USING THE E-PORTFOLIO FOR LARGE GROUPS OF STUDENTS

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Abstract

The number of students in class in studies of first year engineering degree in many Universities, in particular at the Polytechnic University of Catalonia, is high with an average of 75 students per class. While the large groups permit to transmit information efficiently, to a large number of students, it is equally true that it is difficult to teach students to actively think about what they are learning.

In small groups is becoming more common the use of e-portfolio for learning and assessment. This increased use is due to the need of the teacher to improve student autonomy by means reflection on learning processes. The biggest growth is in the use of e-portfolio as it has the ability to incorporate new information and communication technologies into the learning process.

We think and we are convinced that teaching in large groups does not have to limit itself to the master class only. Under this conviction we have introduced the e-portfolio in a core subject in studies of first year engineering degree. Also they can be displayed in a common space on University virtual campus where the students can view each other's e-portfolios.

In this work, we show the results concerning the use of the e-portfolio in large groups as a tool for teaching, learning, assessment and self-assessment of student learning, as well as and satisfaction and usefulness of this tool. The study sample consists of all students from the first year of Engineering in the subject of linear algebra at the ETSEIB of Polytechnic University of Catalonian.

To prepare the e-portfolio has been essential on the one hand, the definition of the goals that we want students to achieve, as well as the issues that we consider basic to exceed targets, also we must prepare and plan the course comprehensively in order to make the coordination of the different tasks carried out in the classroom with the work of the e-portfolio. On the other hand, has been important the selection of platforms to implement the e-portfolio. We decided to choose the use of the integrated Moodle and Mahara (Mahoodle) platform, as well as the simultaneous use of platforms Exabis inside Moodle and Google Sites.

Keywords: E-portfolio, Digital platforms: Moodle, Mahara, Exabis, Google Sites.

1 INTRODUCTION

The emergence of Information and Communication Technology (ICT) has caused a change in the world of education and has promoted a modernization on educational systems. A significant change is the way educators think about students' capabilities, the nature of learning, the nature of quality in learning, as well as what tools can use to obtain evidences of learning in terms of classroom assessment, teacher assessment and large-scale assessment. As a consequence, the use of portfolios as a mode of assessment has gained a lot of interest and one tool in within the ICT context is the use of e-portfolio. In recent years several authors work in introducing the e-portfolio at the higher education, as we can see in [1], [2], [3], [4], [5], [6] and [7] for example.

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2 E-PORTFOLIO

Increasingly, teachers feel the need to improve the autonomy of students making them to reflect on the process of learning. This is why it has become more common to use the e-portfolio in the learning and assessment of students.

The e-portfolio (also called digital portfolio or online portfolio) is a collection of electronic evidences joined and managed by a user, usually on the Web. Such electronic evidence may include entering text, electronic files, images, multimedia, blog entries, and hyperlinks, among others. E-portfolios are both demonstrations of the user's abilities and platforms for self-expression, and, if they are online, they can be maintained dynamically over time.

In our particular setup, the e-portfolio has the sense of "assessment folder" or a broader form of "learning portfolio". More specifically in the context of this work, the e-portfolio is a method of teaching, learning and assessment of different types of productions by students through which they can evaluate their abilities in the context of a discipline or field of study. Moreover, the student productions are reviewed by the staff with evaluation criteria previously established, allowing the student (and others) to see their efforts and achievements into the learning objectives.

Following we show in Fig. 1, a schematic overview of the artifacts that are part of the portfolio, as well as pages that integrate it and the groups that should compose it, in order to clarify the structure of it.
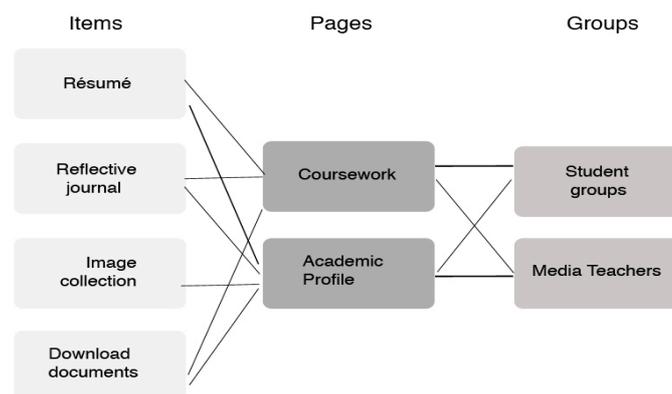

Fig.1. Organizing a portfolio: Schema.

2.1 Different ways of using the e-Portfolio

The electronic portfolio allows students and teachers to create and manage a virtual space under academic and professional point of view; and in turn to incorporate a review and justification of the importance of these activities.

a) E-Portfolio Evaluation:

It allows assessing the achievement of specific criteria to obtain a degree or work.

b) E-Learning Portfolio:

Allows providing information on learning objectives incorporating both self-reflection and the student and the teacher

c) E-Portfolio "Demonstration of best practices":

Allows submit information to specific audiences or achievements.

d) E-Portfolio Transition:

Let us bring evidence and records useful in times of transition or passage of an academic level to another.

It is important to accentuate that, regardless of the way of use of e-portfolio, the process of design, creation and development involves data collection, organization, reorganization and presentation.

Hellen C. Barrett in [8] proposes a balance between all the possibilities of use of e-portfolio. Specifically, the author proposes a balance between different aspects of the e-Portfolio that interact along a continuum such as: Process-Product, Immediate reflection-Reflection retrospective, Reflective journal-Organized web pages, Formative evaluation-Summative evaluation, Learning documentation-Documentation of achievements, among others relations.

In the context of teaching and learning of the subject of linear algebra, the e-portfolio can be used as a repository of learning experiences because through e-portfolio, teachers and students work activities of teaching and learning from and the Internet.

More specifically, the student uses the e-portfolio for

 i) To collect, systematically, achievements in learning,

ii) Self-evaluate how to acquire and develop the skills required in the subjects they are studying,

iii) Self-assess the results of their learning, and the teacher uses the e-portfolio for

i) To collect and place the work done by students in their courses

ii) To assess how to acquire and develop skills by students through the implementation of activities (with the tutor, with the peer group, independently, etc.) and

iii) To evaluate the result of learning.

That provides a clear interaction between teacher and student.

2.2   Different platforms for creating a portfolio

There are many online platforms that allow building your personal e-portfolio. Following we describe the three platforms models we used in our experience.

2.2.1   Mahara

Mahara is an open source web application for managing e-portfolios and social networks. Created in New Zealand in mid-2006 as a collaborative project in which the Universities of Massey University, Auckland University of Technology, The Open Polytechnic of New Zealand, and Victoria University of Wellington participated. The name chosen for this application is a Maori word meaning "thinking".

This application helps create a Personal Learning Environment known as PLE / PLN (Personal Learning Environment / Network), in contrast to most Management Systems more focused on organizational learning than Mahara that is an application more centered to the learner.

2.2.2   Exabis

Exabis is also an open source of e-portfolio which allows the users to create and administrate personal e-portfolios. Students can collect documents, notices, and links in their e-portfolio and if applicable may publish documents.

2.2.3   Google Sites

Google Sites is a free online application offered by the company Google. This application allows you to create a website in a simple editing a document. Both teachers and students can gather in one

place and quickly texts, images and also other documents. It also allows easy sharing personalized information publicly or across the network.

However, one limitation of this application is the storage space is 100 MB. People who are users of Google Apps   can be expanded to 10 GB.

3   LINEAR ALGEBRA FOR UNDERGRADUATE ENGINEERING STUDENTS

It is well known that linear algebra is a fundamental matter in different areas of science and engineering. This is because many problems can be modelled by linear systems, where linear algebra becomes essential to obtain and analyze the solution.

Nevertheless, one of the main difficulties to overcome in the first year by university students enrolled in different programs other than the career math is that they do not appreciate the importance that mathematics may have in their different fields of interest.

This may seriously affect their motivation in the course, and its ultimate success. This effect appears to be more pronounced in the first year of linear algebra due to its abstract factor, while the calculus find it easier to think that it may be useful for your future career.

When several projects about real life problems are proposed, the students can place their progress in the e-portfolio. Through the e-portfolio, the students can discuss among peers and with the teacher.

3.1   The e-portfolio and Linear Algebra

Under learning e-portfolio point of view, to prepare the e-portfolio has been imperative define the goals which we want that the students reach as well as the topics that we consider basic to overcome objectives.

The topics include linear system equations, vector spaces, matrices, linear maps, the matrix of a linear transformation, change of basis, eigenvalues and eigenvectors as well as applications in the field of discrete linear systems (see [9] and [10] for an undergraduate course of linear algebra). All these topics should be in a place accessible to all students, in our case we use the Moodle platform accessible from the University. We show in figure Fig.2, the Moodle page available to students.
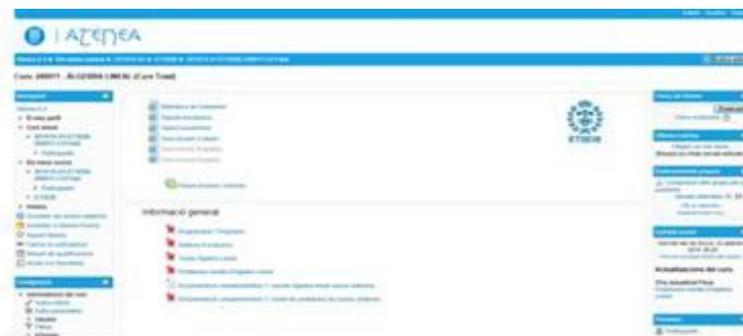

Fig.2. Linear Algebra topics in UPC-Moodle.

In order to ease the work in the different platforms used, we have prepared templates. In all the three templates we have divided de site in three areas depending on the content. The first one corresponding to the presentation of the e-portfolio, the second one was the place for academic curriculum in both individual and the complete group, and the third one corresponding to the solved tasks.

Following, we show the three figures of templates models.
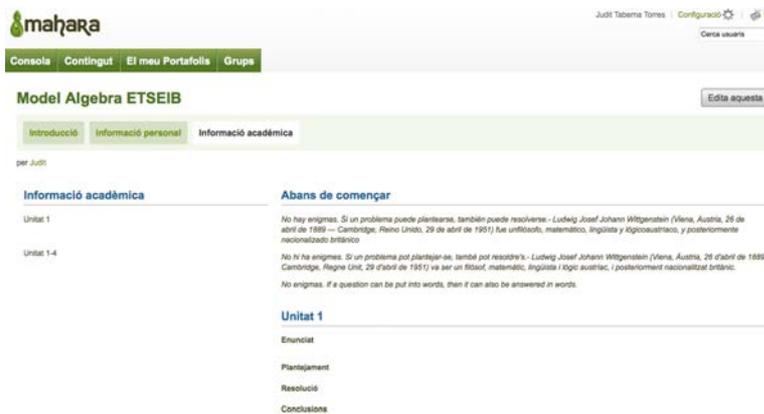
In Fig. 3, we show the Mahara template.

Fig.2. E-portfolio Mahara template.

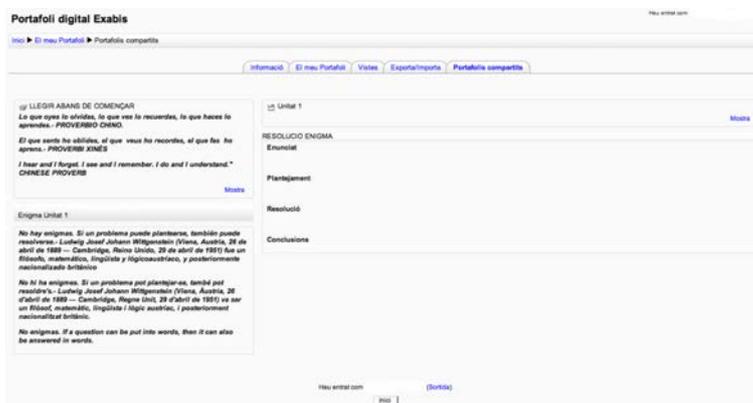In Fig. 4, we show Exabis template.

Fig.3. E-portfolio Exabis template.

Finally, in Fig. 5, we show Google Sites template.

Fig.4. E-portfolio Google Sites template.

Beyond that, we encourage students to use their imagination and creativity to develop their own e-portfolio and make it exclusively theirs.

3.2 Case of Study

At the beginning of the academic year 2014-15 we have began a pilot for the development of e-portfolios in a core maths subject, for undergraduate students of the "Escola Tècnica Superior d'Enginyers Industrials de Barcelona, (ETSEIB)" at the "Universitat Politècnica de Catalunya, (UPC)".

The aim of this pilot project is to involve teachers of the subject of linear algebra in using different platforms for creating e-portfolios in its integral use, that is to say, an e-portfolio integrating all types of use.
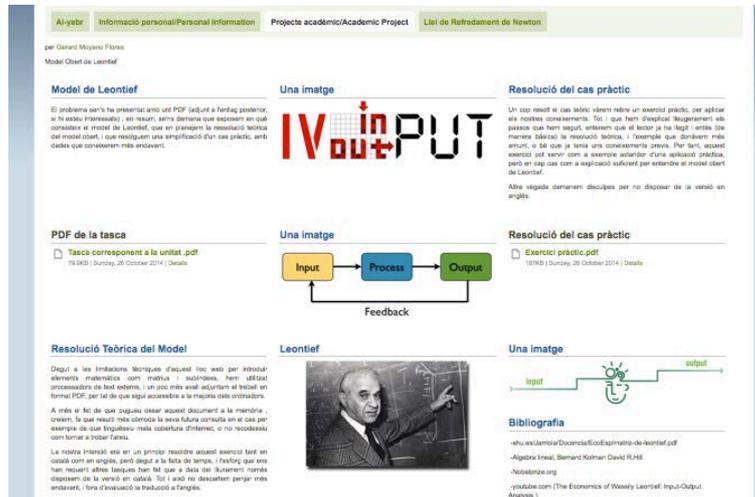

Fig.6. E-portfolio Mahara example.

The e-portfolio allows for integrating reflective activities for learners and professors through blog functions and the creation of "critical incident diaries" in which students of select Linear Algebra classes reflect on their learning and experiences over a given period or for a given learning activity.

It is the first time that a project using e-portfolios is run in a large learner group. In this case, there are 10 groups of about 70-85 students per group and all of them work individually on their portfolios. At the same time, the students perform tasks of linear algebra in groups of four students previously constituted and these subgroups have maintained throughout the entire course.

The important thing about the experience is that it is the first time that the School of Engineering, a test about creation of e-portfolio is made in large groups and all groups simultaneously. In this pilot is also involved the Institute of Education Sciences of our University.

In our experience has been taken into account that the learning activities for the development of an electronic portfolio are setting learning objectives, data collection, reviews by peers, feedback between peers, reflection, and sharing of materials. These activities include gathering knowledge, organization, reorganization, presentation, sharing, application, knowledge accumulation and management.
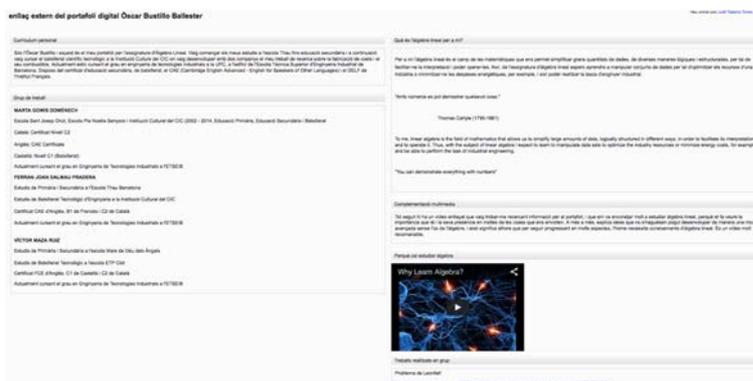

Fig.7. E-portfolio Exabis example.

For this project we have chosen the platforms Mahara, Exabis and Google Sites. Each of the three platforms has been used by one third of students approximately. Different authors as for example Diana Bri, Miguel García, Hugo Colls, Jaime Lloret in [11]), analyzed educational platforms in order to facilite the decision about platform on which to choose. We can see some examples of e-portfolios using different platforms in Fig. 6, Fig. 7 and Fig. 8.
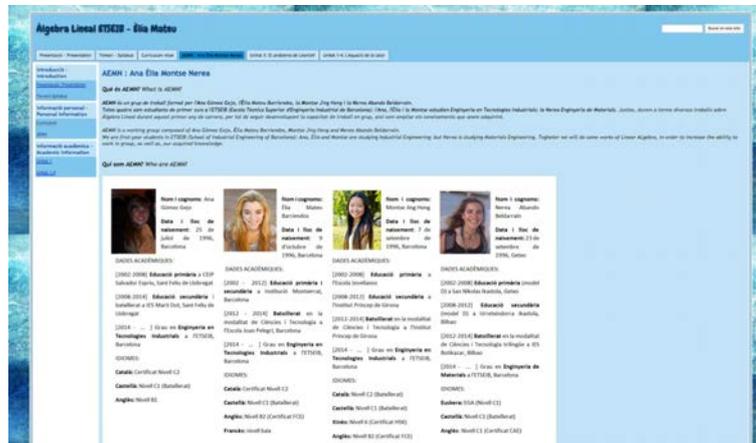

Fig.8. E-portfolio Google Sites example.

3.3 Integral e-portfolio edition

The student teacher contact is performed through the Moodle platform. Remember that the platform Moodle is an open source e-learning platform, also known as a Learning Management System. This platform is used for the teachers on the one hand, as a repository in the sense of a storage area, from which students can retrieve files or different objects that can be useful for their tasks. Then, students deposit their achievements at their personal e-portfolio, and, on the other hand, to communicate with students using internal mail or forums.

The platforms Moodle and Mahara have built-in support for each other in the form of single sign-on and transfer of content or export different types of objects from Moodle to Mahara (API Portfolio) and to import objects from Mahara to Moodle (API repository). Exabis is also an open source of e-Portfolio able to be connected to Moodle by means of a plug. We are using the e-portfolio 4.1 version "My Portfolio" in Exabis, for Moodle, let us users upload files. And finally, in the case that the student use Google Sites as a platform for creating their e-portfolio, the professor must open a repository in Moodle where students placed the link to their portfolio that previously have made visible to the teacher.

3.4 Students' Evaluation of Educational Quality (SEEQ)

Students' Evaluation of Educational Quality (SEEQ) is a tool used to obtain student feedback on teaching quality and effectiveness that was developed by H. W. Marsh of the University of Western Sydney, Macarthur (Australia), [9].

SEEQ has been widely investigated giving a high degree of reliability and it is based on psychometric analysis. Correlate well with a wide range of measures of learning outcome and also correlates well with teacher's self ratings.

We adapt the questionnaire to collect feedback from students about the new experience of building a portfolio as a learning tool of linear algebra.

3.4.1 Query for linear algebra course results

The SEEQ questionnaire consists of nineteen questions divided in the following seven topics: learning, enthusiasm, organization, interaction with the group, personal attitude, examination and workload and difficulty.

We show below the results of the survey relating to the most representative questions corresponding to the learning topic.

1- The preparation of the e-portfolio seemed exciting and intellectually stimulating.

2- Making the e-portfolio I learned different things that I consider valuable.

First in Fig. 9, we show the results obtained by one of one group and then the overall results.
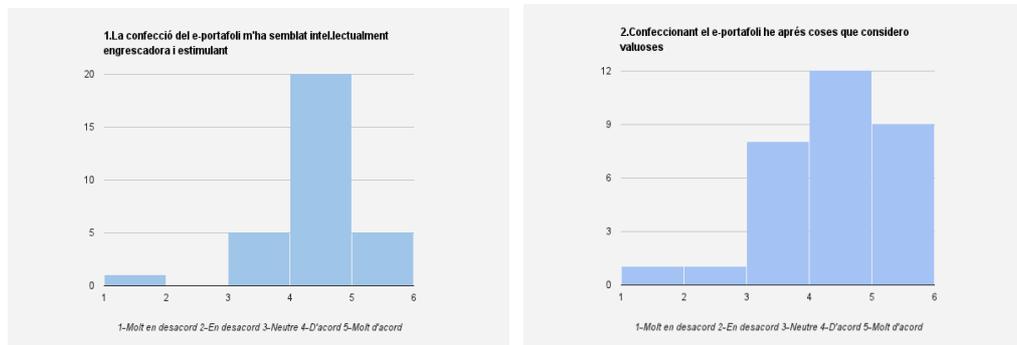

Fig.9. E-portfolio SEEQ. Group 10.

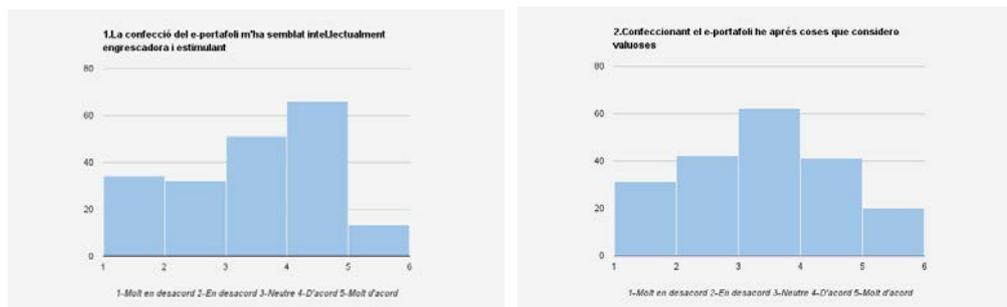And in Fig. 10, we show the results of all groups.

Fig.10. E-portfolio SEEQ. All groups.

The opinion of students depends on the group to which belonged, although on the whole seemed them, that the construction of the portfolio has been intellectually stimulating; but are not very convinced that they have learned something more than what they had learned with traditional teaching.

Finally we want to show that the results depend on the platform used, as we can see in the Fig. 11, whose results correspond to the first question and in the Fig. 12 whose results correspond to the second question.

Looking these results, we can conclude that the Google Sites is the platform that the students liked more.
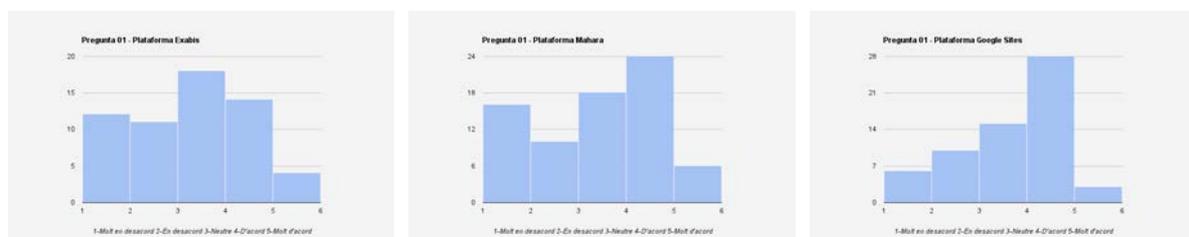

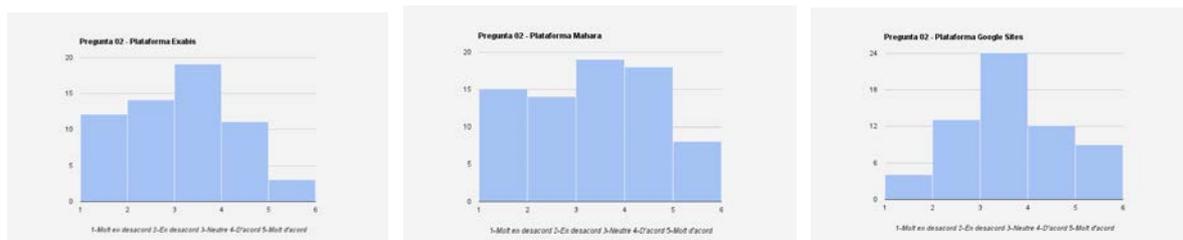Fig.11. E-portfolio SEEQ, all groups, platforms, question 1.

Fig.12. E-portfolio SEEQ, all groups, platforms, question 2.

4   CONCLUSION

Through our experiences we can conclude that the e-portfolio is a good tool to link teachers with students and vice versa and to optimize this tool is necessary to improve the interconnection between Mahara and Moodle, as well Exabis and Moodle platforms, in order to improve the accessibility of both students and instructors.

REFERENCES

[1]   Bairral, M.A., dos Santos, R.T. (2012). E-Portfolio Improving Learning in Mathematics Pre-Service Teacher. Digital Education Review, 21.

[2]   Barragán, R.   (2005). El portafolio, metodología de evaluación y aprendizaje de cara al nuevo espacio Europeo de Educación superior. Una experiencia práctica en la Universidad de Sevilla. Revista Latinoamericana de Tecnología Educativa. 4 (1). pp. 121-139.

[3]   Barrett, H. (2000). Create Your Own Electronic Portfolio (using off-the-shelf software). Learning and Leading with Technology.

[4]   Brandes, G.M., Boskic, N. (2008). E-portfolios: From description to analysis. International Review of Research in Open and Distance Learning, 9, (2), pp. 1-17.

[5]   Domínguez-García, S., García-Planas, M.I., Palau, R., Taberna, J. (2014). Uso del e-porta-folio en la formación: El e-portafolio integral. CIDUI.

[6]   García-Planas, M.I.,   Taberna, J. (2014). Using Integral E-Portfolio to Learn Linear Algebra. Mathematics and Computers in Science and Industry. pp. 75-79.

[7]   Mccowan, C., Harper, W., Hauville, K. (2005). Student E-Portfolio: The Successful Implementation of an E-Portfolio across a Major Australian University. Australian Journal of Career Development.   14, (2), pp. 40-51.

[8]   Barret H. (2010).   Balancing the Two Faces of ePortfolios. Educaçao, Formaçao & Tecnologias, 3 (1), pp. 6-14.

[9]   García-Planas, M.I., Domínguez, J.L. (2013). Introducción a la teoría de matrices positivas. Aplicaciones. Ed. Iniciativa Digital Politècnica, Barcelona.

[10]   Lay, D.C. (1994). Linear Algebra and Its Applications. Addison-Wesley.

[11]   Bri, D., García, M., Coll, H., LLoret, J. (2009). A Study of Virtual Learning Environments. Wseas Transactions on Advances in Engineering Education, 6 (1), pp. 33-43.

[12]   H. W. Marsh "SEEQ: A Reliable, Valid, And Useful Instrument for collecting Students' Evaluations of University Teaching" British Journal of Educational Psychology, Volume 52, Issue 1, pages 77–95, Article first published online: 13 May 2011, retrieved on December 4, 2015.