DEVELOPMENT OF A PLATFORM TO PROMOTE PROJECT-BASED LEARNING IN HIGHER EDUCATION: CONTRIBUTES OF THE RESTART4EDU PROJECT

P.C. Dias[1], I.M. Oliveira[1], A.S. Azevedo[1], E. Kara[2], H.M. Dönmez[2], O. Ergunay[3], M. Girtu[4], D. Caprioara[4]

[1]Universidade Católica Portuguesa, Faculty of Philosophy and Social Sciences, Centre for Philosophic and Humanistic Studies (PORTUGAL)
[2]Eskisehir Osmangazi University (TURKEY)
[3]İzmir Democracy University (TURKEY)
[4]Universitatea Ovidius din Constanţa (ROMANIA)

Abstract

Pedagogical innovation in higher education is increasingly a necessity to adapt to new audiences and differentiate among institutions. It requires, however, training for teachers and tools that support them in the design of their curricular units. This paper aims to present an interactive platform to support higher education teachers in the application of project-based learning (PBL) in higher education. PBL is presented as one of the best exemplars of constructivist learning with benefits in terms of students' engagement, motivation, and achievement. However, it challenges teachers' traditional conceptions of the classroom and requires efforts to adjust rules and tasks both by teachers and students. Carried out in the scope of the Restart for Education in a Digital Era through Project-based E-learning (RESTART4EDU) project, the development stages of the platform and its evaluation by teachers, in the context of a summer school, are presented in this proposal. The platform was developed according to the principles of PBL project preparation, with suggestions and indications for improvement in each of the essential aspects. The content and the usability were evaluated by a group of teachers from three European countries and their responses, recorded in open format, point out to clear benefits of this tool to support teachers in developing their projects. However, suggestions for improvement in terms of interactivity, design and usability were made. Contributions to the development of the platform, as well as implications for pedagogical practices in higher education and research are presented.

Keywords: Project-based learning, higher education, teachers' professional development.

1 INTRODUCTION

During the 20th century, significant changes in learning theories have occurred [1]. Some authors even call it the century of learning [2]. However, the accumulated and evolving knowledge, as well as the social, cultural, and technological transformation are not necessarily translated in teachers' practices yet [1]. The need to reinvigorate teachers' practices remains a challenge that has been highlighted in several reports from international institutions, such as OECD [3, 4, 5], UNESCO [6, 7], and the European Commission [8], which conceive higher education institutions as the Lighthouses of the European way of Life. After the implementation of the Bologna Process, higher education institutions have been challenged to promote student-centered practices, particularly since the Leuven/Louvain-la-Neuve ministerial conference, in 2009, a central pilar for the reinforcement of the European Higher Education Area. Although learning and educational practices are often seen as distinct concepts [1], one cannot be conceived without the other and their complementarity nature needs to be highlighted. These complementary fields of theory and practice are determinant for the success of the opportunities created to nurture students' development and prepare the next generations.

The project *Restart for Education in a Digital Era through Project-based E-learning* (RESTART4EDU; https://restart4edu.eu/) was developed within this context of inspiring new practices in higher education. The RESTART4EDU is an ERASMUS+ project, coordinated by the Universitatea Ovidus din Constanta (Romania), joining the contributes of the Initiatives pour Une Formation Efficace ASBL (Belgium), the Universidade Católica Portuguesa (Portugal), and the Eskisehir Osmangazi Universitesi (Turkey) to help improve higher education teaching practices, particularly by stimulating the use of Project-Based Learning (PBL) in a digital context.

PBL is defined as “a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed projects and tasks” [9, p.4]. Several studies have identified benefits from PBL in students’ interpersonal communication and teamworking skills [10], collaborative, authentic, and interactive learning, students’ engagement in a specific disciplinary subject [11], as well as development of skills and knowledge transference to practice [10, 12]. A review study on the use of PBL in higher education [13] also enabled to group positive outcomes in main areas: a) cognitive, which considers improvement in learning strategies and knowledge; b) affective, which recognizes the increase of general positive feelings about the experience with PBL; c) behavioral, which translates in improved skills and engagement; as well as d) artifact performance, which includes novelty and relevance of products (e.g., reports, multimedia files) created by the students. In fact, meta-analysis focused on the PBL effects +on students’ academic achievement have suggested a medium to a large mean effect size [14]. These results are inspiring, despite differences in cultural backgrounds and scientific fields. Nonetheless, it is worth mentioning that PBL studies have been mostly performed with western students and from social sciences. This can be understandable, as PBL emphasizes the role of transversal skills, but does not diminish the potential to promote and improve the so-called hard skills, or technical and theoretical knowledge [16, 17].

Although research has covered mandatory school years and K-12 level teachers are already being prepared to use PBL [15, 17], more still needs to be done in higher education. Considering the experience of the Buck Institute for Education [18] in K-12 teachers training, seven essential elements should be considered when designing a project:

1. Students should be presented a meaningful and challenging scenario with questions, problems, statistics, etc. to drive the project development;
2. Students are involved in an in-depth inquisitive process that is maintained over time, in a sustained inquiry, bringing new questions, finding (re)sources, and applying information;
3. Students should be involved in meaningful learning experiences that involve real-world experiences relevant to their knowledge, concerns, interests and skills development;
4. Students should be involved in the development of projects, with voice and choice in decision making, according to their grade level and type of project;
5. Reflection takes a central place of project development, with students and teachers discussing the process and the product of the project, effectiveness, quality of work, obstacles and strategies to overcome them;
6. Teachers and students are involved in a continuous interaction process, presenting their inputs, receiving feedback, and improving their process and products;
7. A public presentation should be planned for sharing, explaining, and celebrating what was learned to the broadest possible audience.

These seven key-elements and best practices challenge traditional and more expositive practices, by fostering interactions among teachers and students [19], and by demanding adequate training and planning to ensure the PBL correct implementation and results [20]. Particularly after the context of COVID-19 pandemics, and the reflection about the role of technology to support and promote learning, it is important to explore new and innovative methodologies in higher education.

The existing research offers empirical support and evidence on the PBL potentialities to promote students’ learning. However, planning PBL with digital resources is a recent trend and challenges emerge to promote its best possible effects, minimizing possible risks, not only from plagiarism or other forms of academic misconduct [21]. In fact, while some authors and teachers tend to exclude technologies from the classroom to avoid risks and distractions from students, others try to use technologies to promote students’ motivation and engagement. Considering lessons learned from COVID-19, we can understand the potential benefits of educational technologies to create a more innovative and challenging learning context for students. However, it is important for teachers to understand the main principles of a certain methodology and some support to develop effective projects for their courses.

To contribute to the dissemination and particularly for the development of new PBL projects in higher education courses, RESTART4EDU aims to develop a platform to support teachers in a step-by-step design process. Considering the best practices for the development of PBL [9, 18, 21], a platform was developed by the consortium, particularly by the Initiatives pour Une Formation Efficace ASBL

(Belgium), considering a sequence of steps described in Table 1. This platform was presented and tested in a summer school, at Eskisehir Osmangazi Universitesi, with 58 higher education teachers from Romania, Turkey, and Portugal. Considering the teachers' experience drawing a new project, the usability of the platform was evaluated and suggestions for improvement were collected. In this paper, we intend to present the resulting feedback, comments, and suggestions presented by the participating teachers, as well as their implications for the RESTART4EDU platform development.

Table 1. A step-by-step guide to develop PBL projects.

Step	Title	Aims
1	Project aims	Describe the goals / skills to promote with the PBL unit.
2	Project launch	Describe the scenario and the driving question to challenge students to the PBL.
3	Set standards	Identify the artifacts of the project; and Schedule milestones and products that students should present.
4	Reflect and improve	Evaluate the inclusion of other components to use and improve students' technical skills; Reflect about the potentialities of the project to develop transversal skills.
5	Group formation	Clarify the procedure for creating heterogeneous groups.
6	Assessment	Plan the moments and the criteria for artifact and transversal skills evaluation.
7	Use of Technology in PBL management and evaluation	Evaluate how technology is used in the implementation of the project in planning, implementation, and public presentation.
8	Celebration of the project	Plan and prepare the context for presentation and celebration of the project toward an audience.

2 METHODOLOGY

2.1 Participants

Participants included 58 higher education teachers, from Romania (*n* = 19, 32.8%), Portugal (*n* = 14, 24.1%), and Turkey (*n* = 25, 43.1%); from the total, 39 (67.2%) were women and 19 (32.8%) men.

2.2 Measures

To collect teachers' information about the RESTART4EDU platform, an open questionnaire was presented. Demographic information about the participants was collected (e.g., gender, country, academic degree, and scientific field). Participants' perspectives about the potentialities and difficulties generated using the platform, as well as suggestions for its improvement were also collected.

2.3 Procedures

Data was collected during a five-day summer school in Eskisehir Osmangazi Universitesi, Turkey. After the presentation of the platform, teachers were asked to create international groups and to jointly develop new PBL units. Based on such procedures, the participating teachers were asked to voluntarily answer the questionnaire, which was developed in *Google* Forms and shared to each participant by email. Each participant was invited to respond individually, with the guarantee of anonymity and confidentiality of the gathered data.

3 RESULTS

Overall, the participating teachers shared positive feedback about the design of the platform, the information presented, and the step-by-step structure. In a linear process of introduction of information,

the platform provides suggestions and feedback about best practices to each of the steps to design a project, promoting some interaction and context for the revision and improvement of each project. Also, the user-friendly experience and the possibility to be open to all higher education teachers that might be interested, in the end of the project, was quoted as a positive aspect related to the RESTART4EDU platform.

As for improvement suggestions, participants highlighted design aspects (e.g., "when we click on *categories*, a category explanation shows on the left side, … I personally do not check the left side; left side looks like a previous page") and technical issues (e.g., "at the *milestones* and *assessment* pages, the table should be more intuitive"; "the *Modification* part should be more useful or changeable"; "possibility to save one's progress" or "Add a warning that the project needs to be submitted in order to be saved"; "Announce the upcoming questions (or start with a table of contents showing all questions), because there is a risk someone will answer a subsequent question too early"). Suggestions to improve language or clarify words/expressions were also offered (e.g., "The page on *Celebration,* what exactly do you mean by celebration?"; "the language of orienting explanations is too academic … we can simplify our language or add more explanation"). Also, the participating higher education teachers acknowledged that the platform was developed to support projects individually designed by teachers. However, it would be useful to improve the platform to better support interdisciplinary or cooperative projects among teachers.

4 CONCLUSIONS

Higher Education has undergone significant changes in the last decades [4, 5], due to various reasons, such as the massification and arrival of new audiences, the continuous social and cultural changes, or the digitalization amplification and the remaining effects of the COVID-19 Pandemic. Not only did the Bologna Process advocate for a change in the structure and need to improve the quality of higher education, but also the ministerial conference of European Union at Leuven/Louvain-la-Neuve, in 2009, has emphasized the role of pedagogical innovation and the potential of student-centered methodologies in the reinforcement of the European Higher Education Area. By better responding to students' needs and developmental characteristics, student-centered methodologies hold potential to promote the necessary skills to sustain active citizenship and social integration [9].

In the context of the COVID-19 and digitalization, the RESTART4EDU Project intends to contribute to the promotion of the quality of teaching and learning in higher education, by disseminating resources and creating training opportunities in PBL, a methodology that has been associated to positive benefits in students' transversal skills and disciplinary specific-knowledge [10, 11, 12, 13, 14]. However, to promote the use of PBL in higher education, it is important to acknowledge the relevance of teachers' professional development, as well as to create opportunities to help them improve their teaching skills and deepen knowledge about student-centered methodologies and innovative pedagogy [15]. As the UNESCO states [22], the challenges inherent to the pandemic and digitalization offer an exciting moment for higher education to reflect about the potential for resuming or reforming practices, and to better support students' learning. Given the lessons learned during the pandemic times, higher education teachers seem to be currently more prepared to implement new teaching methods and to sustain new learning strategies in their classrooms. Within this framework, the RESTART4EDU project intends to contribute to such changes and reinvigoration of higher education, by promoting resources to foster an adequate PBL use in a digital context. More than getting back to old practices, it is now the time to identify opportunities and possibilities to create challenging, creative, and critical learning contexts in higher education, so it really acts as Lighthouses of the European way of Life [8].

One of the contributions of this project consists of creating a platform to be available online and open to all interested teachers that aim to use PBL in their courses. For its development, a team of scholars and educational technologists prepared a beta version that was presented and tested in an international summer school with more than fifty teachers. Based on the teachers' trial experiences and feedback, it is expected to review and improve the platform to better meet the expectations and needs of a diverse audience. Hence, an interactive structure was planned, considering a step-by-step process according to the principles or gold standards of PBL design [18, 20]. This way, the process includes: setting goals for the project, considering not only the contents, but specially the skills that students are expected to develop during such project; creating a context or a scenario that challenges students to engage in their projects, considering statistics, news, theoretical, professional or social issues; setting standards, considering artifacts, milestones and products that students should present; considering other components to use and improve students' technical skills (e.g., style formatting, scientific database research, contact with professionals or community partners); grouping students in heterogeneous

groups; planning moments and criteria for evaluating artifacts and transversal skills; planning the use of technologies in the management and evaluation of the projects; and considering contexts and people to involve in the celebration and sharing of the projects with an audience.

The feedback from the higher education teachers who participated in the summer school and tried the platform was globally positive, thus supporting its relevance. Still, some suggestions for improvement were presented, mostly covering design, technical, and language aspects. These suggestions and main improvement aspects are determinant to improve the platform and to help reach the broadest public possible. Additionally, the participating teachers suggested the possibility to improve the platform to sustain its use in collaborative and interdisciplinary projects. This is an important input to consider in the ongoing development of the platform and illustrates teachers' openness to learn with each other while designing, implementing, and evaluating student-centered pedagogical practices in higher education.

ACKNOWLEDGEMENTS

This study was supported by Erasmus+ (RESTART4EDU Project; Reference 2020-1-RO01-KA226-HE-095772).

REFERENCES

[1] D. Schunk, Learning Theories: An Educational Perspective. Pearson, 2019.

[2] N. Longworth, Lifelong Learning in Action: Transforming Education in the 21st Century. Routledge, 2016.

[3] OECD, Learning Our Lesson. Review of Quality Teaching in Higher Education. OECD, 2010.

[4] OECD, Fostering Quality Teaching in Higher Education: Policies and Practices. OECD, 2012.

[5] OECD, The State of Higher Education. One Year into the COVID-19 Pandemic. OECD, 2021.

[6] UNESCO, Higher education in the twenty-first century: vision and action. UNESCO, 1999.

[7] UNESCO, Pathways to 2050 and beyond. Findings from a public consultation on the futures of higher education. UNESCO, 2021.

[8] European Commission, Commission Communication on a European strategy for universities, 2022. Available online at: https://education.ec.europa.eu/sites/default/files/2022-01/communication-european-strategy-for-universities.pdf

[9] J. Ravitz, N. Hixson, M. English, & J. Mergendoller, "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

[10] P. Crespí, J.M. García-Ramos, & M. Queiruga-Dios, "Project-Based Learning (PBL) and Its Impact on the Development of Interpersonal Competences in Higher Education", Journal of New Approaches in Educational Research, vol. 11, no. 2, pp. 259-276, 2022. https://doi.org/10.7821/naer.2022.7.993

[11] M. A. Almulla, "The effectiveness of the project-based learning (PBL) approach as a way to engage students in learning", SAGE Open, pp. 1-15, 2020. https://doi.org/10.1177/2158244020938702

[12] M. Granado-Alcón, D. Gómez-Baya, E. Herrera-Gutiérrez, M. Vélez-Toral, P. Alonso-Martín, & M. T. Martínez-Frutos, "Project-Based Learning and the Acquisition of Competencies and Knowledge Transfer in Higher Education," Sustainability, vol. 12, no. 23, 10062, 2020. https://doi.org/10.3390/su122310062

[13] P. Guo, N. Saab, L. Post, & W. Admiraal, "A review of project-based learning in higher education: Student outcomes and measures", International Journal of Educational Research, vol. 102, 101586, 2020. https://doi.org/10.1016/j.ijer.2020.101586

[14] C. Chen, & Y. Yang, "Revisiting the effects of project-based learning on students' academic achievement: A meta-analysis investigating moderators", Educational Research Review, vol. 26, pp. 71-81, 2019. https://doi.org/10.1016/j.edurev.2018.11.001

[15] P. Grossman, C.G. Dean, S. Kavanagh, & Z. Herrmann, “Preparing teachers for project-based teaching”, Phi Delta Kappan, vol. 100, no. 7, pp. 43-48, 2019. https://doi.org/10.1177/0031721719841338

[16] A. Markula, & M. Aksela, “The key characteristics of project-based learning: how teachers implement projects in K-12 science education”, Disciplinary and Interdisciplinary Science Education Research, vol. 4, no. 2, 2022. https://doi.org/10.1186/s43031-021-00042-x

[17] S., Kingston, J. de Monsabert, & K. Wagner, Project Based Learning and Every Student Succeeds Act (ESSA) Evidence Levels: Is PBL and evidence-based practice? PBL Evidence Matters. The Buck Institute for Education, 2022.

[18] Buck Institute for Education, Your PBL Journey: A Guide for Teachers. Buck Institute for Education, 2019.

[19] A. Habók, & J. Nagy, “In-service teachers’ perceptions of project-based learning”. SpringerPlus, vol. 5, p. 83, 2016. https://doi.org/10.1186/s40064-016-1725-4

[20] S. Boss, J. Krauss, Reinventing project-based learning (3rd ed), Arlington: International Society for Technology in Education, 2018.

[21] P.C. Dias, & J. Mergendoller, “Plagiarism vs. pedagogy: Implications of project-based learning research for teachers in the 21st century”. in Handbook of Research on Academic Misconduct in Higher Education (D. M. Velliaris), 247-266. Hershey: IGI Global, 2017. https://doi.org/10.4018/978-1-5225-1610-1.ch011

[22] UNESCO, Resuming or Reforming? Tracking the global impact of the COVID-19 pandemic on higher education after two years of disruption, UNESCO, 2022.