Project Areas Based on Digital Portfolios: The DPF (Digital PortFolios) Application

Duarte Costa Pereira, João Carlos Paiva

Chemistry Department - Faculty of Science – University of Porto

Centre for Computational Physics (UC)

jcpaiva@netcabo.pt

Abstract

A digital and on line application called "DPF", Digital PortFolios, in which the students write and work their own ideas and self-evaluation, is described. That new tool supports a recent pedagogic experience in the Chemistry Department of the Faculty of Sciences of Porto University that is currently being developed by the authors to the Project Area for the last year Chemistry students, (the year before pre-service training). Some examples of students registrations in the portfolio are presented and the power of the portfolios as a training tool is discussed.

Keywords: Project, Digital, portfolio.

Introduction

Science is becoming much more a **project** than an object, according to an always existing but increasingly accepted constructivist epistemology [3].

Also the emerging Information Society and the new paradigms on communication and learning point towards a different type of Science Education for the contemporary schools, where learning becomes more important than knowing. The use of Communication and Information Technologies plays in this issue a very important role [4].

A recent pedagogic experience in the Chemistry Department of the Faculty of Sciences of Porto University is described: this is in a **project area** for the last year Chemistry students, that, in a few months, will become science teachers. The project is oriented through a portfolio, which should include reflection on personal history, self concept elaboration, social identity construction, together with the most recent ideas on project didactics. The use of these portfolios should follow a Socratic strategy of self analysis and self evaluation, preparing the student for his/her pre-service training.

To support that curriculum new area, we are improving a digital and on line application called "DPF", **D**igital **P**ort**F**olios, in which the students write and work their own ideas and self-evaluation (Figure 1).

Figure 1: DigitalPortFolios first screen.

The project area

The project area included in the undergraduate course preceding the pre-service Science teacher training must develop in the future teachers' personal and transferable competencies, according to the Society where they will be living. It must, first of all, approach those young teachers to a constructivist science view, most certainly opposing the positivist view through which they were educated. The skills they learn are not only to teach today but also to teach in the future. Working in the project, future teachers will have the capacity to integrate the other sciences and science education, in particular. This project area experience in the Chemistry Department (Porto) took place during the current academic year. In that way it is expected that students are helped in preparing to the next year (pre-service training).

The students are assigned to a particular project. They are a small group of 8, with two teachers helping. The projects are "From stars to the atom" and "The Atmosphere", distributed in two different groups but with several tasks and activities together (see bellow). The group of "Atmosphere", which

friendly and affectively called itself "The atmospheric students", for example, made their own outline of the project: «This project has, as its base, a careful reflection on the 10 Th grade new Chemistry curricular unit called "On the Earth's atmosphere: radiation, matter and structure.", in particular on the sub-topic "Molecules in the troposphere– major species and vestige species". We intend to deepen the scientific knowledge associated with the various learning goals as well as how to discuss the methodological suggestions referred in the curriculum. A related laboratory or computational experience will be undertaken. We will bear in mind related interdisciplinary aspects and collaboration in project works with other high - school students».

Here are examples of some tasks they have defined and have just been developing:

1) Carefully read and discuss the global parameters of the new curricular proposal for the 10 Th grade, in Chemistry and Physics course.

2) Vertical study of the subtopic "Molecules in the troposphere– major species and vestige species" , referred to in this unit and present the associated concepts in group.

3) Collect, study and present, in group, articles from international scientific magazines (JCE, Education in Chemistry, Chemical Educator, etc.) which deal, directly or indirectly, with this unit.

4) Outline and develop an experience (lab or computational) related with this unit.

5) Attend a class on this unit and discuss the opinions and impact in the group.

6) Reflect and discuss, in the light of this experience, the motivation/vocation proper to a Chemistry and Physics teacher.

7) Build a final essay, between 20 and 30 pages, based on point 4 and/or on a new item from the new 10 Th grade curriculum. This essay will include a reflection on the project year including the portfolio methodology.

8) Participate in the school "Garcia de Orta" activities and, in particular, in associated projects.

9) Discuss: "being a Chemistry teacher: how and what for?

NOTE: The tasks are intentionally numbered so that the daily registers may be linked with the associated tasks.

The use of the digital portfolios (DPF)

Working, evaluating and organising those tasks is particularly potentiated with a digital support. Because students could (and should) work and register not only in the traditional class but also at home or elsewhere and at any time. The decision was taken to turn these registers into web pages, allowing to produce text in a off line mode and link it after in the web page. Technically the DPF software produced is only a beta version at the moment this paper is being writen. It will be available, in a few months in the *site* www.digitalportfolios.net.

Digital portfolios are no long new ideas in education [1]. The theory scenario of the portfolio, should include [7]:

- Reflection on personal history

- Self concept elaboration

- Social identity construction

- *Portfolios* should follow a Socratic strategy of self analysis and self evaluation, preparing the student for his/her pre-service training. "know yourself" is the key of those strategies…[8].

PDF has some general and natural characteristics like working on line, supported on data bases, being always available, always updated. The portfolio that is being designed is absolutely cantered in the work of the students. Some particular specifications of DPF are the different "intimate" levels (or "publisher" levels), according to the information destinations. The colour is red if only the student can read it, yellow if the student, the project-group and the supervisor are able to know and green if everybody can read. Green colour contains improved information, from the student individually or from the group. That kind of "conceptual traffic lights" is one of the originalities of this DPF tool. Qualitative and quantitative evaluations (from 1 to 5) to the different activities could be made, according to the pre-defined tasks in the project. Here is an example of a simple part of the portfolio made by our students:

Nº: 1

Task : 2

Description: *"Visit" to the office of the teacher André Melo*

Date : 09-10-2001

Duration: 1 h

Qualitative Evaluation: "Got free access data base addresses on the net, 2 modulation programmes (molkel and moldraw), as well as various potentially interesting sites related to environmental issues. It was nice!"

Quantitative Evaluation : 3

Nº: 2

Task: 1/3

Description: Session in the library.

Qualitative Evaluation: "Had my first contact with Journal os Chemical Education. It allowed me to have an idea of what kind of articles are published in this journal. Reading of unit of the Physics and Chemistry A /10 th grade programme. It appears the experimental work in the area of chemical link/alloy will have to be computational".

Another description/Evaluations activities:

Preparation of the visit to the school "Garcia de Orta (task 8)

Establishing some tasks for the preparation of the teacher's meeting. I looked through my scraps of the Sunday JN magazine for experiences which may be used in the school Garcia de Orta . I found some that may be good for the school activities. This is the record of the experiences, from the ones I checked, that are most connected with the project area and that I think can be adapted for the school activities, bearing in mind their easy execution and short duration:

-Building of a rudimentary barometer.

-Study of the properties of the matter

-Study of the superficial tension in water

-Exemplification of the cfc's effects on the ozone layer.

First session in the school Garcia de Orta (task 8)

First contact with a secondary school in the past 5 years. Entering, I had the feeling was small and short (ceilings included)...I was pleased with the good conditions of the astrophysics room. It's wide (if I'm not wrong it has approximately 7,7 x 7,7m) The ceiling was a disappointment, though. In spite of the teacher's optimism I suppose it'll be difficult to adapt the room to the planetary orbits! In what concerns the teachers, they seemed interested in the activities to be developed, although I had the feeling they weren't still not very well informed about the process. However, for a first meeting I believe the outcome is fairly positive.

Note 1: Quantitative Evaluation is from 1 – very bad – to 5 – very good.

Note 2: This list may be ordered by date, task or by quantity evaluation

Note 3: In the final version it is possible to observe the evolution graphics according to the days for each task.

DPF has a search internal option available, to find information by date, by task, by key words, by "colour" of information ("intimate" level), etc.

Conclusions and The future

This project was started with enthusiasm but without a precise idea about what would happen. The 8 students involved, some colleagues, that are giving feedback to the work and, of course, the authors, are contributing to an encouraging environment to keep and improve the work in the project area with the digital portfolio.

A more extensive and systematic study of the impact of DPF will be made at the end of the first experimental year. The authors also plan to adapt the DPF teacher training portfolio to a Personal and Professional Development model offered to the undergraduate Chemists planning to be Scientists and not teachers (2nd Semester of next year). In coming years the authors plan to adapt the DPF technique to other situations, starting to apply it to the freshman as they arrive to the university and using it as a tutorial tool and prolonging its use for the graduates after leaving University, having it progressively updated and attached to the employment world, using it as a tool for continuous Education. The authors hope that with the use of such a technique so many undergraduates will not abandon the course during their critical first year and the current situation of "à la carte" continuous Education (particularly in the case of teacher training) could be substituted by a much more rational approach.

A first "beta" version is freely available in English and Portuguese in the URL: www.portfolios.net.

All comments and suggestions are welcome.

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