

Managing personal learning environments: the voice of the students

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Abstract

The main purpose of this paper is to contribute to a better understanding of the kind of educational work to be done with higher education students (undergraduate) in order to encourage them to create and use personal learning environments (PLEs) as a strategy for learning (Attwell, 2007). Based on our current classroom work with students of the 2nd year of a degree in Education and mainly using the functionalities of the Ning system (Copyright © 2010 Ning, Inc.), as well as other tools available on the Internet, we tried to implement a strategy based not only on the presentation of content by the teacher, but also on the recognition of the importance of student's leadership in the organisation and management of their own learning. Therefore, in addition to face-to-face lectures, we tried to extend the discussion outside the classroom walls using the different services offered by Ning, proposing to integrate the work done by students in their individual evaluation (50% of the final classification). At the end of the semester we observed evidence of a general difficulty felt by the students, particularly in terms of self-regulation and personal organisation. So we decided to try to understand the problem observed in depth. For the purpose of understanding the nature and the extent of these difficulties, we used a methodology focused on analysis of a questionnaire applied to the students about their perception of the difficulties in managing the learning process and about the strategies used for dealing with those difficulties. Although the students acknowledge that the development of the individual online portfolio in a PLE requires that, for the most part, largely they themselves have to get organised and manage of their own learning (Barrett, 2000; Attwell, 2007), one can see that they do not feel prepared for this, experiencing difficulties in personal organisation, time management and regular participation in the proposed activities. In strategic terms, they value the appraisals and/or suggestions given by the teachers, but do not adopt an attitude of reflection or interaction and sharing with others, as catered for by the platform and its functionalities.

Keywords: personal learning environments; strategies for learning; student's leadership; student's portfolio; self-regulation

1. Introduction

As part of an undergraduate course at Lisbon University a working strategy was implemented during one semester in one subject, based on the presentation of content by the teacher in the classroom, as usual, and on activities that the students would carry out on a regular basis in an autonomous and independent manner, between the classroom lessons (5H/week).

Using mainly the functionalities of the Ning system (Copyright © 2010 Ning, Inc.), as well as encompassing other tools available on the Internet, adapted to the activities and defined learning goals, the students were asked to regularly show their progress in terms of the end products and the strategies used, and to outline the difficulties experienced and how these were overcome.

In a common online space¹, in which each student had their own individual area upon registering, the initial work of the teachers was to clarify the type of products that would make sense to include, the need for personal organisation and what kind of work this would imply, until there were no longer any doubts or questions about what this complementary working strategy to be implemented throughout the semester was meant to achieve².

Having meanwhile noted difficulties in its implementation and having seen, at the end of the semester, after analysis of the critical reflections requested from the students (on the functioning of the subject, the learning achieved and the organisation of the work), that there were obvious difficulties, particularly in terms of personal organisation, we deemed it pertinent to look deeper into the matter. As such, we directly questioned the students in order to gain a better understanding of the nature and extent of these difficulties from their point of view, as well as the strategies used to overcome them.

The aim of this article is therefore to arrive at conclusions, from the perspective of the students themselves, about these difficulties, making them the basis for reflection and discussion, and also to use this information as the starting point for more systematic studies about the problem of higher education teaching and learning through the use of network technologies.

Given that the work we carried out with the students is based on the use of the potential of digital technologies in a network, in close articulation with the learning portfolio concept (Barrett, 2000), we were especially interested to deepen the reflection and draw conclusions about the most suitable approaches when this kind of working strategy is suggested to higher education students.

In other words, we were interested in paving the way for a relatively recent working proposal that calls for the creation and utilisation of personalised online spaces as an ideal learning strategy (Attwell, 2007), based on analysing the

¹ We labelled this space *Escola 2.0* (School 2.0) (<http://aprender2.ning.com>), taking advantage of the Web 2.0 metaphor in relation to the kind of work we intended that the students carry out. In contrast to many closed collaborative spaces, *Escola 2.0* is an informal, open space, able to be personalised, where the students can freely record their thoughts, research and connections, thus making it easier to become fully aware and to outline their learning. Since Ning system becomes charged, we have moved *Escola 2.0* to a new web address: <http://grou.ps/escola20/>.

² As well as tackling the classroom topics, we widened the discussion to outside the academic timetable, using the different services available online in the aforementioned system, integrating the investment made there by each student in the individual assessment (50% of the final grade).

difficulties undergraduate students encountered when faced with teaching strategies that were substantially different from what they are used to in most of their lessons. Such methodologies require not only a greater cognitive involvement from the students, for example in solving problems, but also imply the mobilisation of meta-cognitive strategies, self-assessment and self-regulation, which are facets that are usually not included in university working processes.

To gather the data, we applied a questionnaire to students, constructed around the kind of difficulties felt in the management of the learning process, outside the classroom, and the kind of strategies most used to overcome these difficulties.

This essentially exploratory study had its empirical basis on the students' answers to this questionnaire, applied two months after the semester had been completed and after knowing their grade in the subject³.

2. Background

In general this study, as mentioned beforehand, is along the lines of work and reflection that aim to identify the possible convergences between the potential afforded by the digital technologies in a network that are today available and the learning objectives, whether these are implemented in a formal learning perspective or outside the scope of formal teaching contexts (Osborne & Hennessy, 2003; Hague & Logan, 2009). We are referring to all the Internet-based technologies, especially a set of tools through which this universal platform allows discussion and collaboration in real time, such as chat rooms and audio and/or video conference applications, or asynchronous communication, such as e-mail, lists, discussion forums, blogs, wikis, social networks and many others that are emerging every day and which can have huge potential, if used appropriately, to serve the learning objectives. These tools have the ability to usher in a second generation of Internet horizons as regards the relationships between people and the very management and construction of knowledge.

In tandem, this study fits into a theoretical perspective based on recognition of the importance attributed to the fact that students should take responsibility for the organisation and management of their own learning (Barrett, 2000; Attwell, 2007). While there is a great tradition of using portfolios for educational ends, although their actual use is far from widespread (Costa, 2008; Gray, 2008), the personal learning environments are a relatively new phenomenon (van Harmelen, 2006) in the panorama of enriched learning backed up by the technologies. They have appeared, to a certain extent, in the wake of the digital portfolios, as an alternative to the paper portfolios, but above all, as van Harmelen suggests (2006), as a way of giving real expression to one of the overriding aims of the learning portfolios, which translates into attributing control of the learning to the students themselves.

³ This prudence is justified by the need to guarantee that the students felt comfortable when answering the questionnaire, doing so on a voluntary basis and without any pressure that may arise from being assessed. This aspect was reflected in the way the task was requested so as not to bias the results of the study.

Personal learning environments may represent a solution for the pedagogical approaches that argue “that learner’s e-learning systems need to be under the control of the learners themselves” (van Harmelen, 2006, s/p), but also an answer to the individual organisational needs of the multiple resources, contexts and systems through which the learning activities may occur.

Although there are many reports about the specific advantages of the use of the emerging technologies in online teaching and learning environments, most of the resources available end up bringing added difficulties, namely as regards the management of information, above all when taken as a contrasting element to the kind of information and the way it is traditionally transmitted at university. While in this background it is important to value and rethink the role of the teacher, it is equally important to emphasise the action of the students as the agents of their own process of change, with the ability to use learning strategies adjusted to the demands and opportunities presented to them (Ramsden, 1992).

In this order of ideas, we share Laurillard’s opinion (1993, 2002) in stressing that the use of technologies requires both the teachers and the students to mobilise a set of regulation strategies and processes that help to satisfy the demand for meaning inherent to the learning tasks proposed.

These strategies are, namely: (i) discursive strategy, which is characterised by acknowledgement of the importance of adopting an investigative and systematic researching attitude by both parties; (ii) adaptive strategy, the focus of which lies in the adjustment of processes, procedures and actions taking into account the ideas of the different intervening parties; (iii) interactive strategy, which involves the need for the teacher and student to constantly engage in listening and dialogue with each other; and (iv) reflective strategy, which should supply opportunities to facilitate the reflection not only about what is being learned, but also about how one learns and the role of each intervening party in the teaching and learning process.

As such, it is important to help students incorporate the aforementioned strategies, assuming that instead of being naturally acquired they are constructed and developed in environments propitious to the individual autonomy and organisation of the learning, where one can include the management of today’s technologies.

3. Methodology

As an area of recent research, we opted for an exploratory approach, of a descriptive and interpretative nature (Bogdan & Biklen, 1994; Almeida & Freire, 2000), aimed at describing and understanding how higher education students take on the management of the learning processes.

Out of the sixty-seven 2nd-year students taking the Education Sciences Degree 30 took part in the study (44.8%), the vast majority of whom were females (90%), with an average age of 22.

A questionnaire was constructed to collect data based on an analysis of the content of the individual electronic portfolios. This questionnaire was structured and organised in four sections. The first section – “Difficulties in the management of the learning” – aimed to find out the students’ opinions in relation to the difficulties felt in the management of the learning process (Table

1). It comprises 22 items, and a 6-point Likert scale is used (1 – Completely disagree; 6 – Completely agree) to answer the question: “*What are the main difficulties one feels in the management of the learning process outside the classroom, in Educational Technologies II?*”

Table 1. Categories and operability of the difficulties felt by the students

Categories	Operability
Organisation (5 items)	Items related to personal organisation difficulties, both in terms of work planning and management of time to carry out the tasks proposed.
Learning (7 items)	Items related to difficulties in the learning process, situated as regards the cognitive processes of a higher order that imply, for example, the application of information selection, analysis and assessment skills.
Participation (6 items)	Items related to the difficulties of participation in the activities proposed and in carrying out the learning tasks.
Resources (4 items)	Items related to the difficulties related to the use of digital technologies and tools needed to achieve the aims.

The second section - “Strategies of management of the learning process” – comprises two questions. The first, “*At what frequency are the following strategies adopted to overcome any difficulties felt in the learning process outside the classroom, in Educational Technologies II?*”, includes 12 items and a 6-point Likert scale based on frequency (1 – never; 6 – always). The items are distributed equally around four categories (Table 2) geared towards the understanding of the strategies used by students and adapted from the analysis model of the educational potential of the technologies as proposed by Laurillard (1993, 2002).

Table 2. Categories and operability of the strategies used by the students.

Categories	Operability
Discursive (3 items)	Items related to the strategies that facilitate the exchange of information and ideas, as well as clarification of doubts and deepening of ideas based on the use of feedback.
Adaptive (3 items)	Items related to strategies that enable the students to adapt their actions according to the learning aims and interests.
Interactive (3 items)	Items related to strategies that result from the interactions established with a variety of resources (technologies and human) and which enable the students to independently manage the learning.
Reflexive (3 items)	Items related to the cognitive and meta-cognitive strategies used by the students to tackle the topics they are studying.

The second question, “*How do you globally appraise the contribution of the work proposed in the Escola 2.0 (management of personal space and compiling an individual portfolio), for your learning in the subject?*” has a single answer in a 6-point Likert Scale organised based on the perception of the usefulness of the work proposed (1 – it was a waste of time; 6 – it was indispensable).

The third section of the questionnaire aims to identify the factors that, from the students' point of view, may hold back or favour the success of the implementation of the PLEs in higher education. To do so, an open question was asked to allow the students to add something they deemed relevant (*"Taking into account your experience of Educational Technologies II, in your opinion what factors does the success of the individual portfolio by the students depend on, within the scope of the personal learning environment provided in Escola 2.0?"*).

The fourth and last section of the questionnaire aims to gather biographical data from students (age and gender) and information about the average weekly time they are on their computers, on the Internet and on the Escola 2.0 system, for the duration of the Educational Technologies II subject.

Analysis of the data was carried out using the functionalities of the *Survvs* application (<http://www.survs.com>), which was also used to create and apply the questionnaires. Content analysis procedures were also used (Bardin, 2004), to process the answers to the open questions.

4. Findings

4.1 Average time spent on the computer, the Internet and Escola 2.0

Most of the students (70%) spend an average of 10 hours a week both on the computer and on the Internet. The weekly time spent on the Escola 2.0 was between 0-4 hours, for 50% of the students and between 5-9 hours, for 45% of the students.

4.2 Contribution of the Work Done on Escola 2.0 towards the Learning in the Subject.

Most of the students (87%) considered the work proposed in Escola 2.0 "indispensable" for the learning in the subject.

4.3 Difficulties in Management of the Learning

The items relative to the difficulties felt by the students are shown in Table 3, outlining the average (\bar{x}) obtained in the answers and the average of the averages ($\bar{\bar{X}}$) obtained in the different categories. Based on the latter, one can conclude that the main difficulties felt by the students are at the level of the categories referring to "Participation in the activities proposed" ($\bar{x}=3.33$) and "Personal Organisation" ($\bar{x}=3.25$).

Table 3. Averages relative to the difficulties felt in the management of the learning process.

ITEMS	(\bar{x})	CATEGORIES ($\bar{\bar{X}}$)
1. Keeping up with the activities proposed by the teachers.	2.83	Personal Organisation
2. Managing time in line with the activities proposed.	3.83	
3. Stick to the planned time to hand in the work requested.	2.74	3.25
4. Define my personal learning aims.	3.09	

5. Working continuously and systematically on my portfolio.	3.74	
6. Remembering the work concepts in the lessons.	2.96	
7. Reflecting on the learning undertaken on a regular basis.	3.57	
8. Using and taking advantage of some of the tools tackled in the lessons in other contexts.	3.35	
9. Outlining the knowledge involved in undertaking the tasks proposed.	2.78	Learning
10. Managing the quantity of information available in Escola 2.0.	3.09	3.11
11. Selecting and summarising the relevant and pertinent information.	2.91	
12. Deepening the issues discussed in the classroom through complementary research.	3.13	
13. Regularly taking part in the discussion forum about “The Family in a Network”.	3.83	
14. Reading the material suggested by the teachers.	3.39	
15. Documenting the learning process on a weekly basis in the individual portfolio.	3.91	Participation
16. Keeping track of the work carried out by colleagues and giving them constructive feedback.	3.43	3.33
17. Independently exploring some of the tools suggested by the teachers.	2.74	
18. Sharing information, reflections and experiences with colleagues, teachers and other participants in the process.	2.70	
19. Learning how to use all the functionalities supplied by the tools of Escola 2.0. (blog, discussion forum, chat, videos, etc).	3.13	Resources
20. Accessing Escola 2.0.	2.39	
21. Having to use digital technology to achieve the aims of the subject.	2.57	2.69
22. Managing the public exposure that the Escola 2.0 tools imply.	2.65	

[Scale: 1= Completely disagree; 6= Completely agree]

In the case of “Participation in the activities proposed”, the difficulties that were most keenly felt by the students were related to “regularly taking part in the discussion forum [...]” (\bar{x} =3.83), “documenting the learning process on a weekly basis in the individual portfolio” (\bar{x} = 3.91) and “Keeping track of the work carried out by colleagues and giving them constructive feedback” (\bar{x} = 3.43). As regards “Personal Organisation”, the biggest difficulties involved “managing time in line with the activities proposed” (\bar{x} = 3.83) and “Working continuously and systematically on the [...] portfolio” (\bar{x} = 3.74).

In the “Learning” category, the difficulty in “Reflecting on the learning undertaken on a regular basis” (\bar{x} = 3.57) came to the fore.

“Finally, knowing how to use all the functionalities available in the Escola 2.0 tools (blog, discussion forums, chat, etc)” is the difficulty that is most keenly felt in the “Resources” category and which includes the difficulties related to the actual use of the technologies necessary to undertake the activities proposed.

4.4 Management of the Learning Process Strategies

As can be seen in Table 4, among the strategies that the students said they most used, the strategies included in the “Interactive” category stand out (\bar{X} =4.27), i.e. the strategies that result from the interactions established with a variety of resources (technological and human) and which are shown in the capacity of the students to independently manage their learning process.

Second on the list are strategies from the “Adaptive” category ($\bar{X}=3.86$), corresponding to learning strategies that enable students to adapt their actions, attitudes and ideas the demands of the activities and the learning aims accordingly.

Considering all the items, the number one ranked item is valuing the appraisal and/or suggestions supplied by the teachers in attempting to improve the productions in the portfolio ($\bar{x}= 4,73$) and the independent management of the portfolios ($\bar{x}= 4.36$); next comes the selection of the tools in line with “personal interests” ($\bar{x}= 4.05$) and the “individual learning aims” ($\bar{x}= 3.95$), and the request for support from the teachers in solving issues related to the undertaking of the work ($\bar{x}= 3.86$).

Table 4. Averages relative to the strategies used in the management of the learning process.

ITEMS	(\bar{x})	CATEGORIES (\bar{x})
1. I shared and exchanged information with colleagues using the communication tools in Escola 2.0 (e.g. chat, message box, comments, direct messages, discussion forum, etc).	3.27	Discursive 3.53
2. I asked for support from the teachers whenever issues arose in carrying out a given item of work, by e-mail of Escola 2.0.	3.86	
3. I tried to deepen certain ideas or concepts, through content production in an individual blog	3.45	
4. I adapted to the use of the tools available in Escola 2.0 in line with my learning goals	3.95	Adaptive 3.86
5. I adopted an attitude of permanent curiosity, trying to register my personal portfolio which was the best record of my learning evolution	3.59	
6. I selected the Escola 2.0 tools that best suited my personal learning interests.	4.05	
7. I independently managed the development of my portfolio throughout the semester	4.36	Interactive 4.27
8. I valued the assessments and/or suggestions supplied by the teachers, looking to improve my productions in the portfolio	4.73	
9. I took advantage of the different digital systems to present my ideas and content in a variety of ways	3.73	
10. I reflected on a regular basis about the teaching and learning process, looking to understand my role in this process as much as possible	3.73	Reflexive 3.62
11. I took advantage of the different digital systems to organise and register my reflections in a creative way.	3.64	
12. I showed a critical attitude relative to the different teaching strategies implemented by the teachers.	3.50	

[Scale: 1= Never; 6= Always]

4.5 Crucial factors for the success of the Individual Portfolio in the Personal Learning Environment supplied by Escola 2.0

The results shown in Table 5 show that the factors of an intrinsic nature clearly predominate in the answers the students gave to the open question, namely highlighting the “motivation towards the task”, the “time” needed to carry out the proposed activities and the importance/need to “work on a regular and frequent basis” throughout the semester. The “effort” put into the proposed activities, and in particular, the need to “carry out the research and practical activities to

deepen the knowledge acquired in the lessons”, are the factors that the students next refer to.

Table 5. Crucial factors for the success of the individual portfolio from the students’ point of view.

FACTORS MENTIONED BY THE STUDENTS		fr.
Intrinsic Factors	Motivation	9
	Interest	3
	Effort	4
	Creativity	2
	Time spent	5
	Working on a weekly basis, regularly and frequently throughout the semester	5
	Taking part in the lessons	2
	Individual operation of the tools	2
	Individual management and organisation	1
	Carrying out research and practical activities to deepen the knowledge acquired in the lessons	4
	Reflection and critical sense	2
	Responsibility and individual commitment	1
	Awareness of the importance of the achievement of the individual portfolio for personal development and for collaborative learning	1
	Definition of the learning aims and taking part in compliance with them	1
	Individual learning style	1
	Ease and adeptness at manipulating the technologies	1
Extrinsic factors	Guidelines, support and suggestions given by the teachers on the activities to be developed	3
	Teacher encouragement for student participation	1

4.6 Suggestions and Comments on the Orientation given in the Subject

Despite the value of the exercise by the students questioned about their own involvement in the learning process, there are students who believe “the weekly workload is a little excessive”, even saying that the “biggest problem” was the “pressure to post something every week.” Reflecting on this difficulty, one of the students suggested that in future situations there should be the possibility to initially negotiate “a compulsory number of posts but with freedom as to the posting time”. To balance this issue somewhat, there are others who emphasise the need to make the students aware of the importance of the development of an online portfolio, both as regards the individual learning process and its contribution to the acquisition of new knowledge by colleagues. As such, according to some students, it is essential that the teachers help to establish

“guidelines” for the development of their work and to keep track of the registers and tasks developed on a weekly basis, striving above all to stimulate the students’ participation in the online learning environment. To sum up, although scarce, the suggestions supplied by the students reflect the relevance of the role of the interaction and communication in regulation of the learning processes, and the importance of being given guidelines and a specific task by the teachers.

5. Discussion and conclusion

We began this study aware of the need to bring about a change in the working methods implemented with higher education students. We were interested in understanding the nature and kind of difficulties that students experience when faced with methodologies based on using personal learning environments online, which, owing to their nature, require greater cognitive involvement and imply the mobilisation of a set of self-regulation learning strategies which, it is initially assumed, the students are not fully furnished with.

Analysis of the data obtained through the questionnaires enabled us to identify their conceptions both regarding the difficulties they felt in managing the learning process, and in terms of the strategies they used to overcome these difficulties.

Overall, the evidence shows that the difficulties entailed are linked to the participation of the students in the activities proposed and the completion of the learning tasks, with particular emphasis on the difficulty to document the learning process on a regular basis. On the other hand, the difficulties were at the level of personal organisation, above all as regards time management and the adoption of continuous and systematic work processes.

Stopping to reflect does not seem to have been a strategy the students used often, which to a certain extent explains the high level of difficulty in reflecting on the learning. Even less frequent seems to have been the adoption by students of learning that results from interactions that could be established with their colleagues and other participants in Escola 2.0.

Indeed, excluding the interactions established with the teachers to clarify questions arising out of the undertaking of the tasks, the students recognised somewhat that they did not take much advantage of the communication tools made available to them to share and exchange information with their peers. In specific terms, the strategy the students most used was to value the appraisals and/or suggestions supplied by the teachers in order to improve their productions in the portfolio.

In turn, the factors that most seem to influence the success of the individual online portfolio in a personal learning environment, in the students’ opinion, are much more closely associated to the intrinsic factors than the teaching context and process (extrinsic factors). Especially relevant are the motivational aspects (e.g. motivation, effort), and behavioural aspects (e.g. study habits, responsibility and individual commitment).

This situation brings to the fore and underlines what we argued beforehand, that undergraduates experience difficulties when faced with teaching methodologies that are substantially different from those they are used to.

Despite the students acknowledging that the success of an online individual portfolio depends, essentially, on themselves given that they are responsible for organising and managing their own learning (Barrett, 2000; Attwell, 2007), they admit that they are not prepared for this. They experience difficulties in personal organisation, individual time management and adoption of continuous and systematic working practices. It is also obvious that they need support, guidance and help from the teachers in establishing “guidelines” for the development of their work; to feel the “control” of the registers and tasks carried out on a weekly basis by the teachers, as well as stimulation and motivation to take part in the online personal learning environment.

To sum up, we can conclude that to carry out work of this kind in higher education and to motivate the students to create and use personal learning environments as a learning strategy, it seems to be important to carry out prior preparatory work aimed at developing skills such as autonomy in learning, ability to reflect and capacity to critically analyse their own individual productions.

In other words, we can say that the incentive towards creating and using online personal spaces as a learning strategy must be complemented with a set of actions devised to improve motivation, from the intellectual point of view, and the development of positive emotions (Torrano & González, 2004), which necessarily implies prior knowledge of the students (knowledge, attitudes and skills), including knowledge of their expectations as regards the work proposals that move away from the more traditional teaching methods.

It also seems equally important to improve the way the students carry out the management of the learning outside the classroom, creating conditions that enable them to become aware of their progress and their difficulties in relation to the learning tasks they have to carry out (Ramsden, 1992). It is a question, essentially, of teachers helping the students to delineate strategies to deal more suitably with the difficulties that arise out of an online learning context, redoubling the attention paid to the communication and interaction processes among students and between students and the teacher (Laurillard, 1993; 2002). Therefore, having “*someone to clear up our doubts and point us in the right direction at moments of difficulty,*” as strange as it may sound, is one of the most important helps a teacher can provide to allow students to take a more active role in the independent organisation and management of their learning and to enable them to develop the ability to use learning strategies adapted to the demands and the opportunities afforded (Ramsden, 1992).

To sum up, it is important to help the students incorporate these strategies, assuming that, rather than being naturally acquired, they are constructed and will therefore benefit from environments that purposely provide conditions to improve skills such as individual autonomy and organisation, taking advantage of the technologies available.

References

Almeida, L. & Freire, T. 2003. *Metodologia da investigação em psicologia e educação*. Braga: Psiquilíbrios.

Attwell, G. 2007. *Personal Learning Environments - the future of e-Learning?* *eLearning Papers*, 2(1). Retrieved April, 27, 2010, from <http://www.elearningeuropa.info/files/media/media11561.pdf>

Bardin, L. 2004. *Análise de conteúdo* (3ª ed.). Lisboa: Edições 70, Lda.

Barrett, H. 2000. *Electronic teaching portfolios: multimedia skills+portfolio development=powerful professional development*. Retrieved April, 5, 2010, from <http://electronicportfolios.com/portfolios/3107Barrett.pdf>

Bogdan, R. & Biklen, S. 1994. *Investigação Qualitativa em Educação. Uma introdução à teoria e aos métodos*. Porto: Porto Editora, Lda.

Costa, F. 2008. *A Utilização das TIC em contexto Educativo. Representações e Práticas de Professores*. (documento policopiado), Tese de Doutoramento, Universidade de Lisboa.

Gray L. 2008. *Effective Practice with e-Portfolios. Supporting 21st century learning*. Bristol: University of Bristol.

Hague, C., & Logan, A. 2009. *Adult informal learning and the role of technology*. Futurelab: London.

Laurillard, D. 1993. *Rethinking University Teaching. A framework for the effective use of educational technology*. London: Routledge.

Laurillard, D. 2002. *Rethinking University Teaching. A framework for the effective use of educational technology*. (2nd ed.). London: Routledge Falmer.

Osborne, J. & Hennessy, S. 2003. Literature Review inland the Role of ICT: Promise, and Future Directions. 2003. REPORT 6. Retrieved April, 5, 2010, from http://www.nestafuturelab.org/images/downloads/Secondary_School_Review.pdf

Ramsden, P. 1992. *Learning to teach in higher education*. New York: Routledge.

Torrano, F. M. & González, M. C. T. 2004. Self-Regulated learning: Current and Futures Directions. *Electronic Journal of Research in Educational Psychology*, 2 (1), 1-34.

van Harmelen, M. 2006. Personal Learning Environments. *Sixth IEEE International Conference on Advanced Learning Technologies (ICALT'06)*, 815-816.