their knowledge, but also contribute to the construction of knowledge others And as the adventure renews, they learn how much each's one value, not only for them but by the way they relate to each other – they realize that what they had built together, anyone couldn´t build by himself alone* "[8].

It is important to clarify here that the concepts of network and community are two sides of the same coin: learning. Therefore, and according to Wenger, Trayner, and Laat [25], the network refers to the relationships, personal interactions, and connections established between the participants, along with their contributions to education and knowledge creation (among others); The community is already developing a shared around a theme or challenge with the objective of managing knowledge and mastery of their learning identity.

2.3 Learning Communities vs Communities of Practice

A Community of Practice (CoP) is a partnership between people who want to learn from and with others a specific theme [25]. Another author, bearing in mind that communities of practice aim at learning through collaboration defends that communities of practice can be considered to be part of learning communities [1].

Along with literature review, a community of practice is made up of people who have a common interest in a subject (domain); interact and create relationships (community); accumulate and spread knowledge (practice). In particular, the Domain creates a common ground and defines the identity of the community and its value. [1,8,25].

The community is the core element of this concept. The share of individual contributions and regular interactions creates a value-added social learning system. This trait should be very carefully taken into account, as although membership of communities may be imposed, the level of involvement stems from the choice of each member.

The practice is what maintains ties between community members. Establishes a set of socially defined modes of action. Includes tools, manuals, books, behaviors, thinking styles, etc. All members should have a chance to be recognized as contributors to community practice.

Communities of practice need habitats to learn from [25]. LMS are presented here as a basis for the technological realization of these habitats.

2.4. LMS and Communities of Practice

A community implies a common experience distended in time and space. Thus, technology provides tools to extend this experience despite physical and temporal separations. It is very important to make a technology choice appropriate to the community concerned [25]. Good technology does not make a community, but bad technology can ruin it. Therefore, at the moment to choose technology, the following factors should be taken into account:

– Ease of use and learning, as difficulties in learning how to use tools discourage participation;

– Ability to evolve tools, as they must be able to adapt to the transformations of communities, as it is not static and is under constant construction;

– Proximity and accessibility. Tools should not be too out of context for participants and should be easily accessible - here internet access and speed its crucial.

– User and community perspectives should always be taken into account.

The use of learning platforms as CoP's "host" has proven to be a current trend, mainly because in today's increasingly frantic "busy people wanting it all in one place" [25]. Despite the use of these all-in-one platforms act as a reducing factor for the CoP. They work as a foundation or a referential, including a set of tools common to the group, which can be extended through interoperability and tool integration. This increases personal tool choices and opens up the community abroad [25].

2.5. Research Methodology: Research Based Design

This project was innate to the need of College board that was looking for a strategy that would integrate and involver all community actors. Therefore, the development of this project was supported by Design-Based Research (DBR) methodology [16,22].

The DBR has its origins in research design (DR), which is mainly used in engineering, manufacturing and information systems, with the aim of developing practical solutions to problems in these areas. The pragmatism of the DR, allied to carry out experiments, theoretically based on a real context, brought the DBR to the educational field [14].

The use of DBR is education is very well known as design experiments. This approach has been gaining adherents mainly to "bridge the gap between research and educational practice, in search of a close collaboration between researchers and the most relevant actors, professors, and students, can be beneficial for everyone". As shown in Fig. 1, [22] presents the DBR, explaining in four stages:

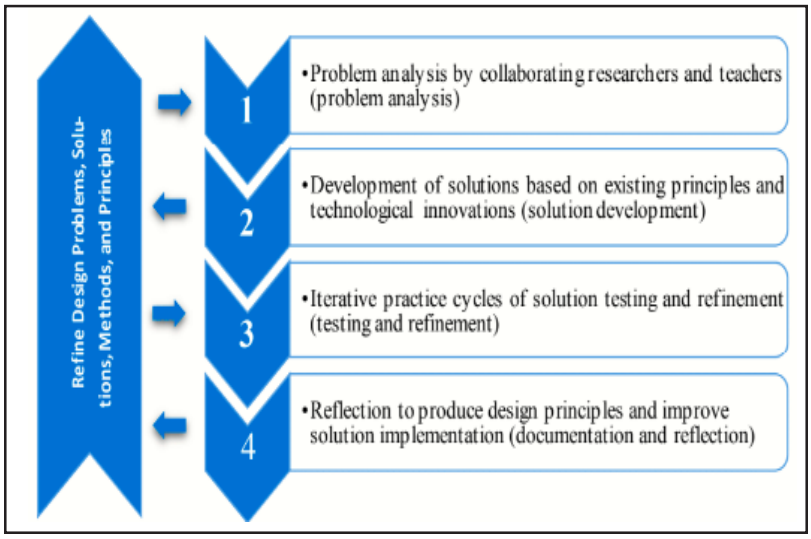

Figure 1. Design-Based Research methodology [22]

3. Design of the Project Research

The digital school project must correspond to two different periods of two academic courses in order to allow a better perception of the intervention developed. In general, the project will consist of several stages, from conception to completion in the classroom, as shown in Figure 2.

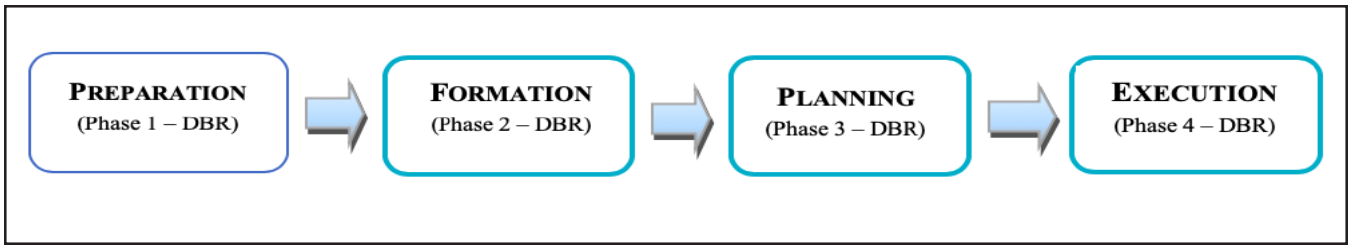

Figure 2. DBR methodology phases [25]

3.1. Preparation

The start of the project will include both its official formulation (articulation and participation of the Director, Professor and Computer Technician) and coordination with external entities such as graphic designers or platforms to support distance learning.

CCMI Digital involved several researchers and actors. In this context, the start-up of the project included both its official formulation (articulation and involvement of the Board, Teachers and the Computer Technician) and the articulation with external entities, namely the Distance Learning Unit (UeD) of the Polytechnic Institute of Leiria (IPL) and a graphic designer. In order to create an identity, it was thought to produce a logo for the project.

For this, a graphic designer was asked to elaborate it, as shown in Figure 3.

Figure 3. Project logo

This phase incorporated a diagnosis, which allowed the identification:

– The material and human resources (allocation of the people involved) for the successful implementation of the project (see Table 1);

Institution	Participants	Dimension
IPL	Researchers	3
UED	Trainees	3
UED	Graphic Designer	1
	Board	3
	Professors	30
CCMI	Informatics Technic	1
	Students	52
	Parents	76

Table 1. Projects participants

– Training requirements for teachers, based on initial interviews, definition, and creation of the respective training plans to be delivered.

In this context, the initial interviews with the 6 teachers (initial group) were applied in order to diagnose the use of ICT by the teachers involved and to identify their training needs.

Subsequently, the steps "*Training*" and "*Planning*" fall under phase 2 of the DBR (Solution Development) methodology.

3.2. Training

On the basis of the results in the diagnosis developed in the previous phase, several actions were taken to ensure the full participation of all the actors involved according to the Table 2.

Training	Objectives
Moodle	Familiarize participants with the project support platform and empower them to use it
Google Docs	Present the tools and explore ways of use and profitability in both educational and orga nizational context.
Movie Maker	Provide participants with skills in making videos to use as a dissemination strategy (or ganizational context) and also pedagogical. Meet the training needs expressed by teach ers.
ScreenR	Approach a tool that enables the elaboration of tutorials, applicable to all curricular areas.

Table 2. Parents' training actions' objectives

3.3. Planning

The planning consists in the organization and programming of all the activities to be carried out (e.g. tools adoption), as well as the allocation of materials, human resources and even financial resources to guarantee the project's fluidity.

The strategies and practices to be undertaken were planned on a case-bycase basis with the school board and teachers. Regarding the parents group, an example is illustrated on Table 3. The selection was based on the syllabus of the subjects, the professional experience of the researchers, according to the students' profile and preferences in terms of activities and also the panoply of known and available tools that best fit the learning objectives and motivation. from the students.

Students' profiles and preferences expressed in terms of activities were analyzed throughout an initial questionnaire survey.

Toll	Objectives
Blog	Develop the students' folio blog; Promote peer / teacher-student communication and sharing; Engagement strategies for parents.
Forum	Develop an appetite for explicit and brainstorming ideas; Promote collaborative teaching; Pro mote greater interaction between participants; Allow a better students' tracking.
Game Learning	Motivate the students; Promote an healthy competition among students; Activate knowledge already acquired; Provide immediate feedback and evaluation
Glossary	Promote interaction between participants; Promote collaborative work.
Google Docs	Promote interaction between participants; Promote collaborative work.
Google Earth	Motivate the students; Promote collaborative work; Provide greater cognitive development; Involve students in their own learning; Skills enhancement.
Simulators	Motivate the students; Arouse students' curiosity for new themes; Engage students. Develop abstraction skills; Allow testing hypotheses about real phenomena; Allow to carry out practical experiments.
Videos	Motivate the students; Arouse students' curiosity for new themes; Engage students.
Webquest	Provide pedagogical activities of web oriented research; Arouse students' curiosity for new ways of learning; Engage students by leading them to build their own knowledge.

Table 3. Parents' training actions' objectives

3.4. Execution

This stage represents projects practical implementation where all interaction with teachers, students, school board members and parents take place.

A practical case for the course of physics-chemistry, exposed on Table 4, its used to illustrate a set of resources or activities developed.

4. Conclusions

ICT can bring improvements and strengthen interactions between all actors in the educational community. Its use should be encouraged in order to stimulate relationships, which generates benefits for all concerned The student's teachers face today

Resource/Activity	Item
Forum	"news"; "doubts" "gravity center, stability and corps equilibrium".
Guideline documents	"course annual planning" "resource list" "Laboratory maps"; "course objectives" "Reports template" "how to make an experiment report"
Digital support materials	"luminous phenomenon's"; "street and road security" "experiments guidelines" "earths interactive maps" "earth gravity demonstration"
Glossary	"movement related subjects";
Simulators	Distinguish between "displacement" and "space traveled"; "Free corps" diagram;
Worksheets	"medium speed" "average speed" "movements"

Table 4. Physics - Chemistry course contents

are quite heterogeneous. They have different languages, life experiences, cultures, goals, learning styles, skills, and motivations. In this sense, teachers must possess or acquire new knowledge and skills to face new challenges. Training is one of the solutions that teachers normally use to acquire new knowledge and skills or improve what they already have. ICT, as well as playing a key role in new ways of teaching and transmitting knowledge, can also be applied to other areas of education.

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