Teachers, Trainers and Headmasters Training towards Problem Based-Learning: Contributes of the SCENE Project

[1]Paulo C. Dias, [2]Ana Sofia Bastos, [3]Susanna Correnti, [4]John Mergendoller,

[1, 2]Faculty of Philosophy of the Catholic University of Portugal (Portugal), [3]FOR.COM. Formazione per la Comunicazione (Italy), [4]Buck Institute for Education (United States of America)

pcdias@braga.ucp.pt, inactu@sapo.pt, s.correnti@forcom.it, john@bie.org

Abstract

Since the last decades of the XX century, we have witnessed a significant leap on learning and human development knowledge. However, little has changed in the structure of the educational systems and on teaching and learning methodologies used by teachers or trainers at schools. In this context, discussion is about the potentialities of school on promoting the 21st century skills (e.g. Ananiadou & Claro, 2009; Bell, 2010). And any change has to engage new learning models and different actors of the educational system. This is the general purpose for the development of the Scene project - Professional development for an effective PBL approach: a practical experience through ICT-enabled lErning solutions" -, a two year and a half project co-funded by the European Lifelong Learning Program (Key Activity 3: ICT), dedicated to the promotion of Problem-Based Learning (PBL) in secondary and vocational schools and adult training centers. In this paper we present the development and experimentation of one of its main products: a continuous online training course for teachers, trainers and headmasters on PBL methodology. This methodology has been exponentially used in higher education, once it has been correlated to cognitive variables, such as school achievement, and motional variables, like motivation, engagement or social skills. The Scene project course involved 179 participants, among teachers, trainers and headmasters from six European countries - Greece, Italy, Portugal, Romania, Turkey and United Kingdom -, as well as an expert from the United States of America, in two pathways of 64 hours. For teachers and trainers, four modules were developed: 1- Self-reflection and introduction to PBL; 2- Designing a Problem Scenario; 3- Assessing of a Problem Scenario; 4- Managing a Problem Scenario; and for headmasters and vocational school managers, five modules were developed: 1- Self-reflection and introduction to PBL; 2- Designing a Problem Scenario; 3- Assessing a Problem Scenario; 4- Managing a Problem Scenario; 5- Towards a "Constructivist School". These courses have been implemented in an E-Leaning platform, considering national and international forums, PBL learning objects, videos and reading cards, as well as face-to-face workshops in each country. From the participants, 147 completed their training. They have positively evaluated the course contents and its relevance for improving their pedagogical practices and for their insight on educational policy and new teaching and learning methods at schools and vocational education centers. Scene project course and the results are detailed as well as their implications for the exploitation of the project and knowledge to be transposed to schools and European educational systems.

1. From Theory to Practice: Contributes of the PBL to SCENE project

1.1. PBL history and value

Much has been discussed, researched and acknowledged about the way students learn and the effects of learning on skill development over the last decades. A special leap happen with the development of the constructivist theory, that changed the way we understand knowledge and therefore education and teaching practices [1].

Based on constructivist theory, one of the methodologies that have internationally generated, greater enthusiasm in the recent decades is Problem-Based Learning. Although questioning and presenting challenges to students dates back to Socrates, at ancient Greece, their systematic application in teaching stems mainly from successful experiences initially in chemistry courses and later in medicine, whether in Canada, Netherlands or Denmark [2] [3].

Over the past decades it has been the target of extensive investigation, in fields as medicine, nursing, science, economics or engineering [3] [4] [5] [6] [7]. Not minimizing the role of so-called "hard skills"

(technical and theoretical knowledge), it mobilizes the "soft skills" such as collaboration, problem solving, independent learning, planning and scheduling [8] [9], the so-called "21st century skills" [10] [11] [12] [13].

Despite research demonstrating the positive impact of this methodology - a review can be found at [14] or [15]-, the challenge for the transition from a "traditional" approach to PBL should be considered [16]. The optimal implementation of PBL involves [19]: the integration between theory and practice, the definition of good problems and help in structuring projects, continuous and systematic evaluation of students' progress towards the established goals, display appropriate bibliographic support; the adequate structuring of the classroom, promoting teamwork, and appropriate supervision of the teacher. To do that, schools and universities should close their relation and discussion in order to prepare teachers at school level, so that PBL could be consistently and successfully implemented. Teachers who want to use this new teaching approach should be motivated by schools and headmasters in order to promote PLB organizations.

At individual level, teachers need to be prepared and available to new dynamics and teaching roles in classroom, once "PBL provides an opportunity for educators to redefine the nature of learning and, in turn, reposition their roles in teaching from a knowledge/information transmitter to a learning/thinking process facilitator" [15]. The effective communication skills and authentic interactions are therefore essential for effective teaching and active involvement of students in learning activities [15]. An attempt to promote this exciting methodology in secondary and vocational schools is the aims of the SCENE project that we present in the following topic.

1.2. The SCENE Project

The SCENE project - "Professional Development for an Effective PBL approach: a practical experience through ICT-enabled Learning Solutions", is co-funded by the EU Lifelong Learning Program (Key Activity 3: ICT), with the aim to promote PBL methodologies at secondary and vocational schools. The project includes core activities, such as [16]: i) design of a PBL working environment; ii) develop and evaluate a teachers/trainers/headmasters training course; and iii) develop a Virtual Facilitator and PBL repository that allow the sustainability of the project.

The "SCENE PBL working environment" is an ICT learning solution that enable and support teachers, trainers, headmasters to acquire and transfer professional skills focused on the Problem-Based Learning (PBL) approach. All contents developed during the project, also news and important information about PBL were presented at the "SCENE PBL working environment", that consists of three distinct elements: the e-learning platform, the virtual facilitator and the PBL repository. It might be consulted online at www.sceneproject.eu (figure 1).

Fig. 1. Website of the project (www.sceneproject.eu)

The SCENE course is one of the major achievements of the SCENE. This activity involved participants, among teachers, trainers and headmasters from six European countries - Greece, Italy, Portugal, Romania, Turkey and United Kingdom -, as well as an expert from the United States of America, in two pathways of 64 hours. For teachers and trainers, four modules were developed:

1- Self-reflection and introduction to PBL;

2- Designing a Problem Scenario;

3- Assessing of a Problem Scenario;

4- Managing a Problem Scenario.

For headmasters and vocational school managers, five modules were developed:

1- Self-reflection and introduction to PBL;

2- Designing a Problem Scenario;

3- Assessing a Problem Scenario;

4- Managing a Problem Scenario;

5- Towards a "Constructivist School".

These continuous training courses, specific by target group, have been developed and performed in an E-Leaning platform, considering national and international forums, PBL learning objects, videos and reading cards, as well as face-to-face workshops in each country. It hosted and streamed learning objects (videos, Adobe Presenter slideshow and documents) in multiple languages, as well as peer collaboration (through forums or chats). It also provided the access to synchronous tools (virtual classrooms, chat), access to quizzes, and a secure login procedure, hosting a PBL repository. An important element in the development of these courses was the special contribute of Buck Institute for Education, an institution with significative expertise in this methodology that shared with this project some existing materials as lecture notes, videos or quizzes.

The Virtual Facilitator was developed with the "Intelligent Agent Technology" which aims to support users with the selection and writing of new PBL scenarios but also promote guidance to assess each PBL sessions to be delivered to students. The Virtual Facilitator is an expert system, "a brain" developed using Fuzzy Logic, to guides the newbie facilitator in all PBL design phases, asking questions, suggesting hints, providing tips, scenario examples and guidelines on how to build or improve PBL sessions.

Finally, the PBL repository is a Learning Management Systems (LMS) where SCENE participants can upload their PBL scenarios and download others. Once the LMS becomes self-sustaining at the end of the project and will be opened to the public, and partners anticipated that this repository might expand as existing and new users add to it.

2. SCENE contributes to teachers, trainers and headmasters training

SCENE experience was a challenging project for partners, teachers, trainers and headmasters. For partners, the major achievement was the development of the e-learning course, based on literature and face-to-face experience. This was a very interesting task that implied the preparation of materials and design of PBL scenarios for each group, considering an online environment. Integrating our evaluations, comments and suggestions of the participants, we could realize that 147 individuals completed their training (from the 179), what is an exciting number. The courses were positively evaluated in what concerns to contents, activities and feedback from tutors. Was almost consensual the relevance of the course for improving their pedagogical practices, once there aren't many opportunities to discuss their teaching methodologies and learning methods at schools and with colleagues.

Especially this issue motivated them to remain active in the ongoing activity in the platform. The materials presented, as well as the rich PBL repository allowed the comprehension of main PBL features, and the analysis of numerous projects that were the basis for developing their own PBL projects. After the implementation of their projects, developed according the e-learning course SCENE, participants had positive feedback either on the opinion of their students, either on the outcomes of learning acquired. It is suggested, however, a review on the implementation of the platform activity through the forum, since participants are not always available to be online at the same time.

Scene project course results will be detailed as well as their implications for schools, teachers training and European educational systems in further publications. However, this project allows us to understand the urgent need to discuss about teachers practices. Despite the actual knowledge about human learning and

development [1], and the need for new skills to succeed in a modern world, little has changed in teachers practices. During the last year we assisted to a progressive consensus about the need to promote new skills in youth, designated as "21st century skills" [10] [11] [12] [13], however, significative changes are required at a political, institutional and continuous training level to ensure this shift.

Teacher training remains essentially focused teacher-centered models, more or less directive, considering it as the reference to transmit and evaluate students' knowledge. The emergence of Information and Communication Technologies allows students to research information in many ways what might allow teachers to direct their effort for new roles, involving students in their learning, as an active element of this process, and focus on the promotion of new skills as collaboration, problem solving, self-directed learning, critical thinking, creativity or others.

This switch requires but also allows teachers to change their roles in the educational system, focusing more in the student as a person, and education as an integral process. In fact, in PBL teacher could act more as a guide and tutor for their students, allowing them to be the true builders of their own knowledge and development that might transfer to their real life and their life projects.

References

[1] Coll, C., Marchesi, A., & Palacios, J. (2004). *Desenvolvimento psicológico e educação – Psicologia de educação escolar* (Vol. 2). (2ª edição). Porto Alegre: Artmed.

[2] Davies, J., de Graaff, E., & Kolmos, A. (2011). Introduction. In J. Davies, E. de Graaff, & A. Kolmos (Dirs.), *PBL across the disciplines: research into best practice* (pp. 1-2). Aalborg: Aalborg University Press.

[3] Strobel, J. & van Barneveld, A. (2009). When is PBL More Effective? A Meta-synthesis of Meta-analyses Comparing PBL to Conventional Classrooms. *The Interdisciplinary Journal of Problem-based Learning, 3* (1), 44–58.

[4] Oliveira, J.M. (2011). Nine Years of Project-Based Learning in Engineering. *Revista de Docencia Universitaria, 9* (1), 45 – 55.

[5] Schmidt, H.G., van der Molen, H.T., Winkel, W.W., & Wijnen, W.H. (2009). Constructivist, problem-based learning does work: a meta-analysis of curricular comparisons involving a single medical school. *Educational Psychologist, 44*, 1-23.

[6] Wijnia, L., Loyens, S.M., & Derous, E. (2011). Investigating effects of problem-based versus lecture-based learning environments on student motivation. *Contemporary Educational Psychology, 36*, 101-113.

[7] Yuan, H., Williams, B.A., & Fan, L. (2008). A systematic review of selected evidence on developing nursing students' critical thinking though problem-based learning. *Nurse Education Today, 28*, 657-663.

[8] Schmidt, H. G., & van der Molen, H. T. (2001). Self-reported competency ratings of graduates of a problem-based curriculum. *Academic Medicine, 76*(5), 466-468.

[9] Schmidt, H. G., Vermeulen, L., & van der Molen, H. T. (2006). Long term effects of problem-based learning: A comparison of competencies acquired by graduates of a problem-based and a conventional medical school. *Medical Education, 40*, 562–567.

[10] Ananiadou, K. & M. Claro (2009). *21st Century Skills and Competences for New Millennium Learners in OECD.* Paris, France: Centre for Educational Research and Innovation (CERI) - New Millennium Students.

[11] Bell, S. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *The Clearing House, 83*, 39–43

[12] Mergendoller, J. R., Markham, T., Larmer, J. & Ravitz, J. (2006). Pervasive Management of Project based learning: Teachers as Guides and facilitators. In C. M. Evertson & C. S. Weinstein (Eds.), *Handbook of Classroom Management: Research, Practice, And Contemporary Issues* (pp. 583–615). Mahwah, NJ: Lawrence Erlbaum, Inc.

[13] Ravitz, J., Hixson, N., English, M., & Mergendoller, J., (2012). *Using Project Based learning To teach 21st century skills: Findings from A statewide initiative.* Paper presented At Annual Meetings Of the American Educational Research Association. Vancouver, BC. April 16, 2012

[14] Artino, A.R (2008). *A Brief Analysis of Research on Problem-Based Learning.* Retrieved from http://eric.ed.gov/ERICWebPortal/recordDetail?accno=ED501593

[15] Hung, W., Jonassen, D. H., & Liu, R. (2008). Problem-based learning. In J. M. Spector, J. G. van Merriënboer, M. D., Merrill, & M. Driscoll (Eds.), *Handbook of research on educational communications and technology* (3rd ed., pp. 485-506). Mahwah, NJ: Erlbaum.

[16] Ribeiro, L.R. (2011). The Pros and Cons of Problem-Based Learning from the Teacher's Standpoint. *Journal of University Teaching & Learning Practice, 8*(1). Retrieved from http://ro.uow.edu.au/jutlp/vol8/iss1/4

[17] Correnti, S. (2012). *Enhanced "Problem-based Learning" through and innovative Virtual Learning Environment: An opportunity for science teachers*. Available online at: http://conference.pixel-online.net/npse2013/common/download/Abstract_pdf/148-TST08-ABS-Correnti-NPSE2013.pdf.