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## Infusing technology in pre service teacher education programs in Portugal: a study with weblogs

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**Abstract:** This paper presents an experience of internet integration in pre service teacher education programs in Portugal. Participated in the study 26 student teachers, 14 from Natural Sciences (S) and 12 from Foreign Language classes (L). Future teachers were encouraged to set up and maintain a weblog for their future students over a period of ten weeks during the 2<sup>nd</sup> semester of 2005/2006 in Educational Technology course (ET). The post-course survey and informal observations confirmed that, though not having prior experience of web design, student teachers enjoyed the experience and that the learning of a new-based technology such as blogging was something they felt complemented and enriched their pre service education. Results also point out differences between S and L students that can serve as interesting cues for the design of teacher education curricula in Portugal according to the Bologne Reform.

**Keywords:** teacher education – educational technology – weblogs

### 1. Introduction

The aim of this paper is to analyse and discuss the importance of infusing technology in pre service teacher education programs in Portugal as a form of preparing technologically proficient teachers in the schools. Such a debate gains additional relevance considering the structural reforms imposed by the Bologne process to teacher education curricula in Portugal. We believe the failure of technology integration in portuguese schools is due to a lack of professional development of teachers in technology-supported pedagogy. We will begin by presenting some principles/beliefs that resulted from our experience of years of teaching educational technology (ET) in pre service teacher education programs, and evaluating its impact on teachers professional development:

- there is no chance of changing educational systems if teachers are not involved in the reform process;
- teacher education programs are crucial for technology to be integrated into the classrooms
- technology integration is a first step towards transforming teaching and learning activities;
- pre-service teachers need to observe technology being modelled by teacher educators;
- teachers teach the way they were taught, therefore pre-service teachers need to experience the facilitative paradigm of a constructivist learning environment;
- for changes to occur student teachers need time to practice and to reflect on practices.

We assume that without changing teacher education programs there is no chance for technologies to be integrated in our classrooms routines: teachers will continue to teach in traditional ways and students will (rarely) use computers rather than for drills and word processing. The key question motivating this study is whether a technological learning experience using the internet facilities (weblogs) in pre service teacher education programs: a) can help student teachers embody best practices to create enriched and collaborative learning environments, and b) motivates student teachers to use technologies for instructional purposes.

## **2.Theoretical Framework**

### **2.1 The need for new Learning Environments**

Today's students are growing up immersed in digital media which they use for entertainment, communication, learning, and even shopping. Students without access to digital media face the prospect of being developmentally delayed and disadvantaged. Increasingly, net generation learners will demand that educational institutions provide technology-rich learning environments (Austin, 2004).

Current learning theory values interactivity, activation of prior knowledge, connecting the theoretical to the experiential, and using relevance and efficacy to assess information. In this constructivist approach, there is a fundamental shift in the educational paradigm from instruction to construction and delivery. Learning is not simply assimilating knowledge transmitted by textbooks and instructors but personally building and communicating knowledge. (Harada, 2003). Education research on designing learning environments that optimize learning have been identified as being learner-centered, knowledge-centered, assessment-centered, and community-centered (Donovan, Bransford & Pellegrino, 1999). In learner-centered environments, teachers create challenges for students and its role changes from the instructivist to the constructivist (Austin, 2004).

Technology is a tool that can help teachers embody best practices to create enriched and collaborative learning environments, meet a variety of learning style needs, support learning transfer, address high-level thinking, make education equitable, incorporate real world problems and authentic assessments and prepare students for the need of lifelong learning (Fullan, 1998; Ponte & Serrazina, 1998; Paiva, 2002; Silva, 2004; Silva & Miranda, 2005; Osório & Machado, 2005; Romero & Silva, 2005). However, recent studies shows that most teachers spend few time preparing learning materials and have some resistance regarding the adoption of innovative technological learning practices that could change their classroom routines. The reasons they point out refer the bad quality of the software available in the schools, the difficulties they have in getting “comfortable” in technological learning environments, the few opportunities to gain this type of professional development, the feeling that learning outcomes won't change, and even the fear for the future of the profession (taking leave, replacement by the machine, etc). Nevertheless, teachers acknowledge the need for technology education, and recognize the importance of integrating the computer and the internet in teaching and learning practices (Romero & Silva, 2005; Cuban, 2001; Moursund & Bielefeldt, 1999). The reason for this (apparent) contradiction, as to do, in our opinion, with teacher education programs that do not prepare them for an effective use of technologies in the classrooms: teachers only integrate technology in their teaching practices if they feel “at ease” with technologies, but research also shows that when familiarised with information technologies teachers integrate technology regularly in their classroom activities (Johnson & Liu, 2000; Woodbridge, 2004; Romero & Silva, 2005). If we believe technology can be a first step towards transforming teaching and learning, then understanding its pedagogical possibilities can assist teachers in transforming their classroom practice (Johnson & Liu, 2000).

### **2.2 Teachers and Technologies in Portugal**

The use of technologies in the classrooms is a central topic for educational policies in Portugal and so, in the last years, an increasing volume of public funds was invested in the equipment of all public schools with computers and internet access ([http://www.crie.min-edu.pt/formacao\\_professores.htm](http://www.crie.min-edu.pt/formacao_professores.htm)). Recent research however shows that although these initiatives have significantly increased the number of “wired” schools across the country educational practices have remained unchanged: teachers continue to teach in traditional ways and students rarely use computers and the internet for learning activities (Gil, 2001). The greatest futile public assumption was that making computers available to educators would automatically result in their implementation (Paiva, 2002).

Reporting the situation in the USA, Cuban (2001) maintains that technology in education has been driven by a push to sell technology products, a vision of educational transformation, and the social concern of equitable access to technology and technology education; however, computers are “oversold” but “underused”, and he believes the failure of technology integration is due to a lack of professional development for teachers in

technology-supported pedagogy. Like Cuban we believe no school reform is possible without technologically proficient teachers who use educational technologies for instructional purposes. Recent studies show that teachers in Portugal lack adequate training in using computers and the internet in their teaching learning practices (Silva, 2004; Silva & Miranda, 2005); they also show most pre-service teachers had only limited technology education in their teacher preparation programs and were rarely given the opportunity to create lessons using technology or opportunities to practice teaching with these technological tools (Gil, 2001; Silva, 2004; Silva & Miranda, 2005).

In fact, teacher education programs often view technology as a subject to be added to the program rather than a tool to be integrated into current curriculum but we also know that for changes to occur teachers need to be introduced to new activities with technologies, then given time to practice and reflect about them (Coutinho & Chaves, 2001; Paiva, 2002; Coutinho, 2005). Teachers do not adopt new pedagogy simply because they think they possess the skills and knowledge to do so (Ulmer & Timothy, 2002; Silva & Miranda, 2005). Otherwise teachers tend to teach in the manner in which they were taught and their teaching often reflects their preferred learning style (Bell & Cowie, 2001).

In a recent analysis of pre service teacher education programs of most important public universities in Portugal, we could verify that although educational technology was a compulsory subject, most programs were obsolete and could not meet the needs of new teachers to develop technological competencies (Schwab, 2000; Coutinho, 2005). In Minho University we prepare student teachers for more than 15 years and constantly had to adapt our teaching practices to the technological changing world we live in order to prepare teachers who use technologies in the classroom. We are now in 2006 and we know we need to prepare teachers who are proficient creating technological learning environments where learning is accomplished by engaging students in learner-centered models where interaction and cooperation are essential for success. Learning models that take into account the internet resources and enhance collaborative learning strategies (Du & Wagner, 2005; Luca & McLoughlin, 2005). Webquests and Weblogs with their collaboration-supporting features are some of this new knowledge sharing technologies that should be integrated into the curriculum and need to be tested in pre service teacher education programs in our country (Silva & Miranda, 2005; Timothy & Jacobson, 2005).

### **2.3 Weblogs: enhancing the learning experience of pre service teachers**

The term weblog refers to a personalised webpage, kept by the author in reverse chronological diary form. As a “log on the web” it is kept first and foremost on the web, either on a static web page, or via a database-back website, enabled through “blogging” software. As a “log on the web” it easily refers to other internet locations via hyperlinks. The features of weblogs including archival of past weblogs by date-posted, hyper linking to other bloggers, instant publishing of web content with little technical skill required, and ways for other to comment/feedback, provide new opportunities for people to present and express themselves online (Downes, 2004).

Gomes (2005) systematizes the rationale for using weblogs as an “educational resource” or as a “pedagogical strategy”. As an “educational resource” blogs can function as a) a space for efficient information retrieval or b) a space for the teacher to provide online information for students. As a “pedagogical strategy” blogs can serve as a) digital portfolio, b) a space for the exchange of ideas, c) a space for role-playing and d) a space for integration. The few research studies regarding the potential of educational experiences with blogs show promising results specially regarding the pedagogical uses of this tool as a digital diary or portfolio (Du & Wagner, 2005; Birney, Barry & Eigeartaigh, 2006).

## **3. Empirical study**

### **3.1 Design**

The project we present in this paper was developed in the second semester of 2005/2006 and enrolled two classes of 3rd grade student teachers who attended the annual course of ET in Minho University (3 hours/weekly theoretical and practical classes). Educational Technology integrates teacher education programs in UM since 1975; according to the program the main objective of ET is to develop technological competencies for future teachers to communicate and use in the classrooms. In the theoretical sessions student teachers learn the

conceptual frameworks of ET (Communication and Learning Theories and Systemics). In the practical sessions student teachers design and develop multimedia and hypermedia documents to use in their future teaching practices. The need to enhance innovative pedagogical experiences using the internet motivated the study we present in this paper regarding two classes of pre service teachers, one of science teachers (S) and another of foreign language teachers (L). Preservice teachers were asked to set up, in groups of two elements a weblog for their future students using the editor *blogs.sapo.pt* (a portuguese version of blogger). The weblog had to be kept on-going throughout a semester and would be evaluated both by the instructor and the class-fellows; this weblog should function as an educational resource that could replace some of the teachers' traditional learning practices: a) providing online information for the students to read and respond; b) gathering and organizing internet resources for the specific course and topic; c) providing links to appropriate sites and annotating the links to highlight their relevance; c) post photos and comments on class activities; d) providing a space to communicate with parents.

In parallel a shared course weblog (one for S class and another for L class) was developed by the instructor for the whole group (students and instructor) as a tool to support the new learning experience: this weblog functioned as a place for "debate and exchange of ideas" where all students could write comments opinions or questions on daily issues of interest and discuss the activities developed in the weekly face to face class. The instructor also used this space to document students progress and to program the activities for the next week. According to recent studies, this collaborative aspect of weblogs allows instructor and students to interact and commenting capacities means that instructors can easily answer students' questions, or that students can perform peer-reviews of one another's work (Birney et al, 2006).

### 3.2 Method

26 pre-service teachers participated in the study, 14 from science course (S) and 12 from foreign language teaching (L). All L students were female; in S 6 students were male. Students average age was 25 years old. 46% said they had heard about weblogs but no one had ever had the opportunity to use such a technological tool.

In the first week of the study students were introduced to the weblog technology. Most S student teachers were already familiarised with internet technologies and were enthusiastic about learning how to use weblogs. All S and L students quickly became engaged with the topic. After the initial orientation a weblog was set up focusing on a topic of students' specific curricular area, and made an initial post. In the following weeks the students were gradually introduced to the features of weblogs, including commenting, permalinks, backlinks, and had the opportunity to personalize the weblog considering both the topic and the age of the receivers. Every week students reviewed the week's presentation in their weblogs using the internet to find additional information on the topic that was presented. Students were encouraged to read other students' weblogs posts to see what additional information they had found on the topic presented and to leave a feedback comment. In the two final weeks of the study, students presented the weblog they had developed in the semester and all the other students as well as the instructor commented and evaluated the final works.

The weblog class portfolio was maintained by the instructor and all students were encouraged to visit it every week in order to see the news posts and/or to complete the tasks designed to promote interaction and reflection (leaving a feedback comment on instructor's posts or/and post reflecting on own learning resulting from each classroom presentation). Upon completion of the study students were administrated a questionnaire that asked them questions related to their experience with the weblog technology and to their attitudes/feelings regarding the importance of using the internet and weblogs in their future teaching practices. A mixture of open and closed questions was used. The number of comments on each weblogs post left by other students, by the instructor or by external sources were also taken into account with the intention of analysing the levels of interaction between students, between students and instructor and between students and external sources. In S class, student teachers set up seven weblogs covering subject topics of natural Sciences from K7-12 grades (*The soul of the planet; We and chemistry; Science is amusing*, among others). In the L class six blogs were set up for K7-K11 levels (*The blog of friendship; Play with French Language, Visit Paris*, etc).

### 3.3 Data analysis and Discussion

Students teachers filled up the questionnaire anonymously at the end of the final semester class after all groups had presented, discussed and evaluated final works. The questionnaire was structured in three main sections besides some initial identification items related to students age, gender and previous experience with technologies.

### 3.3.1 The learning experience with blogs

The first section reported students perceptions of the experience they had lived with educational weblogs: difficulties they experienced and benefits of using weblogs for teaching and learning. As to the difficulties, “inexperience in using internet resources (retrieval of relevant information, links that did not work)” and some “technical difficulties with blogging editor” were the most reported by the students; we could also verify that two L students admitted having “difficulties in working with the computer”. Difficulties in the weekly maintenance of the weblog were also reported: “the three hour class time was not enough and many extra work was needed”, and “there are so many resources in the web that it is hard to find valuable information and credible links”.

### 3.3.2 The potential of educational weblogs

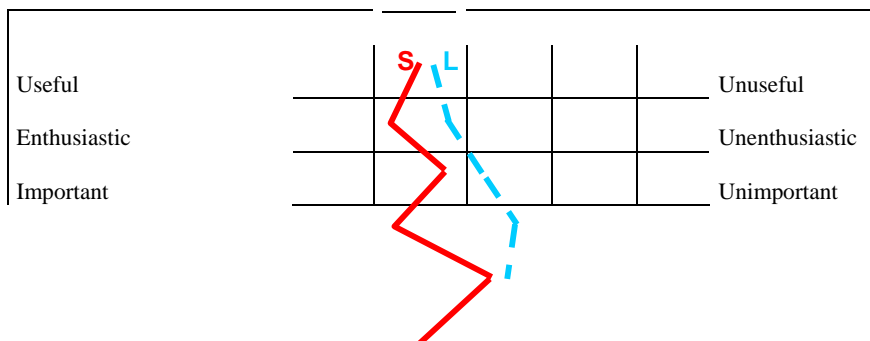
The following section investigated student teachers perceptions on the potential of educational weblogs in a 5 points Likert scale for degree of agreement (1= Do not agree at all; 5= Total Agreement). Table 1 presents results for S and L classes, in terms of the average (arithmetic mean) of degree of agreement for each item. We can verify differences between the two groups specially in specific items of the questionnaire: S pre service teachers have higher expectations regarding the potential of educational blogging (item 2), show a firmer intention to use weblogs in their future practices (item 5), and also believe much more than L teachers in the interaction that weblogs can help the interaction between instructor and students (item 8).

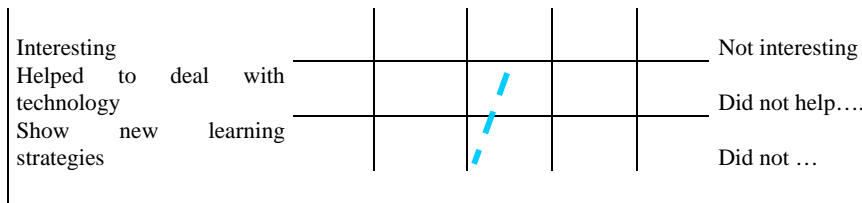
Questionnaire Items	S N=14	L N=12
1. To set up a blog helped me to better deal with technology	4,071	3,928
2. Blogs are powerful educational tools	4,357	3,903
3. To maintain a blog encouraged the practice of searching information on the web	4,142	3,934
4. I do not believe in the potential of blogs in education	1,357	1,565
5. I think I am going to use educational blogs	4,357	4,027
6. The experience with blogs helped the communication dynamics in our course	4,071	3,851
7. A blog can be much more than a simple place for teachers to provide information to students	4,285	4,252
8. Blogs promote interaction between teachers and learners	4,428	4,032
9. I don't think I am going to use blogs in my future classroom activities	1,428	1,802
10. I loved to set up and maintain a blog	4,642	4,203
11. This experience with blogs helped me to find new learning strategies	4,285	4,175

**Table 1:** S and L perceptions on the potential of educational weblogs

### 3.3.3 Weblogs in teacher education programs

For this section the questionnaire included a Guttman scale item and an open ended item. In the Guttman scale format item student teachers were asked to answer the question: “Considering your education as a preservice teacher rate the experience of working weblogs for educational purposes with an X in the adequate place”.





**Figure 1:** Weblogs in teacher education programs for S and L teachers

Figure 1 shows the results for the two groups of student teacher: as verified before we can confirm that S teachers considered this educational experience much more valuable for their future educational practices than L teachers do; this fact was not surprising and we believe it has to do with previous learning experiences with the technologies that are frequent in Natural Sciences teacher programs but almost inexistent in Foreign Language curricula (Coutinho & Chaves, 2001): most L students arrive to our ET 3th grade classes untrained with the computer and for them it is an additional effort to be exposed at the same time to a new technology ...and a new pedagogy!

In the open ended question, after answering whether they intended (or not) to include weblogs in their future practices student teachers had also to justify their answer. All respondents - except one from L class - said they intended to use blogs in their curricular class activities; the only student with a negative answer justified his choice saying *“that schools have limited availability of equipment and most students have not wired computers at home”* (L09). The 25 other students who answered positively, justified as follows their intention to use educational weblogs (some examples): *“Blogs promote interactions between teacher/students and student/student”* (S01, S07, L01), *“Blogs help to motivate our students to curricular activities”* (S02, S09, S11), *“Classes become more interesting and relaxed”* (S05), *“Students can help each other”* (S06); *“Blogs help to modernize classroom contexts”* (L02); *“Blogs help the teacher to clarify difficult topics”* (L03); *“It is very useful to retrieve information”* (L04); *“Blogs can be an efficient pedagogical strategy”* (L06); *“They allow an interesting form of instruction obliging students to visit the blog in order to accede classroom subjects”*(L08). Two students answered an “Yes” conditional depending on whether *“Schools have the conditions”* (S02) or *“The subject is adequate for blogging”* (S10). We can conclude that, in general, pre service teachers believe in the educational benefits of blogging and have positive attitudes towards the idea of integrating this new tool in their teaching and learning practices. It is also interesting to verify how student teachers realise the way weblogs can replace some of the teachers’ usual practices in different ways, depending on whether they are from S or L class. In fact, S students seem to value more the “communicational” or “relational” feature of weblogs; L students seem to value more the “informative” potential of blogging that are seen as precious tools to help the teacher to teach, (an “instructivist” tool).

Although we have not yet finished the quantitative analysis of the interactions generated in pre service teachers experience with weblogs, it resulted clear in a preliminary analysis the high levels of interaction between students and the instructor; the class weblog showed its efficiency in providing what is reported in the literature as educational scaffolding (Huann, John & Yuen, s/d). In fact the feedback provided by the instructor resulted in substantial improvement in the general esthetic appearance of the weblogs as well in the quality of the posts; suggestions put forward by students in their blogging experience also indicated guidance on tasks that could help in forming they thoughts.

Another fact we could verify is that blogging allowed learning to extend beyond the presential class as students were encouraged to visit the other weblogs in order to leave their comments and opinions on posts and engage in critical thinking. Also evident in students’ posts, is that blogging facilitated the exchange of ideas between peers and the process of analysing their peers’ posts functioned as an efficient mean of avoiding what in the literature is reported as web plagiarism (Huann, John & Yuen, s/d) increasing the quality of the posts content. However the interactions between students were less than expected and did not improved as time passed even with all the incentives provided by the instructor. Interactions between students and external sources were very rare as we could only count 2 cases of this interaction type.

#### 4. Concluding remarks

Initial feedback from the survey of student teachers involved suggests that their experience with weblogs was a positive one: the learning of a new web-based technology such as blogging was something that they felt was enjoyable, complemented their education program and encouraged the use of technologies in future teaching and learning practices.

Pre service education practices are essential for preparing teachers who create technology learning environments in the real classrooms. In fact, teachers tend to teach the way they are taught, so pre-service teachers need to experience the facilitative paradigm of constructivist learning environments (Carlson & Gadio, 2002; King, 2002); they need to be exposed to real pedagogical experiences with the internet in order to understand technology is a tool that can help them to create enriched and collaborative learning pedagogical experiences.

Our study shows that an education program for pre service teachers must include experiences like the one we present in this paper. A revised program of ET in pre service teacher education programs must prepare student teachers: a) to plan and design effective learning environments and experiences supported by technology, b) to implement curriculum plans, that include methods and strategies for applying technology to maximize student learning, to develop students' higher order skills and creativity. The experience with weblogs is just an example we hope can inspire other educators in Portugal; like Armstrong (2000, p. 115) we believe the most compelling reason to implement technology education in teacher preparation programs is so that teachers can "provide K-12 students with the tools they need to learn, think, and exchange ideas with peers and experts in our global society".

## 5. Limitations

The number of participants in the study was relatively small and limits the scope of the study. Future research with more participants will certainly lead to more robust results.

The course instructor was also the researcher and the single rater of the experience (evaluation of weblogs and course performance).

The data presented in this paper are only an initial feedback from the pre service teachers perceptions and expectations. Further evaluation to be performed will include further analysis of the quantitative data collected related to the levels of interaction between students, between student and tutor and between students and external sources. A content analysis approach of the weblogs posts contents should also be considered in a future experience. Finally we are also considering the possibility of interviewing the participants in this study within a year in order to verify if they really have developed similar experiences in the classroom.

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