Experience of Using PBL and Gamification as an Active Methodology in Time of Pandemic in Ecuador

Gomez José Manuel(✉)

Indoamerica University, Ambato EC180103, Ecuador
josegomez@uti.edu.ec

Abstract. During the COVID 19 pandemic, the use of innovative and attractive strategies within educational environments has been demonstrated, where teaching is focused on the student, in the development of skills. These strategies conceive learning as a constructive and motivating process. To do this, a topic that generates great interest in the current educational scenario was analyzed: the active methodologies applied within the current situation experienced by the pandemic; which is eminent because through its use it is possible to continue with the teaching/learning process between teacher and student in difficult times such as those currently experienced by society in general. The objective is to know the experiences of teachers in the application of PBL and Gamification as strategies of active methodologies in the teaching process. The methodology is qualitative approach. The sample consisted of 15 teachers from the Sierra del Ecuador educational system. The survey technique was applied. In conclusion, it has been confirmed that the application of active methodologies encourages students to learn, in a practical way, useful and concrete knowledge that they will usually find in their daily context and curiosity about learning is rewarded.

Keywords: Gamification · PBL · teaching

1 Introduction

The COVID-19 pandemic has caused great challenges for the education system around the world, and Ecuador has not been the exception. School closures and social distancing restrictions have forced educators to quickly adapt to distance learning, using alternative methods to ensure continuity of learning. In this context, the use of the Problem Based Learning (PBL) methodology and gamification has emerged as a promising strategy to maintain student engagement and motivation during remote education.

Problem-Based Learning (PBL) is a methodology that involves students in solving real and significant problems, fostering collaboration and critical thinking. On the other hand, gamification implies the incorporation of game elements and mechanics in the educational process to increase the motivation and commitment of students. These two methodologies can be combined to create an engaging and interactive learning environment, even in times of pandemic.

© The Author(s), under exclusive license to Springer Nature Switzerland AG 2023
O. Gervasi et al. (Eds.): ICCSA 2023 Workshops, LNCS 14112, pp. 367–373, 2023.
https://doi.org/10.1007/978-3-031-37129-5_30

In Ecuador, the adoption of PBL and gamification during the pandemic has had mixed results. Some educators have been able to successfully implement these methodologies in remote learning, while others have faced significant challenges. The availability of appropriate technological platforms and tools has been a crucial factor for the success of these methodologies. Educators who have had access to digital resources and online platforms have been able to design interactive and gamified learning experiences, which has helped keep students engaged.

However, the implementation of PBL and gamification has also presented challenges. The adaptation of educational content to the PBL format and the identification of authentic and relevant problems has required an additional effort on the part of educators. In addition, the proper design of gamified activities and assessments has been essential to prevent gamification from becoming a distraction or excessive focus on playful aspects instead of substantive learning.

The use of digital tools as means for the development of active methodologies in the teaching-learning process allows to diversify and innovate teaching processes. In this way, by taking advantage of technology from a structured and dynamic approach, indicators such as interest and motivation of the learner, active participation of all students in planned activities, autonomy when developing tasks and self-regulation of learning can be significantly improved.

In addition to this, there are numerous technological tools that can be used to mediate the cognitive processes of students, since new generations considered as digital natives have lived closely related to the new information and communication technologies and therefore, they show a higher level of interest and motivation to work with these tools. Consequently, by incorporating technological tools in the educational process from a didactic approach, it seeks to attend to two fundamental elements in the XXI century education, the strengthening of education and the development of new digital skills in students.

From this perspective, active methodologies have the potential to engage the student participatively, by encouraging their curiosity allowing adequate spaces for their own reflection and activity within the learning experience; that is, placing him as a key and active actor in the teaching and learning process and not only as a recipient of the knowledge and content that the teacher exposes. According to Mendes (2019) the fundamental purpose of this kind of methodologies lies in promoting the autonomous learning of the student, that is, the ability to learn to learn, to be aware of their own cognitive processes to regulate their learning inside and outside the classroom.

It is necessary to point out that, although the autonomy of the student is promoted, does not mean that the teaching role has less importance, but on the contrary, acquires a deeper function that consists of promoting the appropriate experiences and guiding the student so that he assumes his own learning with responsibility. In this way, Robledo et al. (2015), considers that learning becomes more efficient and meaningful by relying on competences that interrelate conceptual knowledge with procedural knowledge, that is, they not only stay in theory, but focus on the practical application of knowledge, which favors the development of propitious skills and competencies to school and work performance.

Active methodologies include Problem-Based Learning (PBL), Flipped Classroom, and Gamification. Problem-Based Learning refers to a methodology that is focused on the development of content and concepts through a problem of the particular context of the student and his interest in general, in which, through certain guidelines, the student is actively involved in the construction of his knowledge. On the other hand, the gamification methodology focuses on taking advantage of the principles of the game for the development of skills and abilities in the student. It should be noted, that these two methodologies were selected, since they are in accordance with the study problem of this research work.

In the Ecuadorian territory is promoted, from the legal bodies, the development of a quality educational process and centered on the human being, where active methodologies are applied. The development from a perspective of integrality that is intended to be generated in Basic Education, constitutes an essential step for the development of the capacities, abilities and skills that the person needs to face the challenges of today's world.

The problem has been shown that through the research work developed in the master's degree in education of the Indoamerican Technological University of Ecuador, where the participants have made use of innovative digital tools that allowed improving learning. That is why, it is necessary to know the different innovative activities with active methodologies based on PBL and Gamification in basic education, beating out the traditional methods that are beginning to dislike the empowerment of knowledge.

In this analysis, we will further explore the experience of using PBL and gamification as an active methodology in times of pandemic in Ecuador. We will examine the challenges and opportunities that have arisen in the implementation of these methodologies, as well as the observed results in terms of student motivation and engagement. The importance of technological tools and the appropriate adaptation of educational content in this context will also be analyzed.

2 Method

It was based on an investigation of a qualitative nature, due to the collection of information through the interview of the Sierra system of the Ecuadorian educational system. Qualitative research has made it possible to relate all the problematic aspects of active methodologies on PBL and Gamification.

The population of this research was 15 teachers attending the master's degree in education at the Technological University, who made innovative proposals that resulted in the application of active methodologies.

3 Results

The population of this research was 15 teachers attending the master's degree in education at the Technological University, who made innovative proposals that resulted in the application of active methodologies (Table 1).

Table 1. Table with the teachers interviewed with the description of the proposal

Teachers	Area	Level	Type	Description
Wilma Yolanda, Moreno Moreno	Mathematics	10th Year of General Education	PBL	Propose the generating question: Whatsocial, educational, environmental problems exist in your community? With the answers of the students, make brainstorm ideas to propose various problems of the context Activities Make four working groups where each of the issues raised are distributed Explain to students about statistics, variables, research instruments, the collection process, tabulation, and measures of central tendency Development Each group performs the operationalization of the variables of the selected problem. They prepare the data collection instrument and apply it through Google Forms They carry out the data tabulation and the frequency distribution table. Calculate the measures of central tendency, the arithmetic mean, the mode and the median • Conclusion In the conclusion students expose their group interpretation related to recollected data
Santiago Chávez, Zully Sánchez, Jeymy Villagómez	Mathematics	First Year EGB: 5-year-olds	Gamification	Learning experience: ¡¡Jambato SapitoSapón!! (The name of the application that was attached to it) Gamification of scope of RLM in Preparatory First Year EGB: 5-year-olds children – Numbers from 1 to 10 – Count to 10 – Ascending and descending series Steps to the learning process: 1. Observe and identify numbers 2. Associate the quantity with the numeral 3. Identify the numeral and represent itgraphically 4. Sort numbers ascending and descending Gamification Link interactivity https://es.educaplay.com/recursos-educativos/12567808-sapito_sapon.html

(*continued*)

Table 1. (*continued*)

Teachers	Area	Level	Type	Description
Marlene de Jesus, Sailema Amancha	Mathematics	4th Grade of Basic General Education	Gamification	Give the respective explanations of how the didactic game works to the students – Apply the didactic game with fourth grade boys and girls – Enter the Kahoot! platform (teacher and students) – Start the game – The teacher explains the operations to be solved and the answer options to choose from – Students solve the operations and answer the correct answer immediately within 20 s to give way to the next addition or subtraction game Challenge 1: https://create.kahoot.it/share/jugando-con-las-sumas-y-restas/24882540-d253-4356-b786-20d8ac26f296 Challenge 2: https://create.kahoot.it/share/jugando-con-las-sumas-y-restas/24882540-d253-4356-b786-20d8ac26f296 Challenge 3: https://create.kahoot.it/share/jugando-con-las-sumas-y-restas/24882540-d253-4356-b786-20d8ac26f296
Teran Cortez, Darwin Patricio	Social Sciences	9th Year of General Education	Gamification	This gamification seeks to understand the nature of democracy, based on the study of its characteristics, duties and citizen rights, the structure of the Ecuadorian State and the role of the Constitution to stimulate the exercise of critical, responsible and committed citizenship. https://quizizz.com/admin/quiz/5f8f24c90487ba001c99afcc
Mauricio Altamirano, Geomaira Guachamín, Reyna Mendoza, Lara Sayra, Franco Calderón	Mathematics	2nd year of basic education	Gamification	1. Understanding of the concept of basic operations: Activities that allow know the concept of addition, subtraction, multiplication and division 2. Introduction of basic operations: Activities focused on discovering the four basic operations and how to use them 3. Practice of basic operations: Activities to practice the use of the four basic operations productively or systematically 4. Consolidation of basic operations: Activities aimed at using the basic operations in various situations. https://view.genial.ly/62c05f7a59ebc800169280a7/interactive-content-videojuego-matematicas

4 Conclusion

It concludes with the different proposals presented for different activities with active methodologies based on digital tools to improve learning in the Education of the Ecuadorian system, through which contributes to motivation, active participation and the construction of significant learning in the student.

The conclusions of this research show the need to propose various attractive strategies for students and, thus, they can obtain significant learning in the classroom.

The adoption of the Problem Based Learning (PBL) methodology and gamification in the context of the pandemic in Ecuador has proven to be a promising strategy to maintain student engagement and motivation during remote education. Although there have been challenges in its implementation, especially in terms of access to technological platforms and resources, those educators who have managed to overcome these obstacles have seen positive results.

The use of PBL has allowed students to become actively involved in authentic and relevant problem solving, fostering critical thinking and collaboration. On the other hand, gamification has provided a playful and motivating experience that has maintained the interest of students. Both methodologies have proven to be effective in promoting more meaningful and applicable learning in real situations.

To guarantee the success of these methodologies, it is essential to have adequate technological tools and careful planning in the adaptation of educational content. Educators must ensure that they provide digital resources and online platforms that facilitate interaction and collaborative learning. Furthermore, it is essential to balance gamification effectively, preventing it from becoming a distraction and making sure that the main focus remains on substantive learning.

In summary, the use of PBL and gamification as active methodologies during the pandemic in Ecuador has provided opportunities to maintain student engagement and motivation in a remote educational environment. Although challenges have arisen, those educators who have managed to adapt and overcome them have experienced positive results in terms of engagement, skill development, and application of knowledge. These methodologies offer a promising approach for the future of education, even beyond the pandemic, as they foster more meaningful and problem-oriented learning.

In general, the experience of using PBL and gamification as an active methodology in times of pandemic in Ecuador has been positive. These methodologies have demonstrated their ability to sustain student interest, foster problem-solving skills, and promote more meaningful learning. However, it is important to recognize that its successful implementation requires a careful approach and proper planning, taking into account the needs and circumstances of the students. Ultimately, the combination of PBL and gamification offers a promising approach for the future of education in Ecuador and around the world.

References

1. Mendes, I.A.: Active methodologies as investigative practices in the mathematics teaching. Int. Electron. J. Math. Educ. **14**(3), 501–512 (2019). https://doi.org/10.29333/iejme/5752
2. Rodríguez, F., Santiago, R.: Gamificación: cómo motivar a tu alumnado y mejorar el clima del aula. Grupo Oceano (2017)

3. Robledo, P., Fidalgo, R., Arias, O., Álvarez, M.L.: Percepción de los estudiantes sobre el desarrollo de competencias a través de diferentes metodologías activas. Revista de Investigacion Educativa **33**(2), 369–383 (2015). https://doi.org/10.6018/rie.33.2.201381
4. Sánchez, C.: Herramientas tecnológicas en la enseñanza de las matemáticas durante la pandemia COVID-19. Hamut'ay **7**(2), 46–57. Author, F.: Article title. Journal 2(5), 99–110 (2016)