Problem-Based Learning: Prolearn4ALL Project Contributions

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Abstract

Problem-Based Learning consists of an active strategy that involves students as a central part of knowledge processes. In this educational strategy, students face daily problems, search for viable, and properly founded solutions. In this research, after presenting a specific problem, it is important to analyse and reflect on previous approaches on the issue, looking for new information that will allow them to describe the state of the art and identify already existing solutions. After selecting all significant information, participants discuss new purposes to solve the initial problem. In this process, the teacher is a moderator, helping students in this sequencing procedure that results in different solutions to be tested and to create new problems. The Learning Products for ALL (ProLearn4ALL) is a project that intends to impulse Higher Education toward reflections and solution purposes to respond to this question: How can we create awareness in Primary School children toward inclusion and help them to respect diversity, especially regarding disability? Therefore, this project intends to create a new pedagogical kit with ludic products for ALL children, allowing them to understand and respect disability characteristics. Higher Education students from different areas (Education, Arts and Communication) have been involved in several activities, from conception to prototype development, facing, in each part, a new problem different from the previous one. Their contributions, in any activity, improved this project, allowing the work team (students, teachers and researchers) to reflect on the best ideas and to produce a kit with ludic and pedagogical books and games. This shared work developed students' motivation to learn, increasing reflection skills and empowerment for the resolution of problems, projecting those practices to their future work context.

Keywords: Educational strategies, Problem-based learning, Higher Education, ProLearn4ALL

1. Introduction

The fast evolution of technologies has revolutionized society in its various dimensions, in the sense that temporal-spatial frontiers are being crossed, which facilitates the access of any individual to all kinds of information. The demands of the current society refer to the need for rethinking the educational paradigm [1], since young people need learnings that meet their life experiences.

Besides the challenges derived from political and economical pressure, the role

of the teacher has also been a concern in the field of education [2], just like the prevalence of a rigorous organizational and functional system and an educational regime based on the transmission of content [3].

In order for students to reach significant learning, it is important to modify the teachers' educational line of thinking, who should abandon routine practises and assume an autonomous and proactive position, respecting the students' characteristics, interests and profiles [3].

There is still a gap between the educational and professional contexts, when it comes to training and preparing students for the carrying out of future practises, becoming essential for the teaching institutions to consider the existing barriers, in order to overcome difficulties [4].

Thus, it is relevant to provide a coherent learning with the evolution of the network society, which allows tracing innovative educational paths, interactive and student-centred, because if there is no alteration in the educational processes, the students will feel demotivated and disinterested [1] which contributes to school failure.

"Multidisciplinary approaches to higher education are being introduced by institutions that see valuable alternatives to a traditional, singular degree path." [2, p. 9].

Following this line of thought, and with the aim of presenting a pedagogical approach which is integrative in various areas of knowledge, this article aims to describe an educational strategy based on the Problem-Based Learning (PBL), in which students of the Polytechnic Institute of Leiria, Portugal, were integrated in the project ProLearn4ALL, which intends to seek possible solutions to real problems.

2. Problem-based Learning as an Educational Strategy

"The need for individuals with the capacity and courage to solve societal problems is growing exponentially." [4, p. 71], so it becomes essential to adapt educational strategies to the current needs [1]. Thus, active learning emerges as a strategy that allows the reflection of daily problems, which enables to develop several competences, namely interpersonal and social [5], placing the student in a central role, as they build, rebuild and create their own form of understanding the concepts [6].

In this perspective, the higher education institutions have been making efforts to promote pedagogical changes in order to motivate the students to actively acquire knowledge [2]. However, it is necessary to create work conditions that enable the interaction with peers and stimulating learning contexts [6], productive spaces of practices and experiences that give the student the responsibility for their learning [5].

These educational strategies allow the aggregation of new knowledge to the existing one, making learning a dynamic and meaningful process [6] that contributes to increase students' satisfaction and motivation to acquire knowledge [7].

However, for these strategies to become effective, it is necessary to adapt to the different roles: the student should take on a central role in their learning, and the teacher should guide this process, since "There is a need for mentoring and coaching as students work through complex problems to explore new frontiers and gain concrete skills." [2, p. 7]. Hence, the teacher shall become a facilitator of the learning process, in order to allow the student to seek alternative solutions to the non-routine problems arising from daily needs [8].

The Problem-Based Learning (PBL) emerges as a pedagogical strategy that enables active learning through the resolution of issues that arise in real contexts [9], since the student is encouraged to research, gather and analyse data that allows them to reflect on the decisions to make in order to solve problems [10].

Based on these premises, Yew and Goh [9] consider that, a student that experiences this type of strategy can retain the knowledge and apply it in the long term, since when confronted with a certain problem they need to find adequate answers, allowing them to later create analogies in new contexts that need different solutions. From the implementation of PBL in educational management contexts, Hallinger and Bridges [11] highlight six major characteristics: (1) the starting point is a problem and not the theory; (2) learning is based on a problem that may arise in the student's future professional practices; (3) learning is based on the problem and not on curricular concepts; (4) the student is responsible for their learning; (5) learning arises from the carrying out of group work and not from lectures; (6) the students present potential solutions to the problem, obtain qualitative feedback of their work.

Ulger [8] presents the cyclical process of problem-based learning related to the experimental study that he conducted, but illustrates well the various phases that constitute it (Fig. 1).

This iterative process has as its starting point the presentation of the problem, on which the students should research the information that allows them to describe the state of the art and identify existing solutions. Thus, it is possible to identify the needs that will allow the conducting of new researches that are more detailed and a joint reflective discussion. This cyclical character generates brainstorming of ideas that may culminate in suggestions for potential solutions. The teacher, as moderator of this sequential process, poses questions to the students, instead of giving the solutions, encouraging the creative and reflexive thinking, which contributes to generating possible solutions that can be tested, enabling to identify new problems.

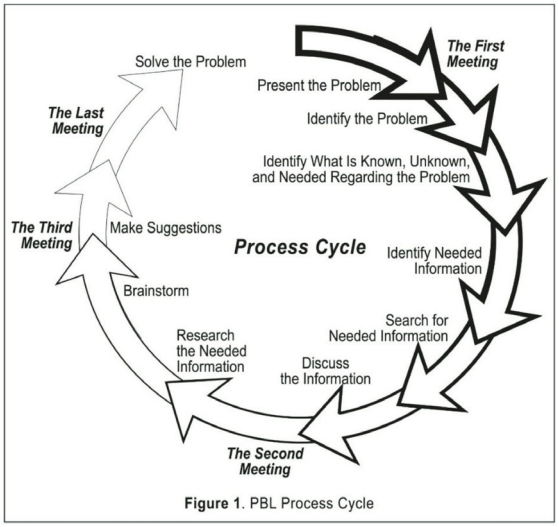

Fig. 1. Cyclical process of problem-based learning [8, n.p.]

3. ProLearn4ALL Contributions to a Problem-Based Learning

The ProLearn4ALL arises from the need to create awareness in Primary School students to the problem of exclusion. Thus, in order to encourage positive attitudes towards people with disabilities and promote social inclusion [12], this project aims to create inclusive ludic-pedagogical products that increase the children's knowledge on the characteristics of the various areas of disability.

The project is developed by the Polytechnic Institute of Leiria (School of Education

and Social Sciences, School of Arts and Design, Inclusion and Accessibility in Action Research Observatory – CICS.NOVA.IPLeiria-iACT and the Research Laboratory in Design and Arts) with the partnership of the Polytechnic Institute of Coimbra (School of Education of Coimbra), and *the Cooperativa de Ensino e Reabilitação de Crianças Inadaptadas* (CERCILEI) and Municipal Hall of Leiria. The team consists of fifteen teachers and researchers and a scholarship holder and includes the active participation of students from various study cycles in Higher Education (Higher Professional Technical Courses, Undergraduate Degrees and Masters Degrees) in various areas of knowledge (education, arts and design).

With the purpose of creating ludic-pedagogical products that are accessible to primary school children, and that approach the four disability domains (hearing, intellectual, motor and visual), some initial questions were made, such as: What type of characteristics should the pedagogical products have in order to become accessible to ALL primary school children?; Which production processes are more efficient to create high value products that are accessible and innovative?; In what way can the use of the products increase knowledge for Special Educational Needs and promote inclusion among primary school children? These questions made it possible to establish objectives: Gathering data on innovative and accessible ludic-pedagogical materials that exist in the market; Developing conceptual proposals for innovative and accessible ludic-pedagogical products; Developing the design and illustration for the obtained proposals; Producing the respective prototypes; Testing the prototypes in primary schools; Reformulating the final products and validating them with specialists in the areas of inclusion and accessibility [13].

ProLearn4ALL has, as a great premise, problem-based learning, in which every phase of the project the starting problem was introduced in the form of a question:

How can we create awareness in Primary School children toward inclusion and help them to respect diversity, especially regarding disability? The general lines of the project do not provide solutions, but rather the incentive to look for answers.

The interactive process (Fig. 2) is not closed, so in all the phases, depending on the knowledge that the students acquired and the respective proposals presented, the products created may vary in their concept or form.

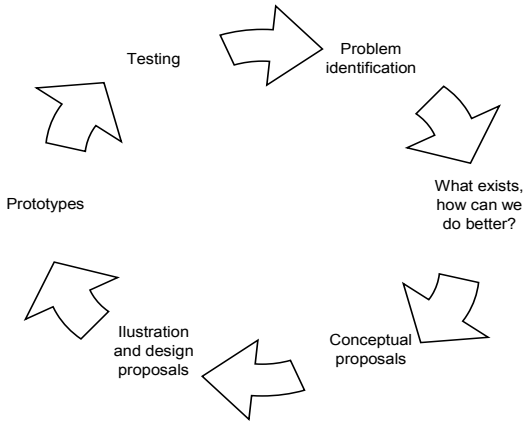

Fig. 2. ProLearn4ALL – Cyclical process (adapted from 9, n.p.)

In the first phase, Master degree students were invited to elaborate researches on existing accessible ludic-pedagogical products. Various board games adapted to people with visual disability, multi format books, videos with interpretation in Sign

language, among others, were found. The literature review was used as a basis to the students of undergraduate degrees in the area of education, who working in a team, formulated conceptual proposals for accessible ludic-pedagogical products and in some cases even created prototypes. From these proposals arose tactile books, sound games, games of physical activity, among others.

The proposals of these students were reviewed by colleagues in the area of Illustration and Design which then started the third phase, in which they needed to find solutions that allowed the products to be attractive, but accessible to the children's diversity.

After defining the design options, the fourth phase was started, in which prototypes were created, considering all the alterations that occurred in the previous phases.

This phase had a longer than expected duration, since after the creation of the tests, many times the product was found to be ineffective regarding the accessibility, and a reformulation was necessary.

Currently the project is in its fifth phase, in which we aim to test the products in the primary schools. This work will be elaborated by students of the Higher Education who will be, in a near future, primary school teachers. After this phase, data will be collected which will allow us to evaluate the products and to analyse if a new reformulation will be necessary.

4. Final reflections

"As higher education continues to move away from traditional, lecture-based lessons toward more hands-on activities, classrooms are starting to resemble real-world work and social environments that foster organic interactions and cross-disciplinary problem solving." [2, p. 9]. The potential of problem-based learning stands out, since it encouraged the involvement of students whose contributions resulted in valid proposals that served as a basis for the creation of resources.

The fact that it is a project with a direct application in a real context allowed for an active and significant learning, which contributed to the participants' motivation, increasing their reflexive skills and empowering problem resolution in future situations.

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