Facilitating Tool for e-Learning in Higher Education Institutions

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Abstract—**Information and Communication Technologies (ICT) have created new spaces in the construction of knowledge. Now, teaching goes beyond the institutions themselves and it arrives at businesses, our homes and social venues. The time for learning is no longer confined to a certain place and period of time, but the whole space, at any time, concepts, distance education, e-learning, collaborative work, b-Learning, m-Learning and Web 2.0 have all become increasingly important in higher education and educational communities. Using an action research methodology as qualitative research method, we present a case of a platform implementation to support e-Learning in the School of Technology and Management, Polytechnic Institute of Viana do Castelo, Portugal. Once the problem to be addressed was diagnosed, we present the action: a study on e-learning, and an analysis of the characteristics of the platforms to support a range of e-learning in Higher Education Institutions (HEIs). Based on this study, we developed a portal and this paper presents the phases of development and selection of tools and content, concluding with an evaluation of user satisfaction with this platform, and its importance for the development of e-learning in HEIs.**

Index Terms—**DL, e-Learning, Web 2.0, LMS, CMS.**

I. DISTANCE LEARNING

Information and Comunication Technologies (ICT) have created new spaces in the construction of knowledge in education; and now business, home, and social environments have become educational. Clara Coutinho and João Bottentuit comment on the fact that more people study at home nowadays, as they can access cyberspace for distance training and learning, seeking the information that is available to them outside the school context, via their computers and internet services, to meet their personal needs in this respect [1]. Distance learning is an educational model that provides learning "anywhere, anytime". The educational space presupposes that there is a separation in place and time between teachers and students, and that technology is a tool for communication and dissemination (except in the case of correspondence courses). It is basically putting the students in control of his or her own learning process. [2].

It is possible to identify stages in the evolution of distance education. The first generation is characterized by correspondence-based education, where teacher and student training materials were exchanged through the post. With the advent of audiovisual resources (educational TV, videos and tapes), DL enters its second phase, enabling alternative ways of learning for students as, in addition to reading, students could hear and see images associated to the educational content, allowing the teaching and learning process to be adapted to the different learning styles of students. The introduction of the Internet heralded a third phase for distance education, opening new spaces for learning and enabling synchronous and asynchronous communication between teacher and student, as well as between peers. At this stage, the use of email and chat tools grew swiftly. The fourth generation is marked by an almost complete replacement of written material (books and paper handouts) by digital multimedia material which can be easily accessed through teaching-learning environments and platforms. In this fourth and final phase, the process of teaching and learning is mediated by technology and so new names are created to refer to this new reality, such as e-learning', 'online learning', online training' or 'online education' [3], [4].

II. E-LEARNING

E-Learning is inextricably linked to the Internet and to the world wide web, resulting in the potential to provide easy access to information, regardless of the moment in time and space, as well as to the rapid publication, distribution and updating of content; the diversity of tools and services for communication and collaboration between all stakeholders in the teaching-learning process, and the possibility of developing "collaborative hypermedia" to support learning [3].

We already know that e-learning is presented as an innovative methodology and we have also seen that distance education presents itself increasingly as an alternative to face-to-face teaching due to the technological support associated with the dynamics of e-Learning, with several authors [5] considering it very useful in training and education. Many of the authors who discuss these issues almost always come to the same conclusion, that methods associated with educational ICT offer new possibilities and pave the way for differentiating between content and working methods. The lack of vision in the planning of e-learning and distance learning Higher Education Institutions (HEIs) led to the misuse of the term "blended learning" or b-learning, a method that is still being applied in spite of strong resistance to it, and one which will be an improved method in the near future and will hold for many years. Therefore, it is not so strange that authors like Rikke Schultz and Lone Guldbrandt Tonnesen are concerned: "we believe that resistance to the concepts of e-learning and distance education among teachers and students in adult education is due to four main factors of the tradition of adult education: curriculum tradition, oral tradition, lack of confidence in technical solutions to educational issues and lack of experience with

the tool" [6].

The development of e-learning and distance learning requires the acceptance of tools, which is rare in educational institutions. Teachers should be encouraged to use these tools and develop ways of integrating ICT. There is a need to support the level of use of the tools in the construction of e-Contents, and in planning b-Learning. The heads of educational institutions therefore have to be aware of the possibilities, as well as the investment required, and the training and administrative changes that are necessary [6]. To fill this gap, it would be appropriate to rely on qualified professionals in Information Systems and in platforms to support e-Learning. Some institutions have already been doing that, but there is still a long way to go.

In addition, teachers need to gain experience in ICT to be able to reflect on their educational opportunities in the context, in order to challenge students through the Internet, be able to respond to individuals and groups, and facilitate online discussion. Students need help in learning to use these new tools, as well as in how to communicate and cooperate with each other [6].

The success and quality assurance of e-Learning and b-Learning is dependent on five basic components (contents, e-teachers, interaction systems, technologies and evaluation), depending on the context and methodology to be adopted [7]. According to Arnaldo Santos, the content/materials should be prepared with scientific quality and the capacity for self-learning in various formats; he also calls for e-trainers to be facilitators of the learning process accompanying the students in their difficulties regarding the content, answering questions and encouraging interaction with the system. These systems of interaction must be appropriate for the learning objectives of the population in question, and the technologies can be used as a means learn or teach. The evaluation systems should be rigorous and transparent so as to be able to assess the trainees, the training, its surroundings, and the management and communication. Thus, it is very likely that any uncertainty about the results of educational courses, and regards e-Learning, b-Learning and quality, is minimized.

Tim O'Reilly conceptualizes Web 2.0 as the second generation of communities and Internet-based services. In relation to what happened before its appearance, Web 2.0 removes the dependence on physical media by allowing a user to keep striving to put online content quickly and publish their resources easily, but as we have seen, the main characteristic of Web 2.0 is the use of collective intelligence, based on information networks where each user becomes the producer of content [8]. This means that, through the use of a global collaborative network, all knowledge is shared and authority is decentralized, with the freedom to use and edit. This new generation, the 2.0 generation as many authors call it, will be increasingly closer to the characteristics of the individual student or individual who seeks knowledge. If we assume that the base will be the tools provided by the new generation, it is important to realize that, although we are technologically supported by this new approach, it is still necessary to review processes in order to bring the trainers of trainees, and understand that this approach should not be seen in terms of distance, but in terms of motivation. There are now ever more frequent references to the media awards given to teachers who somehow motivated their students to use the

services offered by Web 2.0 in their courses. In a situation of physical proximity such as educational institutions, there are certainly students who are still far removed from the subjects taught and these new ways of learning, despite this proximity. Thus, distance is the least important element in the motivation to learn and to use collaborative tools, making it more important to review the processes and create a structure that brings both parties, providing essential media and content that meet individual needs.

Faced with the introduction of mixed environments based on learning platforms, e-learning in HEIs as a process of innovation will be necessary to consider how central aspects of behavior change at the individual level. Nevertheless, it is also important to consider the need for HEIs to restructure at the organizational level in order to exploit the opportunities offered by teaching / learning technologies [9]. The coexistence of routine classroom teaching and e-learning involves the establishment of terms of interaction between the parties, all in a collaborative perspective. However, despite already being used by many teachers in their courses, services and Web 2.0 tools despite already being used by many teachers in their courses are not part of the learning management systems associated with him, or so infrequently that they are at risk of not being understood as a trend teaching process but as an isolated practice. According to Coutinho and Bottentuit [1], the use of Web 2.0 tools to train future teachers leads to better practices in using them, but we cannot forget that this is still a phase of transition, and that not everyone has had the possibility to work with these tools, especially teachers that leave now be the holders and transmitters of knowledge content, becoming facilitators, those that stimulate a culture in which students produce and discuss ideas. This is aligned to one very important condition - change, and although we live in an age where technology is an integral part of our lives and of any educational institution, today, with new tools, there are many questions about the best and most effective way to use them, especially by those who are less accustomed to new technologies.

A. E-Learning Platforms in HEIs

According to a study by *DeltaConsultores*[2] in partnership with *Perfil*[3], under the Program of Operational Employment, Training and Social Development (OETSD), the level of use of existing platforms in the HIE market indicates that of the seventy-five different platforms identified by the respondents, forty-five were of Portuguese origin. This means that although the study noted that most of those used are not of Portuguese origin, a fair amount of solutions are produced at this level.

The following graph shows the distribution of platforms in Polytechnic Institutes according to the study conducted by *DeltaConsultores* in partnership with *Perfil*:

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[2] **DeltaConsultores** was founded in 1993 and has acted primarily in the field of training, developing various products and services for use in technologically advanced environments. http://www.dltconsult.eu/

[3] **Perfil - Psicologia e Trabalho, Lda** is a training and consulting company that works in developing the human assets of organizations. http://www.perfil.com.pt/
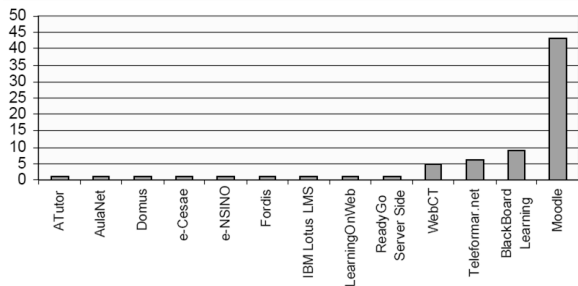
Fig. 1. Platforms in polytechnic institutes.

We can see the strong presence of the Moodle platform, largely due to its availability and experience in installation and maintenance. It can be installed in various operating environments (Unix, Linux, Windows and Mac OS) and is supported by a virtual community, which brings together software developers, system administrators, teachers, designers and users around the world. In addition, the platform is available in multiple languages. The same can be seen in Universities, although these show a greater range of models but, as the study says, many of them are being discontinued due to the purpose of the projects and difficulties in their maintenance.
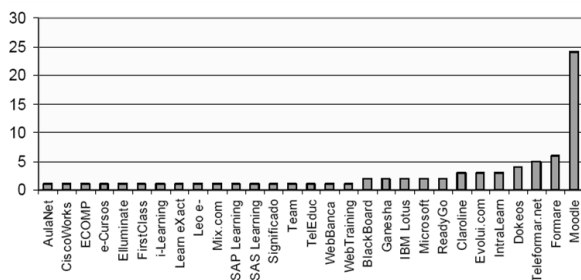

Fig. 2. Platforms in universities.

III. CASE STUDY

Information and communication technologies (ICTs) have created new spaces in the construction of knowledge. Each day, more people are studying at home and, from there, can access cyberspace training and DL. The time for learning is no longer confined to a certain place and period of time; therefore, the concepts of distance education, e-learning, collaborative work, b-Learning, m-Learning and Web 2.0 have become increasingly important in higher education and other educational communities, although their development requires encouragement and training in the use of these tools. This article presents a case study of an implementation of a platform to support e-Learning in the School of Technology and Management of the Polytechnic Institute of Viana do Castelo, Portugal.

A. Research Methodology

The research methodology used in this project was action–research, similar to that proposed by Olesen and Myers [10]. In their work, these researchers successfully used an action research methodology to investigate the relationship between the introduction of electronic tools (groupware) in an organization and the consequent changes in individuals in terms of work habits and organizational structure. These authors give special attention to this

methodology because it "allows a researcher to intervene in the organization and generate knowledge about the processes" (p. 321). Moreover, research presented by these authors allows for an interpretive analysis of the scenario or environment which enabled them to intervene to focus their research on how people try to act in order to achieve a specific situation. Olesen and Myers [10] employ a cycle of action research involving the following steps:

- Diagnostic: identifying the cause of the research;
- Action Planning: determining the actions to be taken to resolve the research problem;
- Actions taken: conducting and monitoring the planned actions;
- Evaluation: determining if the actions addressed the research issue;
- Learning obtained: documenting the knowledge gained through the project.

B. Development Stages

1) Diagnostic

Number Motivated by the new generation of e-learning and the need to create individual learning environments based on the recently available Web 2.0 tools, this research intends to examine the importance of the implementation of a portal to support e-learning in the use of an e-Learning platform and Web 2.0 tools both at the administration level or at the user level, and to find out how relevant these are to the educational community. Taking as points of comparison the best practices already adopted by other institutions with a lesser or greater degree of maturity, and which somehow underpin the need for such applications, the interest in implementing this platform to support e-learning also resulted from the authors' experience as users and administrators of the Moodle platform of their institution to improve the practice of e-learning within the educational community.

2) Planning

Once the objective of the project was identified, a study was conducted into e-learning and new challenges in order to ascertain the quality of e-learning and make an analysis of the characteristics of platforms used to support e-learning at several HEIs.

The aim is to develop a platform to support e-Learning that is reliable and of quality in relation to the technology, processes and content. For this reason and, according to the Institute for Higher Education Policy [11] the "benchmarks" for the success of distance education can be organized into the following categories:

Institutional Support – The standards in this category include activities to ensure a suitable environment for quality distance education and the policies that guide the development of education over the Internet. These standards relate to such matters as technical infrastructure, technology plans, and professional incentives;

Development of courses - This category includes items related to development (including analysis, planning, implementation, testing, evaluation, maintenance, and so on);

Teaching and Learning Process – It relates the didactic aspects;

Structure of courses – This establishes policies and procedures which support the teaching-learning process and

include the definition of the objectives of the course, availability of library resources, types of materials available to students, response time to students and assessment of students' expectations;

Student Support - This category includes a range of services offered in support of student activities, such as training and assistance in using online resources;

Teacher Support - Items in this category refer to some assistance and support activities provided by other more experienced members, or third parties;

Evaluation and Auditing - The items in this category are policies and procedures which define how to evaluate quality.

Of the above-mentioned "benchmarks", those which seemed relevant to the development of a portal to support e-learning quality would be institutional support, support for students and teachers, not forgetting the aspects linked to technical development itself. The total freedom of current publication requires web-site authors to know who potential users are, advising on perception, design, navigation, usability, among others. The ISO/IEC 9126 for software quality fits the model of the 9000 family of quality standards. The quality of use lies in measuring the quality of the product in the specific context of each user. The quality of a software system can be understood in different ways and using different approaches, providing a quality model that incorporates six features, each with sub-features:

Functionality – site capacity to provide functions that meet the needs of the user (active links, search engine internal contact with responsiveness, real-time communication, activities, collaborative writing);

Reliability – capacity of the site to have a good level of performance (fault tolerance, maturity, compliance);

Usability – capacity of the site to be understood, learned, attractive and usable by all users;

Efficiency – site capacity to provide appropriate performance (Rapid Response);

Maintenance – capacity of the site to be modified to include both improvements and extensions of features, and repairs to defects;

Portability - capacity of the site to be transferred from one environment to another.

Therefore, in this study a portal with quality to support e-learning is considered to be able to meet the following Critical Success Factors (C.S.Fs): environment, incentives given to the project, platform development, support and interaction, and evaluation. Based on the categories mentioned above, a questionnaire was created and applied to the leaders of platforms which support e-Learning in various HEIs [12]-[16], in order to obtain guidelines and guarantees for the correct implementation of the technology, processes, content and issues related with its use.
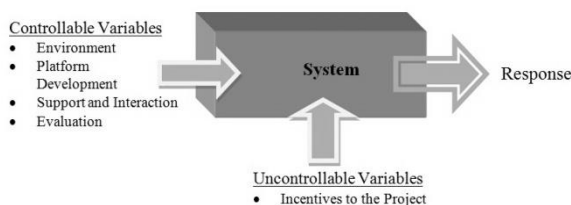

Fig. 3. Adapted model (Taborda Silva, 2001).

The tool used to formulate the questionnaire and analyze the responses given by the implementation teams of

platforms to support e-learning in HEIs gave rise to an adaptation proposed by Taborda Silva [17] (Fig. 3).

In the model we have differentiated and defined two types of variables: i) dependent, which one aims to study and which depends directly on ii) the independent variable, which integrates a number of manageable and controllable factors and conditions that one wants to study. In the awareness that the type of information that had to be collected and, considering that the dependent variable "presence and quality of the platforms to support e-learning" is the presence of the standards of quality mentioned above, what follows is the identification and description of the independent variables:

TABLE I: ASSOCIATION BETWEEN VARIABLES AND QUESTIONNAIRE

Question Number	Variable	Question
1		How long has the platform to support e-Learning existed?
2		What are the objectives pursued with the implementation of the platform to support e-Learning?
3		How were the themes covered in the platform selected?
4	I.V.1	What benchmarking procedures were used in choosing the solution?
5		What organizational changes took place in technology and human resources?
6		What actions have been taken to promote the release of the platform to support e-Learning?
7		What is the community's response to the platform to support e-Learning?
8		Are there partnerships with other institutions?
9	I.V.2	Are financial incentives given to implement the platform to support e-Learning?
10		Are incentives given to the technical team?
11		Are there plans to ensure quality standards?
12		What are the main security measures which have been implemented?
13	I.V.3	Was an analysis carried out to identify the needs of the community?
14		Is there any multidisciplinary team responsible for the platform?
15		Are the materials and procedures reviewed periodically?
16	I.V.4	What forms of interaction with the community are implemented in the platform?
17		Is technical support provided to the community regarding the use of the platform? If so, how?
18	I.V.5	What methods are applied in assessing the effectiveness of the platform?
19		How do you measure the satisfaction of the community regarding the use of the platform?

I.V.1 – Environment - This variable concerns in many respects the relationship between the platform and the community, and what procedures are followed in choosing the solution, themes and dissemination of user feedback.

I.V.2 – Incentives to the Project - This variable has to do with how open the institution is to financially supporting the implementation of the platform to support e-learning, and incentives given to the team in the development of the application.

I.V.3 – Platform Development - This variable concerns the implementation of the platform and the enforcement of quality standards related to the technological development and application of the support services necessary for the community, as well as the frequency of procedures and the need for a multidisciplinary team responsible for the platform.

I.V.4 – Support and Interaction - This variable is related

to the chosen forms of interaction with the school community. It also refers to the need for specific forms of technical assistance provided to those interested in using the platform.

I.V.5 – Evaluation - This variable has to do with the way of evaluating the effectiveness of the platform and the methods used for measuring the satisfaction level of use by the community. It can be measured by comparing the number of users of the e-Learning platform, or the number of outstanding requests for training in its use.

The following table, Table I, considers the examples of the relationship between the variables and the issues raised with those responsible for implementing the platforms.

The analysis of the questionnaire responses showed that the factors deemed most important by those responsible for the platforms to support e-Learning are the "incentives given to the project" and "platform development". These values are meant to represent the presence of the dependent variable "presence and quality of the platforms to support e-learning", not as a quantitative analysis, but as a way to better visualize the importance of their presence. The dependent variable was defined so that the influence of each factor could be analyzed individually and as a whole, in response to the system. The fact that the factor "Support and Interaction" has an average presence, and together with the two factors mentioned above, leads to the conclusion that those responsible are committed to providing good service to users by investing heavily in technological quality, human resources and user interaction.

3) Actions taken

Given the need for tools to support e-learning and the main features that those responsible for the platforms indicated as the most important to take in consideration in its implementation and that should be reflected in the development aspects of the platform, called PAPeLI, it will be a great contribution and complement to e-Learning. It will provide a range of services supporting the use of Moodle, but the aim is for it also to be a driver of collaborative work in education and the environment in which it occurs, as well as contributing to development and innovation in distance learning.

The platform consists of the following areas:

Informative – where information is provided on the e-Learning initiatives of the institution, and about the platform itself, providing support services to all users involved and who use Web 2.0 resources applied to education;

Online Support - where teachers and students can be helped with various support issues, such as creating accounts, blogs and wikis;

Library – where documentation is provided to support the use of e-learning platforms, blogs and wikis;

Collection of convenient thematic data, giving users quick access to pages with information about e-Learning, Web 2.0 and Collaborative Work.

a) Selection of software tools

At this point, the research is centered on finding a software under the open source policy, which can satisfy the requirements of a functional portal: reliable, efficient, able to be modified, including both improvements and extensions of functionality as well as repairing faults, with a usable, easy to understand interface, in our native language (Portuguese) and

with a good community of users/developers to maintain the extra features available.

Another requirement is that the implementation of this portal may be performed in servers which support free programming languages and most of the communication protocols and database on the market. Therefore, a long list of Content Management Systems (CMSs) that are on the market was researched in order to find the one that best fits the objective of the project.

A demo version of the following CMSs was tested: Zikula, Joomla, Geeklog, Drupal, Mambo, PHP-Nuke, Website Baker, sNews, Pligg, MODx, Xoops, Dolphin, Typo3, Concrete5, phpwcms and e107. Among all of these tools Joomla was chosen as the CMS to implement the platform to support e-Learning. Joomla has been developed from Mambo[4]; it is written in PHP and runs in Apache or IIS web servers and MySQL database software. Joomla is in major expansion, is probably in most demand, and has the largest community and available resources. The great advantage of Joomla is its diversity of extensions, add-ons, components, modules and plugins which are free and available in various portals around the Web. This is an open source project (GNU/GPL) and its latest stable version in Portuguese language is Joomla 1.7, already available with this version with the new agreement spelling. There are rumors that the production cycles are shorter, so that the release of new versions is expected six months after the last Joomla stable versions.

In addition to the portal server, PAPeLI will incorporate a wiki, which is a Website for the collective work of a group of authors. Its logical structure is very similar to that of a Blog, but with the added functionality that any visitor can click to modify, add or delete content on the page, even though it has been created by other authors. MediaWiki is the software chosen to implement a server Wikis in PAPeLI. There is other software available on the Internet for this purpose, but the fact that it is free under open source, with multilingual support, PHP and MySQL, the Wikimedia Foundation, gave it sufficient favorable conditions for it to be chosen. In summary, the MediaWiki software is written in PHP, uses the MySQL management system databases, is licensed under the GNU GPL, and was originally written for Wikipedia by the student and developer Magnus Manske. It was released on January 25, 2002 and is now in stable version 1.17.0 of 22 June 2011 and supports over 300 languages.

In the context of PAPeLI, this software will be managed by the administrators of the platform, which will include a section on applications where each user can request the opening of a wiki and apply the settings they want. All wikis are open for use in order to serve the community of an HEI.

Just as there was a need for a server for wikis, a server for blogs has also become essential. A blog refers to a diary on the Web with links to other sites whose information is organized from most recent to the oldest (in "post"), and is frequently updated with opinions, emotions, facts, images, etc. Blogs can be personal and / or collective, open to all or

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[4]**Mambo** is an award-winning content management system (CMS), which can be used for everything from simple websites to complex corporate applications.

assigned to a closed community, the latter being true of the blog server in PAPeLI. The content management system web (WordPress) was chosen, written in PHP with the mysq database, as this is especially used in blogging. WordPress was created from the no longer existent b2/Cafelog and is today, along with Movable Type, the most popular in the creation of Weblogs. Its rapid growth is due to its type of license (open source), its ease of use and features such as content manager. Created by Ryan Boren and Matthew Mullenweg, it is distributed under the GNU - General Public License. The choice was based on the following reasoning: the standards cover the Web, and have the ability to be understood and learned; they are also usable and aesthetically pleasing, with good support in Portuguese, can easily be updated and an increased number of extensions are available.

The server is also available for use by any teacher or student wishing to undertake research and, in order to obtain feedback from users of the platform to support e-Learning, a server questionnaire was implemented. The tool chosen was LimeSurvey, which has the following characteristics: unlimited number of questionnaires at the same time, unlimited number of questions per quiz, unlimited number of participants in a questionnaire, questionnaires in several languages, user management, twenty different types of questions, WYSIWYG HTML Editor, quota manager, integration with images, creation of print questionnaires, conditions for the questions according to previous answers (Skip Logic / Branching), joint response reusable, ability to import questions, research assessment, research anonymous, research group for open and closed participants, sending invitations, reminders and tokens by email, option for participants to save answers and continue the quiz later, questionnaires based on cookies or session, editor templates, user-friendly administration, possibility of data entry Back-Office, questionnaires with expiration date automated, performs import and export functions to text, CSV, PDF, SPSS, R, QueXML and MS EXCEL format, statistical and graphical analysis with export capabilities, screen reader accessible, compliance with W3C and supporting over fifty different languages in frontend and backend. PAPeLI also offers a powerful order management tool that serves as user support. The portal, at this point, is the main activity and it is possible for users to put their questions about the functioning of Moodle or the Web 2.0 tools implemented. When the users come into contact with the technical team, through a system of control messages, they can follow the progress of their request and know at what stage it is. OsTicket is a software management system for e-mail messages used to control the contacts made by users and functions using PHP and MySQL database. The OsTicket works as follows: the client sends an e-mail by creating a new application and automatically receives a response with a number. This number is the ID of the contact and she will be able to monitor the entire process of care, and check the status. Through the management area, the administrator can perform various tasks such as reply, delete, close contact, move the mail between departments, create employees, create departments or strategic areas and create multiple e-mail contacts, among others. These are the resources of osTicket:

- Support by e-mail or Web - Applications may be created by e-mail or through a form, and send the request to user ID;
- Auto-Response - The user receives an automatic email with information on the ID and that the message was received successfully. Default answers can be configured. Joomla is a CMS with more, free, resources available;
- Predefined Replies – This allows predefined responses to be set through the FAQs (Frequently Asked Questions);
- Internal notes – An excellent feature that improves the internal communication team, allowing notes to be placed on each request;
- Help Topics - Allows help topics to be created for users and service staff;
- Alerts and Notifications - Whenever a user sends a new email, the team is informed by e-mail or pop-up on the computer monitor;
- Access Rules - Access levels for each department or group;
- Transfer - Allows requests to be transferred between team members;
- Registration is not required - The user need not be registered to use this system;
- History - All requests have a detailed history by the user.

b) *Portal contents – PAPeLI*

Fig. 4. PAPeLI portal.

Publications in e-Learning - The most important publications in the area of e-learning and collaborative work were analyzed, as well as books and articles that are available on the portal as a ready reference.

Library - This section is the most important included in the PAPeLI portal. This is a database with manuals, video tutorials and other files of interest as well as access to free software that will allow users to get help quickly in the use of Moodle. Nineteen video tutorials were conducted in support of the Moodle site and made available on PAPeLI, for the consultation of users.

Promotion of Events and Training - As with other platforms to support e-Learning, the portal aims to promote events and training in the area of e-Learning. Thus, through the portal, users can have access to this information.

Information, FAQs and Forum - PAPeLI also features a news section on e-Learning and the latest highlights can be found on the home page of the portal. The user can also find direct access to News Feeds at the top of the page, where the latest articles and information from reference sites about

e-learning and other topics are uploaded. While using the portal, the user can use the Frequently Asked Questions (FAQs) section and find quick access to answers to questions from other users. If the user prefers, there is also a forum accessible, where their issues about e-Learning can be discussed and promoted.

4) Evaluation

With the platform in operation, indicators began to emerge that point to the real need for the portal PAPeLI in the School of Technology and Management of the Polytechnic Institute of Viana do Castelo. It was found that much of the community made a large number of requests for the opening of several wikis to develop work to support their courses. Examples of these are two blogs created to promote the course of Computer Engineering (blog@eicandidato and blog@eialuno) among students and prospective students, which emerged as a result of PAPeLI, and others followed. Another focus is the success of Moodle training, conducted within the institution and aimed at the teachers regarding the use of some features of the application, and that also came up because of the portal PAPeLI. The acceptance of this platform was measured using questionnaires developed in the LimeSurvey tool with direct access available to users in the institution's Moodle. Positive responses about the excellent resources available on the portal were collected. PAPeLI is certainly an asset to the support of e-learning and has come to fill the perceived need of support for the use of Moodle, and Web 2.0 services and tools.

5) Learning

It can be verified that the presence of a portal to support e-learning platforms, courses and collaborative and social tools is considered essential. The choice of technology for the development of these portals does not seem to be of any concern, often because of the fact that the best practices have been adopted. It seems that there are major changes in terms of human resources, especially the recruitment of specialized staff, and technological concerns with issues such as integration into existing systems. There is also an awareness of the dissemination of the application and its functionalities within the community and a gradual adaptation of the technology with users is also mentioned. Of note is the existence of partnerships in developing these projects which will solidify the presence of incentives given to the project and its professional staff, which certainly regard with pleasure the support of those responsible for the implementation of such solutions. As such initiatives require significant investment and returns are not always guaranteed in the short term, a possible lack of such returns may be one of the reasons why some HEIs have not yet implemented these support platforms.

Another important point is the concern over integrating these platforms with existing information systems where in issues such as security this aspect is seen as being assured, although the fundamental aspect that stands out relates to the authentication of users. PAPeLI was based on this study and took into consideration the concern with issues of quality of service. In the hope that it will be supported by a specialized multidisciplinary team, it already has a range of forms of contact with users and does not ignore the evaluation process carried out by means of questionnaires, mentioned above.

The users of PAPeLI can access the data library and search for the help they need through the manuals available, which are organized by sections and categories that facilitate their location.

IV. CONCLUSION AND FUTURE WORK

The demand for distance education has grown rapidly with e-learning as a dynamic process offering new possibilities and innovative, pioneering teaching that uses a variety of content and working methods. Today, communities seek content and materials prepared with quality and aimed at self-learning in various formats. However, they need to be aware that the implementation of these systems at an institutional level encompasses a number of challenges which must be able to respond effectively, such as the technological infrastructure, technical support in the maintenance and management of systems, training and professional recognition, in the hope that the whole community will participate in this practice. Motivated by the new generation of e-learning, our aim was to determine the importance of the implementation of a support portal such as PAPeLI in the use of an e-learning platform and Web 2.0 tools, using as a point of comparison the best practices already adopted by other institutions with a lesser or greater degree of maturity and that somehow underpin the need for such applications.

Thus, this article presents the methodology of action-research used to guide us in developing this project in order to ensure the implementation of a platform of support for e-Learning in the School of Technology and Management of the Polytechnic Institute of Viana do Castelo, presenting the Portal and concluding with the evaluation of the degree of user satisfaction with regard to this platform. It was concluded that the Portal made a very positive contribution to the development of e-learning in our Institute.

As a continuation of this work, we have been pointed in a number of directions, both in order to improve and extend it, as well as to address some limitations. Therefore, we propose improving the processes and content, going against the best practices recommended by experts, as well as the mechanisms of evaluation in accordance with international standards. Secondly, we intend to study the factors that have led to poor implementation of platforms to support e-Learning in Higher Education Institutions, as well as the way in which these platforms can bring competitive advantage to those institutions.

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