
Innovative Approaches to Teaching and Learning: Project Based Learning (PBL) Practices for Good

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Abstract

The main goal of this paper is to describe a specific teaching-learning project implemented in two higher education courses – Bachelor in Marketing and Master in Competitiveness and Business Development, offered at a higher education institution. The project integrated Project Based Learning (PBL) methodologies and authentic learning, supported by technology, with Sustainable Development Goals (SDGs), studying real companies from different industries, and aiming to improve the quality of the learning experience, students' motivation and academic success. A total of 300 students were involved in the 1st semester of the year 2022/2023.

The idea of sustainable cocreation was at the base of this pedagogical innovation project, so that students may become aware and assume responsibility on the impact of marketing, strategy and competitiveness decisions in the contemporary society. Students were challenged to include in their works a proposal of actions that had positive impact and contributed to the SDGs defined by the United Nations and to reflect and measure the potential impact of these actions at the level of the community.

From an operational perspective, students developed different activities in their academic works, in four different curricular units, in line with the educational level and syllabus of each curricular unit, always related to real companies from different industries and supported by different technologies, using different immersive learning experiences where students could combine authentic learning and SDGs analysis.

Keywords: Educational Technologies; Authentic Learning; Pedagogical Innovation Project; PBL methodologies; Sustainable Development Goals (SDGs); Marketing education

1. INTRODUCTION

Since the adoption of the 17 Sustainable Development Goals (SDGs) created by the United Nations in 2015, as part of the 2030 Agenda for Sustainable Development which set out a 15-year plan to achieve the Goals, efforts emerged from individual and collective people for sustainable development, and Higher Education Institutions (HEI) should have an active role raising awareness and educating their students to this reality (Chaleta, Saraiva, Leal, Fialho, & Borralho, 2021; Zamora-Polo & Sánchez-Martín, 2019).

Thus, two research questions arise: (i) is it possible develop innovative approaches to teaching and learning in higher education integrating the 17 SDGs? (ii) what are the benefits and pitfalls of these approaches?

In this context, an innovative pedagogical project titled Higher Education for Good was developed at the University of Aveiro involving students from four curricular units of two higher education courses: Bachelor in Marketing and Master in Competitiveness and Business Development. It involved a total of 300 students.

The project aimed to create a specific teaching-learning context, integrating PBL methodologies and authentic learning, supported by technology, with Sustainable Development Goals (SDGs). The students were challenged to study real companies from different industries and aimed to improve the quality of the learning experience, students' motivation and academic success.

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The current paper describes this innovative pedagogical project that was implemented during the 1st semester of the 2022/2023 academic year.

This paper as structured as follow: after this introduction, it presents the literature review of the main concepts and context that supported the implementation of the innovative pedagogical project. Next, it describes the innovative approaches to teaching and learning in the curricular units involved in the pedagogical project "Higher Education for Good", as well as the benefits and pitfalls. The paper ends with final considerations.

2. LITERATURE REVIEW

2.1. PBL AND AUTHENTIC LEARNING: INNOVATIVE APPROACHES TO TEACHING AND LEARNING

In current academic and professional context, it is widely accepted that hard skills obtained with a solid formation in HEI are not enough to face real word challenges (Aničić, Divjak, & Arbanas, 2016). Thus, soft skills and other skills of students are vital to be developed in courses of higher education and complement each other (Gibb, 2014; Tadjer, Lafifi, Seridi-Bouchelaghem, & Gülseçen, 2022).

In this sense, innovative teaching methodologies have been implemented in HEI courses (e.g., project-based learning (PBL), problem-based learning, challenged-project learning (CBL), authentic learning, learning by doing) and several benefits have been found by academic literature, such as critical thinking of students, teamwork skills, problem solving, amongst others (Anazifa & Djukri, 2017; Deep, Salleh, & Othman, 2019; Tadjer et al., 2022).

Among the new methodologies and innovative teaching and learning practices, project-based learning (PBL) and authentic learning are widely used (Bell, 2010; Lombardi & Oblinger, 2007; Musa, Mufti, Latiff, & Amin, 2012; Nab, Pilot, Brinkkemper, & Berge, 2010).

Project-Based Learning (PBL) is an approach that places student at the center of learning process and the teacher as a facilitator (Bell, 2010), while authentic learning places students in an environment close to real-work and real-life problems (Nab et al., 2010).

2.2. TECHNOLOGY-SUPPORTED APPROACHES TO TEACHING AND LEARNING

In the last decade, the gamified-based learning has been increasingly used in higher education, in different scientific areas. Different scholars have been seeking to understand what factors are responsible for the success and, also, what are the barriers that hinder the successful implementation of such approaches (Aragonez, Saur-Amaral, & Gouveia, 2021).

Sitthiworacart and colleagues (Sitthiworachart, Joy, King, Sinclair, & Foss, 2022) defend that the usage of technology as a support for learning will offer, in principle, the opportunity for a more effective learning, yet available technologies are still very much focused on “traditional” learning approaches. According to Cevikbas e Kaiser (Cevikbas & Kaiser, 2022), when technology is used in the context of customized learning, students are stimulated and their cognitive processed are more easily activated.

Following the same line of thinking, Araújo and colleagues (Araújo, Silva, Aguiar, Nunes, & Paiva, 2023) point out that technology supports different aspects in our daily living, including education, and is considered a tool that connects students and teachers in the knowledge dissemination process. This may allow to raise the interest of students and promote the development of learning processes.

For teachers, the use of technologies allows a higher student involvement, leading to an increased level of motivation. Different technological usages can be promoted, from the design of the learning space to activities that promote active learning or student support (Sitthiworachart et al., 2022).

2.3. SUSTAINABLE DEVELOPMENT GOALS (SDGs) IN TEACHING AND LEARNING

The Sustainable Development Goals (SDGs) are a set of 17 goals created by the United Nations in order to sensibilize the different public and private actors to the need of sustainable action (Kopnina, 2020; United Nations). Higher Education teachers and institutions have been including the SDGs in their learning programs, to foster students’ awareness about the environment and to develop new skills and competences in this field (Cottafava, Cavaglia, & Corazza, 2019; Kopnina, 2020; Leal, 2021).

Teaching SDGs requires competencies of systemic thinking and involvement of different partners, being based on reflection and self-awareness of the participating students and teachers (Cottafava et al., 2019). It seems to be a more complex endeavor than regular teaching.

Walter Leal emphasizes that sustainable development may be applied and taught in different ways, with different teaching methods, and points out four learning methods that can be used in non-conventional contexts (Leal, 2021):

- Lifelong learning – helps combining professional and personal interests, specifically applied to working adults, and promotes citizenship;
- Transformative learning – promotes mentality changes and influences future actions based on a new information / knowledge acquired, and promotes citizenship;
- Experience-based learning – is based on emotions and active participation;
- Indigenous knowledge-based learning – promotes intergenerational values and a sense of community participation.

Cottafava and colleagues (Cottafava et al., 2019) point out, as well, the importance of transformative learning and they value, equally, the experience component, which require a change from traditional teaching practices and a focus on the local community and real projects that help involve students and allow them to feel empowered and accountable for any change arising from their learning projects. On her side, Helen Kopnina (Kopnina, 2020) refers to the importance of ecological citizenship education, that “*speaks of sustainability of*

all life on earth", indigenous education, similar to Walter Leal, and empowerment education, that focuses on the weaker fringes of the populations and can be used to empower them.

3. THE INNOVATIVE PEDAGOGICAL PROJECT IMPLEMENTED AT UNIVERSITY OF AVEIRO

3.1. OVERALL DESCRIPTION OF THE PROJECT

The project we implemented at University of Aveiro, in the first semester of 2022-2023 was sponsored by the Rectorship of the university, being one of the four projects selected to be funded and distinguished as Innovative Pedagogical Project. It was promoted by three teachers, all course directors in one of the 20 departments of the university.

The project had as main goal to promote PBL and authentic learning practices, together with Sustainable Development Goals (SDGs), using real contact with companies, whenever possible, and technology to support learning, to improve the quality of the learning and the motivation and academic success of involved students.

The students involved in the first semester were from the Bachelor of Marketing (2nd and 3rd year) and the Master of Competitiveness and Business Development (1st year), in a total of 300 students. Table 1 summarizes the curricular units and courses involved in this Innovative Pedagogical Project.

Table 1. Curricular units and courses involved in the Innovative Pedagogical Project.

Curricular Unit	Year and Degree	Type	Number of students
Strategic Management	2 nd year Bachelor of Marketing	Mandatory	150
Marketing and Business Planning	3 rd year Bachelor of Marketing	Mandatory	60
Innovation and Entrepreneurship	3 rd year Bachelor of Marketing	Elective	50
International Marketing, Strategy and Competitiveness	1 st year Master of Competitiveness and Business Development	Mandatory	40

This innovation pedagogical project has as goals, for the 2nd semester of the 2022/2023 academic year: 1) participation of 60 students of 1st year of Bachelor in Marketing; (2) participation of 40 students of Master in Marketing in the project involving 5 curricular units.

3.2. INNOVATIVE PROJECT IMPLEMENTATION

Project-based learning (PBL), as previously mentioned, focuses on learning using projects, and it is an effective way to bring more dynamics in traditional classrooms and get students more involved (Anazifa & Djukri, 2017; Bell, 2010; Musa et al., 2012).

Different PBL approaches have been implemented in the disciplines involved in the project, combined with technology support and gamification.

For instance, in International Marketing, Strategy and Competitiveness, students developed interdisciplinary projects with Digital Economy and Commerce, which counted for their assessment, using real companies and real challenges for new markets. Similar approaches have been used in Strategic Management, Innovation and Entrepreneurship and in Marketing and Business Planning, where students developed strategic and marketing plans, including SDG diagnostic and SDG specific goals, focusing on a company at their choice.

Moreover, in Innovation and Entrepreneurship students developed business models for companies, using the Business Model Canvas where SDGs and social & developmental costs and revenues were considered, and used LEGO Serious Play approach (see Figure 1). In all curricular units involved in this project students worked with real companies (see Figure 2).



Figure 1. LEGO Serious Play application in Innovation and Entrepreneurship class



Figure 2. Final interdisciplinary project presentations: Students and the teachers of two curricular units.

The close relationship with the industry, either to solve problems previously identified by the companies, or to share experience from real business world, brought to the class of International Marketing, Strategy and Competitiveness, practitioners from marketing and international business fields, from companies Chaise Long (furniture) e Strongstep (services) (see Figure 3). In Strategic Management, students had the opportunity to interact with the Area Manager of Sanitana, and discover how international marketing is implemented in that company (see Figure 4). These activities were considered particularly enriching as students had the opportunity to understand how the theoretical content applies in real life situations.



Figure 3. Classes with the CEO and Marketing Director of Chaise Long and CEO of Strongstep.



Figure 4. Classes with the Area manager of Sanitana.

Classes took place in the special learning spaces (classrooms), but also in the outside environment, where students were challenged to develop different activities and present them in front of the colleagues and pass by people. The teacher used Letter Soups and other gamified tools developed using learning-support technologies (Figure 5).



Figure 5. Classes in the external environment of the campus

In the class of Strategic Management, students developed strategic management plans, working, once again, with real companies, in a similar approach followed in Marketing and Business Planning. Also, during the Project, students were invited to participate in a study visit where they had the opportunity to know PCI – Innovation and Science Park of the University of Aveiro and to interact with the related entrepreneurial ecosystem (see Figure 6).



Figure 6. Visit to the Innovation and Science Park

Technology offered multiple and varied activities to support learning, inside and outside class. In this project, technologies were used to involve students, gamifying the interaction (e.g. Kahoot!) and were part of the classes, in the technological new room available at the University of Aveiro, called SALT.

The SALT room was created with the main goal to promote pedagogical innovation at the University of Aveiro and provides flexible layouts, top-end technologies and promotes new ways of teaching and learning. Hybrid and collaborative learning are particularly well implemented in this space, which was used by teachers to create idea sharing opportunities, receive invited guests which were in another location, promote group work with tutorial support and presentations, while allowing students, as well, to relax and socialize with peers and teachers (see Figure 7 and Figure 8).

Videos were regularly used to showcase concepts, going below the traditional Powerpoint approach, and Moodle was used as learning platform, to share content (1.0 approach) but also to collect students' feedback via quizzes and forums, as well as to interact (2.0 approach).

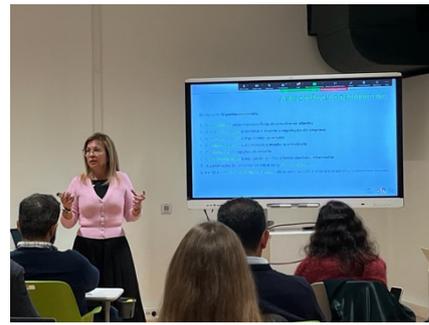


Figure 7. Example of a class in SALT room



Figure 8. Example of a class in SALT room using gamification (Smart TV Screen)

Padlet was used to aggregate relevant information in Marketing and Business Planning, with very positive results (see Figure 9).

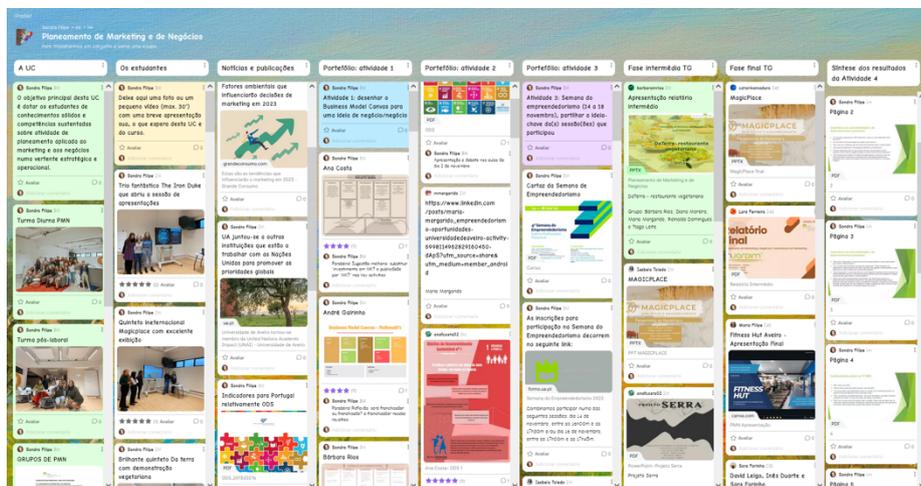


Figure 9. Padlet used in the Marketing and Business Planning class

It was the first time the teachers implemented the Sustainable Development Goals (SDGs) SDG framework in their classes. To ensure the approach was adequate, beside the technical learning and preparation, with material related to sustainability and SDG application in higher education, the teachers participated in a training session promoted at University of Aveiro, focused on the application of a specific tool developed to apply the SDG framework in a challenge-based learning.

In the different classes, students were exposed to SDG content, did practical exercises in class (e.g. describe SDGs and their relevance for companies and society) and were evaluated, in their group work or in the final exam. In Marketing and Business Plan, they even developed posters to present the SDGs (see Figure 10).



Figure 10. Examples of digital posters made by students on SDGs within the portfolio activities required in Marketing and Business Planning

3.3. BENEFITS AND PITFALLS OF THE PROJECT

Students had the opportunity to give feedback during the semester and at the end of it, as well. They evaluated very positively the experience – they appreciated the gamification approaches, the possibility to work with real challenged and interact with companies, the SALT room, as well as the possibility to apply the SDGs.

To our surprise, most students hadn't had the possibility to interact with the SDG framework before our classes and, at the end of the semester, they indicated they could have spent more time to understand and apply the framework, something we intend to include in next year's classes.

From teachers' perspective, the classes went quite well, with no particular drawbacks. In some situations, students complained about the work and showed lower resilience, which we associate to pandemics' effects. However, these situations were overcome with the tutorial support and possibility to develop the work in class time. There was also the need to adjust the approach, customizing it depending on the profile of each group.

From a very objective perspective, all classes obtained excellent results in the Quality Evaluation Assessment done by students at the end of the semester, and three of the courses were distinguished with the "Badge of Good Teaching Practices", which of course allowed the team to be recognized publicly for the capacity to implement this challenging project in the four different curricular units that were involved.

4. FINAL CONSIDERATIONS

Looking back to the experience and results obtained after the implementation of this project, called Higher Education for Good, one may say that it was a busy semester, with a lot of work, yet very satisfying at the end. Students got involved, were motivated and developed very interesting group and individual works.

The capacity to customize the learning approaches to the characteristics of each group of students was a particularly positive aspect, and one that is part of the teaching and learning practice of the involved teacher team.

The usage of technology to support learning happened in a natural, intuitive way, and was not a mean per se but a natural adaptation and variation of the teaching and learning process.

The SDG framework was implemented in an incipient, prototyping way, and there are aspects to be improved and deepened in the next editions of the same curricular units.

Regarding the implementation of the pedagogical innovation project, hereby described, it was successful and fulfilled the stipulated goals. More work awaits in the 2nd semester of the year 2022/2023, when six more curricular units, from three different courses, continue to be involved in the project.

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BIBLIOGRAPHICAL REFERENCES

- Anazifa, R. D., & Djukri, D. (2017). Project-based learning and problem-based learning: Are they effective to improve student's thinking skills? *Journal Pendidikan IPA Indonesi*, 6(2), 346-355.
- Aničić, K. P., Divjak, B., & Arbanas, K. (2016). Preparing ICT graduates for real-world challenges: Results of a meta-analysis. *IEEE Transactions on Education*, 60(3), 191-197.
- Aragonez, T., Saur-Amaral, I., & Gouveia, M. (2021). Game-Based Learning In Higher Education: A Systematic Literature Review. *EDULEARN21 Proceedings*, 1849-1856. <https://doi.org/10.21125/edulearn.2021.0432>
- Araújo, J. N., Silva, M. L. d. N. d., Aguiar, K. D. B. A., Nunes, J. d. A., & Paiva, J. M. (2023). Processo de ensino e aprendizagem: A educação aliada à tecnologia. *Revista Foco*, 16(3), 1-6.
- Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83(2), 39-43.
- Cevikbas, M., & Kaiser, G. (2022). Promoting Personalized Learning in Flipped Classrooms: A Systematic Re-view Study. *Sustainability*(14), 1-19.
- Chaleta, E., Saraiva, M., Leal, F., Fialho, I., & Borralho, A. (2021). Higher Education and Sustainable Development Goals (SDG)—Potential Contribution of the Undergraduate Courses of the School of Social Sciences of the University of Évora. *Sustainability*, 13(4), 1-10.
- Cottafava, D., Cavaglia, G., & Corazza, L. (2019). Education of sustainable development goals through students' active engagement A transformative learning experience. *Sustainability Accounting Management and Policy Journal*, 10(3), 521-544.
- Deep, S., Salleh, B. M., & Othman, H. (2019). Study on problem-based learning towards improving soft skills of students in ef-fective communication class. *International Journal of Innovation and Learning*, 25(1), 17-34.
- Gibb, S. (2014). Soft skills assessment: Theory development and the research agenda. *International Journal of Lifelong Education*, 33(4), 455-471.
- Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals. *The Journal of Environmental Education*, 51(4), 280-291. <https://doi.org/10.1080/00958964.2019.1710444>
- Leal, W. (2021). Non-conventional learning on sustainable development: achieving the SDGs. *Environmental Sciences Europe*, 33(1), 97-97.
- Lombardi, M. M., & Oblinger, D. (2007). Approaches that work: How authentic learning is transforming higher education. *EDUCAUSE Learning Initiative (ELI) Paper*, 5(2007).
- Musa, F., Mufti, N., Latiff, R. A., & Amin, M. M. (2012). Project-based Learning (PjBL): Inculcating Soft Skills in 21st Century Workplace. *Procedia - Social and Behavioral Sciences*, 59, 565-573. <https://doi.org/https://doi.org/10.1016/j.sbspro.2012.09.315>
- Nab, J., Pilot, A., Brinkkemper, S., & Berge, H. T. (2010). Authentic competence-based learning in university education in entrepreneurship. *International Journal of Entrepreneurship and Small Business*, 9(1), 20-35. <https://doi.org/10.1504/ijesb.2010.029502>
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- Sitthiworachart, J., Joy, M., King, E., Sinclair, J., & Foss, J. (2022). Technology-Supported Active Learning in a Flexible Teaching Space. *Education Sciences*, 12(9), 634. <https://doi.org/https://doi.org/10.3390/educsci12090634>
- Tadger, H., Lafifi, Y., Seridi-Bouchelaghem, H., & Gülseçen, S. (2022). Improving soft skills based on students' traces in problem-based learning environments. *Interactive Learning Environments*, 33(4), 1879-1896.
- United Nations. *SDGs: 17 Goals to Transform Our World*. United Nations. Retrieved April 12 from <https://www.un.org/sustainabledevelopment/>
- Zamora-Polo, F., & Sánchez-Martín, J. (2019). Teaching for a Better World. Sustainability and Sustainable Development Goals in the Construction of a Change-Maker Universit. *Sustainability*, 11(15), 4224.
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