EDUCATIONAL SOFTWARE TO DEVELOP ELECTRONIC PORTFOLIOS: FEATURES AND IMPEMENTATION

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Abstract

The use of electronic portfolios (EPs) has widespread in the higher education institutions. Two types of EPs are of our interest: the ones elaborated by the students in order to document their achievements, difficulties and reflections regarding their learning process in a course, and the ones elaborated by professors to structure teaching, promote and evaluate their students learning during the teaching of a course. Inclusion of multimedia elements in electronic portfolio (EP) provides valuable information to teachers in order to recognize their student´s knowledge and skills and also provides students with better and more resources to document their learning process. This gives a superior advantage to EP over traditional portfolio. To favor the use of EP it´s important to provide teachers and students with the knowledge and skills that will allow them to create their own portfolios. This paper describes the features of an educational software which provides this knowledge and skills; also, a description of their implementation with professors and students of the psychology program in the Zaragoza Faculty of Higher Studies belonging to the National Autonomous University of Mexico. Through the analysis of EPs, created by professors and students as a result of the educational software implementation, highlighting the features of EPs that promote student´s learning and contribute to improve the teaching process.

Keywords: Educational software, electronic portfolios, e-learning.

1 INTRODUCTION

The rise of digital technology has favored the emergence and modification of diverse practices on the higher education. Diverse digital tools have been incorporated into the teaching in order to facilitate the learning process. In the same manner, the ways in which learning is shown, shared and analyzed have changed [1]. The use of electronic mail, discussion forums, teleconferences, online courses, blogs, etc., has become common in the academic activities of the universities.

One of the tools being modified has been the traditional portfolio, which has led to the electronic portfolio (EP). The advantages of this over the traditional are the diversity of means that can be used to form both the learning as well as teaching proofs. For example, when a student of psychology or pedagogy includes on its EP a video showing a procedure to favor the strategy of a school-age child to solve an arithmetic problem, this video serves as a learning sample from the psychology student and the professor could include it as a sample that can be used with other students in order to improve the teaching process.

There are several definitions of EP, the one used in this paper is the following: “An e-portfolio is a digitized collection of artifacts, including demonstrations, resources, and accomplishments that represent an individual, group, community, organization, or institution. This collection can be comprised of text-based, graphic, or multimedia elements archive on a Web site or on other electronic media such as a CD-ROM or DVD” [2].

There are different classifications of electronic portfolios (EPs). One of these [3] classifies the EPs in three types: process, product and samples. The firsts include samples of a teaching or learning process that reflect more than the result, the manner in which such process was conducted. On the second the samples focus on the products. Finally, the EPs of samples present the successful outcomes of a teaching and / or learning process. Another classification [2] divides them into student EP, teaching EP and institutional EP. Any of these may be used, among other things, to document the knowledge, skills and learning, and to plan and assess programs and courses.

For our purposes we will specify what we understand by two types of EPs, the learning and teaching EPs. In a learning EP a student documents the processes, products and reflections on its learning. The portfolio may include proof of a single course or part of it or its entire school trajectory. In a

teaching EP a teacher collects materials and evidence of its teaching activities. Just as the learning EP, the evidence may be from one course or different courses, current or past.

2 CONTEXTS

The educational software (ES) described here is located in two specific contexts: the degree of psychology from the Faculty of Higher Studies Zaragoza (FES Zaragoza, for its acronym in Spanish) belonging to the National Autonomous University of Mexico (UNAM) and a proposal to favor the use of EPs in such degree.

2.1 The degree of psychology

The ES is aimed to teachers and students of the degree of psychology from the FES Zaragoza. The curriculum of the degree lasts for four years during which students take eight semesters. Besides a basic education stage that covers two semesters, is also found the professional education stage in which students must take three of four fields: 1) Educational psychology, 2) Clinical and health psychology, 3) Social psychology, and 4) Industrial and organizational psychology.

Each one of these fields contains two modules and each module has the following learning modalities: Course, seminar, research seminar and supervised practice. These modalities are the instructional activities involving a teacher with students. It is important to notice that in the activity refer to as supervised practice, students conduct activities with members of the surrounding communities living near the school premises. Under the supervision of the psychology professor, students contribute to solve community problems corresponding to the fields of educational, clinical, health, social and organizational psychology.

2.2 A proposal to favor the use of EP

It is intended that professors and students use the EP in different learning modalities. To achieve such a proposal was developed that is currently being tested and contains four axes as described below.

2.2.1 Widespread use of the EP

The purpose in this axis is that the largest number of students and professors use the EP, appreciate its benefits and get the most out of its implementation on their academic activities. For such the following actions are conducted:

- Gatherings and informational meetings aimed to professors and students.
- Elaboration and promotion of informational documentation about the uses and advantages of the EP in higher education.
- Elaboration of an ES, which will be described later on.

2.2.2 Encourage practice communities

Through the promotion and use of the EP it is to form and strengthen groups of professors and students interested in the implementation of the EP in the academic activities. The importance of such communities is to connect people, provide a shared context, enable dialogue, stimulate learning, capture and diffuse existing knowledge, introduce collaborative processes, help people organize, and generate new knowledge [4]. The actions expected for the creation and strengthening of such communities are:

- Creation of an initial working group.
- Academic gatherings for strengthening: Annual meeting, work seminars, in-person tutorials.
- Creation of digital resources for identity and for community support.

2.2.3 Promoting learning

Through the EPs it is intended to favor the students' reflective learning. The EP is a tool that allows students to reflect on the actions performed in their academic activities so as to engage in an active, responsible and reflective manner in the teaching-learning process. In working with professors and students is emphasized:

- The relationship between the evidences included in the EP and the learning that is derived from these evidences.
- The analysis of the type of reflections included in the EP.

2.2.4 Assessment of learning

The EP is conceived as an assessment alternative that allows identifying more accurately the type and quality of students learning. Through the EP, students have more and better opportunities to demonstrate their knowledge and skills; therefore it is necessary to link these realizations with appropriate assessment strategies [5]. For such it is promoted:

- The reflection on different types of assessment.
- The use of different formats of presentation of learning evidences.

3 EDUCATIONAL SOFTWARE BACKGROUND

In the degree of psychology, on the field of educational psychology there is an instructional activity in which students conduct a psycho-educational intervention with children reported by their teachers as students with poor school performance, particularly in math, reading and writing. In this activity an electronic report was used to include information from children, a description of the intervention, and the changes in the strategies and knowledge of the children as a result of the activities conducted by the students. The information was included in the form of text, image, audio and video [6].

Noting the advantages of the electronic report, especially the possibility to include information in different formats, progress was made towards the design and use of EPs. A tutorial was designed so that professors and students had minimal elements to elaborate an EP. Both the tutorial and the EP were developed with the *PowerPoint* program. The tutorial included basic information about *PowerPoint* components that facilitate its use as a tool to develop EPs [7].

4 EDUCATIONAL SOFTWARE FOR DEVELOPING ELECTRONIC PORTFOLIOS

As stated previously, the ES is part of a proposal to promote the use and advantages of the EP among students and professors of the degree of psychology. The software is conceived as an interactive tutorial through which the user receives information that uses to perform practical activities allowing him/her to obtain a knowledge of the EPs and the skills needed to develop an EP. Its elaboration was adjusted to four features required by tutorials: user-oriented, high degree of autonomy by the user, be interactive, and facilitate skills and procedures learning [8].

4.1 Purposes

The main purpose consists in students and teachers incorporating the EP to their school activities. Through the software the user is expected to:

- Obtain knowledge about the features and advantages of the EP in higher education.
- Design the structure of two EPs with the essential elements for its functioning.
- Design a template for students to develop their EP.
- Dominate two development tools to elaborate an EP.
- Acquire basic skills that allow him/her to incorporate multimedia elements to an EP.
- Obtain knowledge on how learning aspects can be link with the EP.

4.2 Recipients

The ES is aimed to students and professors of the degree of psychology. However, it can be used by students and professors of any degree of higher education. The only requirement is to have basic knowledge of the *PowerPoint* program, which does not represent an obstacle since this program is often used in the academic field for presentations.

4.3 Development Tools

For the elaboration of the software it was based on the belief that it is not required to master programming languages to design educational computer programs. Within this approach you can choose to use authoring programs, programs that are available on the Internet or application programs. Although, the application programs are designed for specific purposes, such as writing documents, elaborate spreadsheets or make presentations, its features are taken advantage to use for educational purposes. Such is the case of the *PowerPoint* program that was used as the main development tool for elaborating the ES.

The main function of *PowerPoint* has been to produce presentations, however, the improvements to the program, have made it to be used with more ambitious purposes than simply making presentations [9] [10]. The advantages of *PowerPoint* to be used as a tool to develop ES, in this case, an interactive tutorial, are the followings:

- Learning facility compared to other authoring programs.
- Possibility to incorporate different types of content (video, audio, still images, animations, text).
- Availability of internal and external hyperlinks.

The second program used as a development tool was the *Camtasia Studio* program. With this program several actions were recorded on video that were display on the computer screen. These video segments were included in the ES and the users can watch them repeatedly.

With a preliminary idea of the content to be included in the software, we proceeded to work on the structure and navigation. With these elements the wireframes of the several screens were developed and the design was continued from an interactive prototype using *PowerPoint*. The prototype was shown to a group of students and professors who provided suggestions that helped to improve the design of ES.

4.4 Description of educational software

The ES consists of an introduction and four sections corresponding to the subjects that comprise it: Basic concepts, portfolio elaboration, multimedia elements and promoting learning. Below, a brief description of each one is done.

4.4.1 Presentation

This section contains four screens: 1) welcome to the user, 2) the purposes of the course, 3) a list of the subjects that will be reviewed and instructions about navigation, and 4) the products that are recommended to produce as a result of running the software. On figure 1 the list of subjects and navigation instructions are shown.

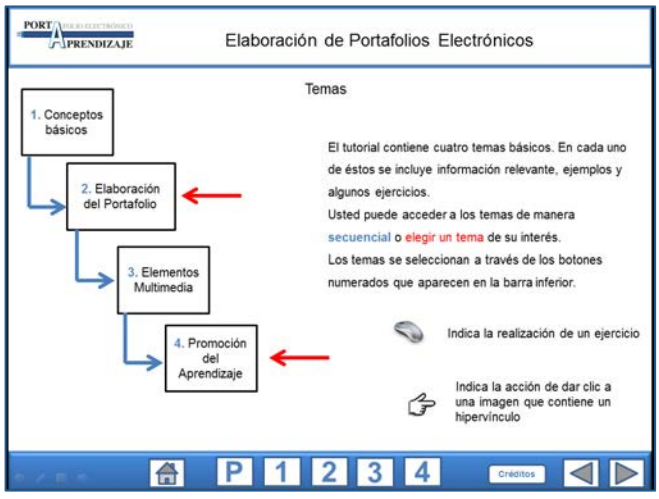

Fig. 1. Screen with a list of subjects and navigation instructions.

4.4.2 *Basic concepts*

This section introduces the user to the EPs field. In addition to the information contained in the software, the user can access hyperlinks that direct him/her to Internet websites where he/she finds examples, definitions, components and classifications of EPs. From this section the user will build a presentation in which, as a result of the analysis of the consulted information, it will include concepts and ideas about the EPs. In Figure 2 a screen of this section is observed.

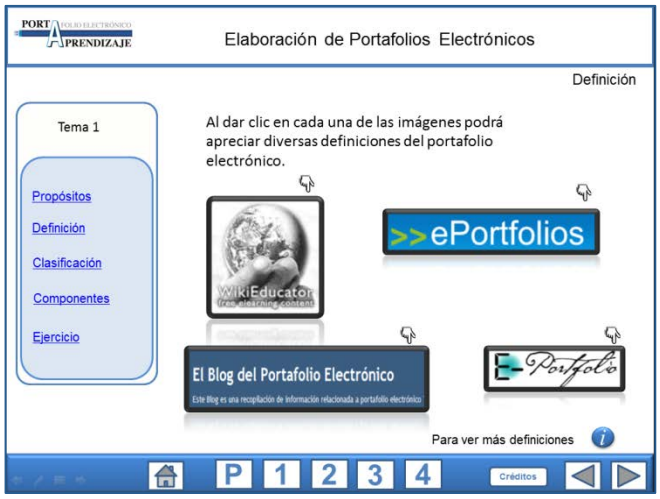

Fig. 2. Example of a screen of the *Basic concepts* section.

4.4.3 *Elaboration of portfolio*

This subject covers the following aspects:

- Steps in the elaboration of an EP.
- User Interface
- Elaboration of templates to produce EPs.
- Development Tools: Commercial, Open Source, application software.
- Development Tools: *PowerPoint* and *Google Sites*.

As a result of the implementation of this section, users will perform:

- The user interface or the screen design of an EP.
- The template design to be used by students in a course portfolio.
- The structure of an course EP using *PowerPoint* as development tool.
- The structure of a teaching EP using *Google Sites* as development tool.

The support for the EP elaboration using *PowerPoint* given through the demonstration, through video segments, of the following program features: 1) Insert images, 2) Action buttons, 3) Hyperlinks, 4) Movies and sounds, and 5) Slides pattern. For each function exercises are proposed to include, in a *PowerPoint* file, examples of the previous features. In figure 3 an example of a screen of this section is shown. In case of the EP elaboration using *Google Sites*, three video segments are included: 1) Creating a site, 2) Editing a page, and 3) Creating pages. Along with these videos a document in pdf format in which the previous features are shown graphically.

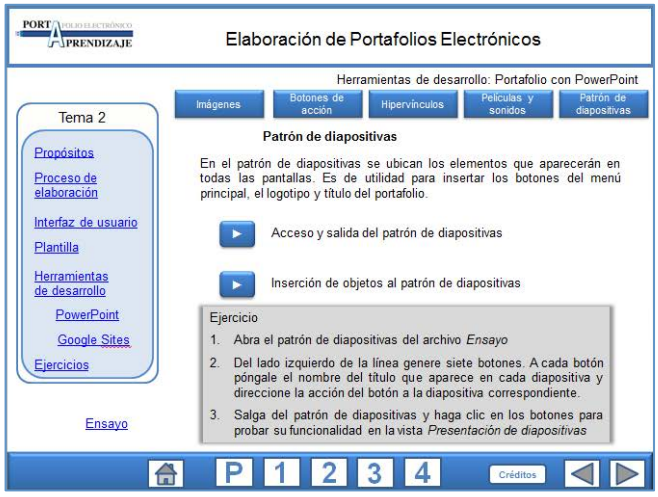

Fig. 3. Example of a screen from the *Portfolio elaboration* section.

4.4.4 Multimedia elements

One of the advantages from the EPs is the inclusion of information in different modalities: audio, text, image and video. This feature is the main difference with traditional portfolios. In addition to providing a multimedia definition, basic information for each one of these modalities is included in the ES:

- Recording or capture devices.
- File Formats.
- Processes and replay programs.
- Processes and editing programs.

The incorporation of video into EPs has been extremely useful. For this reason three video segments are included showing the import, trim and insert processes of titles and subtitles in videos with the *Windows Live Movie Maker* program. This information is also shown graphically in a document elaborated in pdf format.

As a result of the implementation of this section, the users:

- Perform format changes in various texts.
- Edit images (copy, trim and change the format).
- Record and edit a video (Insert titles and subtitles, trim at the beginning, middle and the end).

In figure 4 a screen of the section is shown.

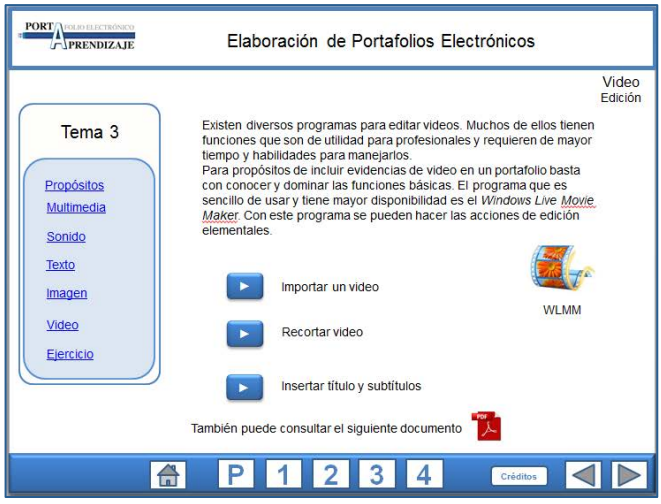

Fig. 4. Example of a screen of the *Multimedia Elements* section.

4.4.5 Promoting learning

The learning and teaching EPs are the type of portfolios which we are interested that professors and students develop. For this reason on the ES a section about different aspects of learning is included:

- Types of learning that promote the EP: Cooperative, situational and reflexive.
- Evidences: Types, organization, educational purposes, professional skills.
- Assessment: Types and examples.

As a result of this section, users:

- Propose situations that favor the three types of learning through EP.
- Reflect about experiences of their academic experience that may be included as evidence in an EP.
- Propose assessment methods compatible with the knowledge and skills that are incorporated into an EP.

In figure 5 a screen of the section is shown.

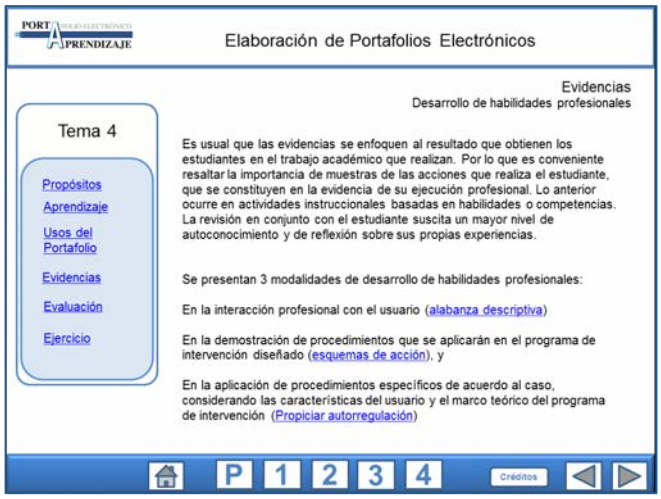

Fig. 5. Example of a screen of the *Promoting Learning* section.

4.5 Structure and navigation of the educational software

The ES consists of five modules, corresponding to the presentation and the four main subjects. At the bottom of each screen is a bar with buttons which allows access to the program start, to any of the five modules and two forward and back buttons to the next and previous screen, respectively.

In each of the four modules, corresponding to the subjects, there is a menu located on the left side of the screen. The menu options allow the displacement toward the different sections of each module. In this way, from any screen you can navigate to the different sections of a module and to the home screen from any module. This type of navigation was possible by using the *Slides pattern* feature incorporated on the *PowerPoint* program.

As mentioned previously, the ES is conceived as an interactive tutorial, which means that the information is not only given to the user but also provides the opportunity to perform exercises that will be used as the basis for implementing knowledge and skills to develop their EPs.

5 EDUCATIONAL SOFTWARE IMPLEMENTATION

In order to know the effect of ES in the academic activities two strategies have been followed: 1) The teaching of courses on EPs which includes the ES management, and 2) The EPs that teachers and students have developed as a result of the knowledge of ES.

5.1 Teaching of courses

Three courses were taught to teachers in which the information included on EPs and ES management in both its previous version and the current. The courses have been used as *user studies* that have allowed obtaining information about the way teachers interact with the ES. The observations performed along with comments from the teachers, have allowed performing improvements to the ES.

It is worth mentioning that the current version of the ES has included a lot of information that was given in the courses. By being the ES an interactive tutorial in which the user can run it independently, it is expected that, with the delivery of the ES, professors and students will be able to develop their EPs.

5.2 Electronic portfolios developed by professors and students

Professors that have taken the courses have given students the ES to it helps as a guide in elaborating their EPs. Sometimes just the delivery of ES is enough and others it is accompanied by a template designed by the professors so that students can develop their EPs. An additional effect has been that students, who have developed EPs on a previous semester, can request to a professor that did not have any knowledge of the ES in order to develop an EP for the current semester.

Although the ES effect can be assessed through the number of professors and students who have elaborated EPs through the knowledge of ES, we consider that a qualitative analysis of the EPs provides us valuable information about the manner in which the EPs are used by part of the professors and students of the degree of psychology, in order to favor learning. Examples of three cases in which the EP has been used are found below.

5.2.1 The EP on the psycho-educational intervention

In the educational field of the degree of psychology, students work directly with communities with scarce economic resources. With the advice of his professors they attend diverse educational problems afflicting the communities. Problems of school performance, discipline, human developmental alterations are some of the problems faced by the students. To account for the psycho-educational intervention, they have developed EPs in which, among other things, they detail the intervention performed and the generated changes as a result of this intervention.

The incorporation of video evidences, both of the students' actions as well as the population attended, along with the students' reflections, has allowed a professor to have a broader view of the knowledge and skills of the students. The learning assessment is enriched since it demonstrates the manner in which students apply the knowledge acquired in the courses. An additional benefit consists in that the evidence contained in the students EPs is used to promote the growth of teaching portfolios of professors since some videos are used to show other students the examples of acts that have to be done with the population and changes they have to promote in it.

5.2.2 The EP in the clinical field

In the clinical field of the degree of psychology, students work with the same communities to which reference was made in the previous section, what changes is the type of problems they attend: personal, family, and addiction problems among others. The EPs elaborated account for the clinical intervention of the students. In this case the use of the EP has been useful to record therapeutic sessions we have with the people. Students perform a selection of the most relevant parts of them and frame their actions in the psycho-therapeutic guidance they applied. This implies an effort not only to get to know the latter, but to identify concrete actions, through video or audio, which led to a change in people.

The evidences of the students have been used as teaching resources for students joining for the first time to study the clinical field. Just as the EPs in the previous section, professors have more resources to assess their students learning and improve their teaching.

5.2.3 The EP in the basic formation area.

In the basic formation area of the degree of psychology students come into contact with the basics of psychology. To enter into the specialized literature, students must know the characteristics that a scientific text should have. Through the EP the understanding of such texts has been promoted. During one semester students conduct an experimental research and elaborate an article with all the requirements of a scientific text and include it as evidence in their EP.

The professor assesses learning by examining students EPs. Through the article elaborated by students the professor perceives the theory that was used as a basis for the research, the quality of the research conducted, and the report of such. In this manner, the EP contributes to get the students in contact with the scientific research field in psychology.

6 CONCLUSIONS

The EP is a tool that favors learning and teaching. It is therefore important that professors and students use it in their academic activities. From the information collected about the implementation and utility of the ES it is deduced that it has contributed to such purpose. However, it is advisable to conduct further inquiries that allow a constant update of such according to the needs arising from higher education.

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