Interdisciplinary learning and use of tics, a way of innovating in education

Pilar, R., Marcos, P., Arana, A., Barroso, A., Larretxi, N.

Begoñako Andra Mari. Escuela Universitaria de Magisterio
Begoñako Andra Mari.Teacher Training University College

Abstract: The ability to find information and how to process it is one of the main challenges of education in the information society where vast amounts of information are easily available. Process information implies testing its reliability, reaching a diagnosis about its accuracy and/or combining information if it comes from different sources or has peculiarities that require verification. Collaboration between diverse cultural institutions such as archives, museums and libraries is substantially important and future teachers of primary and secondary schools should teach how to acquire these skills. In the Teacher Training College BAM (Bilbao) it is offered a subject shared by the BAM, the Archive and the Museum named "Laboratory of active methods for interdisciplinary learning sciences" which is included in the Curriculum of Primary Education pathway in curricular deepening (6ECTS). During the course of this subject, students take part in various workshops where they create scientific-didactic materials for social and natural sciences where the use of ICT´s is fundamental. Students work in projects and use ICT-s with the aim of making real the comprehensive rethinking of teaching and learning that is needed which highlights innovation and multidisciplinary.

Keywords: multidisciplinary, use of tics, information management, innovation

Introduction and Theoretical Framework

Our aim in this paper is to present this college subject as a commitment to interdisciplinary collaboration between the Archive, the Museum and the University. The projects seeks to generate knowledge networks and break with the isolated strategies and dynamics that institutions sometimes tend to deploy. Not only three institutions are taking part in this project but also five professionals of different disciplines. Both the planning and the implementation, are clear and innovative commitments to the interdisciplinarity. Owe to this, materials and projects are developed from different points of view and diverse professional perspectives (arts, psychology, didactics, philosophy, history, files, the use of tics and so on).

The educational project that takes shape in the course "Laboratory of active methods for interdisciplinary learning science" emerges in the context of creating the European Higher Education Area, more popularly known as "Bologna Process ". In Spain, the implementation of Bachelor´s degrees has been a substantial part of this process. Bachelor degrees have replaced traditional degrees and diplomas, based on ECTS (European Credit Transfer System) credits. This situation involved a redesign of the curriculum in different majors, which allowed the introduction of new subjects such as the present one. This laboratory is part of the Bachelor of Primary Education pathway in Curricular deepening. The course is taught in Begoñako Andra Mari Teacher Training University College, attached to the University of Deusto (Bilbao) since the course year 2011-2012.

The main competences of this subject are the use of ICTs and the level 2 of written communication (fluent writing skills, good content structure and the use of graphics to facilitate the understanding of the information and increase the interest of the reader in medium length writings)

The specific skills are:

• promote learning that emphasizes the comprehension of the reality and the problem-solving skills from a transdisciplinary perspective which is appropriate to their developmental stage;

• enter the socio-cultural and natural reality in the curriculum for analysis, intervene on it and see the possibilities of its transformation, generating civic learning communication; and

• applying information technologies and communication with an educational focus, leveraging its potential to contribute to learning and the acquisition of the intended skills.

The title of the course "Laboratory of active methods for interdisciplinary learning sciences" shows the three theoretical pillars on which our project is based. The core of this proposal relays on combining active methods of learning to learn, an interdisciplinary perspective and a project methodology, all seasoned with the use of ICTs. The preparation and development of the subject has been a laboratory both for teachers and students.

Methods

The following projects are the product of the joint thinking of a team formed by five professionals that come from different areas and that have their own. We believe that future generations of teaching professionals need to be equipped with the largest possible amount of resources to carry out its work because of this we have joint together with the aim of contributing to such training. Additionally, we want to provide a different viewpoint of archives and museums, breaking some stereotypes and preconceived images that keep them away from being conceived as potential educational resources.

We believe in the complexity of the reality and the need for future teachers to reflect on the necessity of approaching it from different perspectives that complement and enrich the information we have. Therefore, we have developed projects of interdisciplinary work that provide different views of the same reality and provide our students with the specific tools that we think they will need in the future for doing the same in the performance of their work.

In the preparation of this subject, we have gone through several stages. In the first course we taught, each of us gave his/her own vision and the educational possibilities of her/his resources and institutions. From that experience, we understood the need of deepening and improving our skills to conduct a real interdisciplinarity. After common self-assessment and taking into account the views of our students through a survey, we decided to launch, as we have noted, the work by projects.

During the second year, we changed the methodology. In the first session we present the subject and teaching and educational possibilities offered by the Museum and Archive. We highlighted that the students had to use different educational resources, manage various types of information and generate projects with a guiding theme, without forgetting the use of ICTs. In the current year 2014-2015, we have decided to go a step further. We want to use the Tics as a cross-cutting element and also develop integrated projects without presenting our activities as watertight projects, but as integrated projects to develop the assessments.

After the presentation of the subject, methodology and evaluation criteria, we proceed to the formation of groups formed by 3-4 students (first year teams were formed by 6-7 students and last year by 3-4 students). Preparing the subject first we chose the possible topics within the primary curriculum. We valued what each institution could provide and looked for the guiding theme. Our students will develop two tutored projects. For management reasons, projects will be developed in four-hour sessions per workweek.

Each of this two projects includes a part of work tutored by the professors and another part of work (the adequacy of these proposals to the stage of Primary) that will be submitted by the students before the deadlines. After the completion of the two tutored projects, we request the preparation of a final project for each group where students should show their mastery on the previously trained and developed skills and the use of ICTs (WEBQUEST, Googlesite, WIKI, Blog…).

On the final project, students must define the guiding theme that will integrate all the perspectives and propose a number of activities related to each of the sources and institutions. In addition, they will have to prepare an oral proposal of their project and defend it in front of the rest of teams. We will guide the process and suggest them activities in order to enrich their projects.

So far we have developed the following projects topics: Mediums for communication, Ecosystems, Light and color, Social and family structures, Metallurgy, Values and the Human Being. The results over the years have been satisfactory. We need to take one step towards testing them straightly in elementary classrooms, which would be the result of that we develop this course.

An important aspect was to develop criteria for evaluating the different projects that have been done by our students. We must bear in mind that this subject is part of a process referred to a university course and therefore the listed skills of our program must be respected.

The first thing we want to emphasize is the complexity of working together several professors and three institutions with different origins and purposes. We cannot underestimate the different professional paths and demands that arise from them, which could be translated into a different way of implicating common criteria. We have tried to circumvent this difficulty by developing a tool that allows us to make the most objective assessment. After a process of reflection and taking into account both the skills to be developed by our students and the guidelines given for each project, we have agreed in a table of assessment rubrics for the written projects and the oral defense of their final project. We have also decided to use a virtual classroom for sharing different contributions and comments that each professor wants to make.

Another issue we had to solve was related to the different route our students had to make related to their development. On the first two proposals (especially on the first one), they provided with bigger guidance and we have tutored them in their process. In contrast, as we believe that on the last project they will be able to show what they have internalized during the first two projects they will be asked for more autonomy. Hence, we propose that the first two proposals worth together a 30% of the final mark and the latter one will be the 60% of the total mark. From our experience in previous years, we have introduced a small "correction factor", a 10%, that is related to oral expression and participation on the areas designated for that purpose. It is mandatory to pass both sections separately to apply these percentages.

As the first two proposals are only assessed on their written part and to enhance the part of the oral presentation, at the last project (60% of the final mark) the oral presentation will worth a 60% and the written part a 40%. We apply here the same exception as in the previous case, only two passing both parts these percentages will be applied.

The results of this project can be consulted at:

https://sites.google.com/site/aprendizajeinterdisciplinar/home/

https://www.youtube.com/watch?v=mAYLU-RxYU4 [comunicación presentada al Congreso Educación y Aprendizaje, Nueva York, 15-17 julio de 2014

https://www.youtube.com/watch?v=mlnaaBePcEU [comunicación presentada en el Moodlemoot Euskadi 2014, Bilbao, 13 de junio de 2014 http://mooteu14.moodlemoot.net/.

Conclusions

The subject "Laboratory of active methods for interdisciplinary learning sciences", has, so far, a short but exciting journey. We have had four years of students from the 2011-2012 academic year to the present, 2014-2015, ranging between 39 and 32 students per year and including three students undertaking an Erasmus program (European Community Action Scheme for the Mobility of University students): two from the Czech Republic and one from Austria. It goes without saying that during these years numerous changes have been done around the same original idea and, in some cases, significant changes have been done result of particular experiences. Furthermore, as teachers we have learned a lot during this educational process.

The development of the subject has been a laboratory, coordinating five teachers and three institutions (including geographical movement of students between three different spaces and two cities), maintaining the unity and coherence of the different projects.

We should train that unity of viewpoint, which we will ask for to our students, to avoid one of the most common dangers that many interdisciplinary projects suffer. With other words, it may happen that even having very good principles and magnificent wills it end up becoming a *disiecta membra* amalgam. Our previous experiences have made us better understand potential problems and difficulties that our students could find. We have had to unlearn previous and traditional educational models to find out new paradigms that were in line with our project. Of course this is a work under progress that could be refined by many ways and where the work of our students is key.

We believe we have achieved, to the extent of our ability, the old concept of meaningful learning (Ausubel 1976), supplemented by classic studies such as those of Novak and Gowin (Novak 1998 Gowin, 1981. Novak and Gowin 1988). Starting from the level of development of the students and the cognitive and ecological-contextual paradigms. This is, students should learn by themselves, with other words, learning to learn (Caballero 2009). We also share the concept of critical meaningful learning developed by Professor Moreira (Moreira 2005).

> *"A través del aprendizaje significativo crítico es como el alumno podrá formar parte de su cultura y, al mismo tiempo, no ser subyugado por ella, por sus ritos, sus mitos y sus ideologías. Es a través de ese aprendizaje como el estudiante podrá lidiar, de forma constructiva, con el cambio, sin dejarse dominar, manejar la información sin sentirse impotente frente a su gran disponibilidad y velocidad de flujo, beneficiarse y desarrollar la tecnología, sin convertirse en tecnófilo. Por medio de este aprendizaje, podrá trabajar con la incertidumbre, la relatividad, la no causalidad, la probabilidad, la no dicotomización de las diferencias, con la idea de que el conocimiento es construcción (o invención) nuestra, que apenas representamos el mundo y nunca lo captamos directamente".*

We believe from these paradigms that, in large part, thanks to this subject, we have achieve to develop in our students a certain epistemological curiosity through a interdisciplinary perspective. In addition, we believe that they will be able to create learning strategies, placed on their different contexts (the archives and libraries, museums, social and natural sciences), without losing the overview and planning processes being aware on the same time of their own learning processes.

We firmly believe that the teacher's role is mainly a mediator one (Vergnaud 1998), and that although meaningful learning is not a discovery learning, it is also true that discovery learning can be, in case it is well done, a meaningful learning. If we have achieved that during these years, our students can manage among the vastness of sources and information that surrounds us with critical awareness, skills and strategies to detect false "truths" or conceptual distortions, and they can transfer these knowledge to the field of primary education, we think that our objectives, in some way, have been achieved.

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