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# Active methodologies to promote meaningful learning of natural sciences in Basic General Education of Ecuador (Review)

**Metodologías activas para fomentar aprendizaje significativo de ciencias naturales en Educación General Básica de Ecuador (Revision)**

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## Abstract

Active methodologies in the natural sciences foster the development of fundamental skills and encourage meaningful learning, which contributes to improving educational quality. This article presents the results of developing a proposal for active methodologies for project-based learning, flipped classrooms, and gamification for eighth-year students of Basic General Education, considering natural science content on topics related to climate change, biodiversity, and sustainability. A mixed methodology is used, combining empirical, theoretical, and mathematical-statistical methods to ensure the relevance and reliability of the results. Descriptive statistical analysis was used to interpret qualitative data obtained through surveys, observation sheets, and questionnaires, with a sample of 35 students and 4 teachers, from 2024 to 2025. The proposal was assessed using specialist criteria, highlighting the relevance of the active methodologies designed. The results indicate that their application promotes the development of a scientific and educational culture, transforms traditional teaching, and plays a decisive role in

streamlining the teaching-learning process of natural sciences and awakening greater student interest in their study.

**Keywords:** Natural Sciences; active methodology; Project-Based Learning; Flipped Classroom; Gamification

**Resumen**

Las metodologías activas en el área de ciencias naturales propician el desarrollo de habilidades fundamentales y fomentan el aprendizaje significativo, lo que contribuye a mejorar la calidad educativa. Este artículo tiene como objetivo mostrar los resultados de la elaboración de una propuesta de metodologías activas sobre aprendizaje basado en proyectos; aula invertida y gamificación, para estudiantes de octavo año de Educación General Básica, teniendo en consideración los contenidos de ciencias naturales en temas relacionados con el cambio climático, la biodiversidad y la sostenibilidad. Se emplea una metodología mixta que combina métodos empíricos, teóricos y matemático-estadísticos para asegurar la pertinencia y confiabilidad de los resultados. Se utilizó un análisis estadístico descriptivo para interpretar datos cualitativos obtenidos mediante encuestas, fichas de observación y cuestionarios, con una muestra de 35 estudiantes y 4 docentes desde 2024 con finalización en 2025. Se valora la propuesta mediante criterios de especialistas, se destaca la pertinencia de las metodologías activas diseñadas y los resultados indican que con su aplicación se promueve el desarrollo de una cultura científica y educativa, se transforma la enseñanza tradicional y desempeñan un papel decisivo al dinamizar el proceso de enseñanza-aprendizaje de las ciencias naturales y despertar un mayor interés en los estudiantes por su estudio.

**Palabras clave:** Ciencias Naturales; metodología activa; Aprendizaje Basado en Proyectos; Aula invertida; Gamificación

## Introduction

Education about the natural world faces the challenge of transforming itself to meet the needs of a constantly changing population, just like nature itself. In this context, active methodologies occupy an essential place in the act of teaching and learning solutions to environmental problems, which is increasingly common in international, national, and local contexts.

Natural sciences, as part of the curriculum, constitute an important way to achieve this goal, as it emphasizes experiential learning as a way of verifying objective reality through the

relationship between the biotic and abiotic factors that make up the different ecosystems. These ecosystems are so in need today of a preventive process that promotes healthy nature as a contribution to Ecuadorian society, as it is considered part of the world's green lung.

Over the years, there have been numerous environmental studies and practices that have sought to establish the necessary nature-society balance, as carried out by Cabrera (2024), which is currently reflected in the climate changes affecting different areas of Ecuador. It is worth highlighting the interest of international organizations with goals centered on the 2030 Agenda, which aims to continuously improve the quality of life through the sustainable use of natural resources (Naciones Unidas, 2018).

It is vitally important that classes be a systematization in creating the way of acting of the new generations of Ecuadorians, promoting practices that favor environmental sustainability. This challenge is embraced by teachers committed to increasing good educational practices that educate students in the mastery of the natural world, its contributions, and the shortcomings that persist when it is not used properly. In this regard, there are multiple scientific solutions that have been discussed by different authors, such as Gallardo and Camacho (2018), with the Theories of Learning and Teaching Practice, among others who have contributed to the learning of natural sciences. In all cases, their applications promote the acquisition of increasingly meaningful learning content, especially through the use of methodologies such as project-based learning, gamification, and the flipped classroom, which, when applied, turn students into active participants in their educational process.

By personalizing and streamlining learning, not only are students' motivation and engagement increased, but they also develop essential knowledge, skills, and abilities such as critical thinking, problem-solving, and collaboration to learn the use and conservation of nature as the essence of human survival.

Considering, according to the Constitution itself, that nature is a subject of law in Ecuador, it is valid to highlight the good practices that are systematically needed for the conservation of biodiversity. Therefore, the natural sciences curriculum is an important means of educating those who must conserve natural resources by understanding the interactions between the biotic and abiotic factors of ecosystems, as well as the natural processes that sustain life on the planet, reflecting on the interrelationship between people and their environment. Furthermore, it focuses on the development of critical skills and problem-solving, enabling

students to apply scientific knowledge to address everyday challenges, particularly on issues related to climate change, biodiversity, and sustainability.

Despite all the efforts made in the educational approach, the various assessments that measure students' support for nature protection, conducted by the National Institute for Educational Evaluation (Instituto Nacional de Evaluación Educativa, 2024), show that the performance criteria associated with the skills that connect humans with nature are not met. This is observed in the behavior of students who do not always rationally consume what nature provides for their well-being. Hence the importance of this article as a way to promote educational actions that raise awareness about behavior according to the principles of sustainable development.

To perfect educational practices that promote natural balance, it is necessary to embrace the rich theoretical framework currently available from a didactic and pedagogical perspective for the implementation of strategies and methodologies that lead to such goals. In this regard, it is interesting to begin with social constructivism, which constitutes the foundation of the curriculum (Ministerio de Educación de Perú, 2016), where everyone learns through the construction of knowledge, peer interaction, and the teaching resources that justify proper environmental education. Social constructivism not only promotes active student participation but also highlights the importance of collaboration and peer exchange as essential mechanisms for knowledge acquisition. Through this approach, students are able to integrate and apply the knowledge they acquire, creating an educational environment that fosters reflection and collaborative action on issues related to natural balance and sustainability.

Similarly, experiential learning, studied by Dewey and Piaget, has inspired approaches such as project-based learning and inquiry for new knowledge. These methodologies facilitate a deep understanding of scientific concepts and connect learning with everyday life. This approach, aligned with constructivism, promotes active education where students construct their own knowledge based on direct experiences. Thus, project-based learning and inquiry enrich learning and develop critical and creative skills essential for comprehensive education (Tünnermann, 2011).

Problem-solving is fundamental in educational institutions, as it allows students to confront complex situations and develop important cognitive skills. These skills foster critical thinking and autonomy, improve academic performance, and provide tools to effectively address

challenges. Therefore, implementing strategies that strengthen problem-solving in the classroom is essential to optimize both academic performance and students' cognitive skills (Perales, 1998).

From a didactic perspective, it is valuable to recognize the impact of the flipped classroom model, which uses technology such as videos, films, and other resources. Natural interaction becomes a means of satisfaction and solution to the problems that concern students. They have recognized the pedagogical benefits of this approach, reflecting on their commitment to their own learning and the importance of learning through interactivity. Furthermore, they highlight the use of innovative media, such as artificial intelligence, which has a marked impact on the renewal of teaching. The flipped classroom model, by incorporating technology, offers an interactive approach that encourages active student participation, generating deeper and more autonomous learning. The use of technological tools not only encourages interaction but also allows students to take a more active role, promoting pedagogical renewal.

The flipped classroom is a teaching model that promotes active learning through activities, abandoning repetitive memorization. This innovative teaching tool, adaptable to various educational contexts, has challenged traditional methods used in the past, offering an innovative strategy for teachers. Mendoza and Ledo (2020) the flipped classroom is proposed as a technique to strengthen group work from a cooperative, participatory, contextualized, interdisciplinary, and intercultural perspective. Therefore, the flipped classroom represents an effective alternative for transforming traditional teaching, facilitating meaningful and collaborative learning in different educational environments.

The teacher's role must awaken students' interest in environmental care, modernizing pedagogical practices with innovative models (Hernández et al., 2014). This requires adapting teaching strategies and introducing methodologies that encourage participation and reflection on the importance of the environment. The implementation of the flipped classroom, where students play a more active role, favors informed decision-making and the development of critical skills for addressing environmental problems. Modernizing pedagogical practices not only enhances interest in the environment but also strengthens students' ability to act responsibly and consciously.

Learning about the environment in a playful way sparks students' interest, motivating them through challenges. Gamification promotes learning by using game elements as points and rewards. This methodology stimulates students, keeping them engaged and fostering scientific

curiosity, problem-solving, and hands-on learning in the natural sciences. Students not only improve concept retention but also increase their academic performance and participation in practical activities, enhancing their understanding of the natural sciences. Therefore, implementing gamification in the classroom is an effective strategy to increase interest in scientific content and foster a more dynamic and participatory education (Egas et al., 2023).

Games, as a recreational activity, are presented as an effective methodology for improving learning. According to Fernández and Prendes (2022), gamification facilitates students' active participation and fosters their motivation toward academic goals. Sánchez and Lamoneda (2021) emphasize that this methodology is fundamental in the pedagogical field due to its versatility, enabling educational progress by promoting autonomy and intrinsic motivation among students. Therefore, gamification not only enriches the learning process but also strengthens essential skills through innovative and participatory strategies. The different methods or traditions of science education correspond not only to a set of pedagogical ideals established in our learning culture, but also to attempt to restore a research-based culture with an eye toward new, innovative trends in unique training and socialization settings. These methodologies transform education, promoting active learning, where students not only receive information but also construct and contextualize it in their environment. The constructivist model promotes the idea that knowledge is actively constructed through experience and interaction with the environment. Therefore, progress in science education requires a flexible pedagogical approach that allows for the integration of different methods to better adapt to social changes and new learning demands (Pozo & Gómez, 1998).

In the process of student development, it is necessary to prepare them to solve problems they face everyday. It is imperative that teachers be proficient in active methodologies to improve critical and reflective thinking. These methodologies encourage active participation and the analysis of problems from multiple perspectives. Sánchez and Nagamine (2021) highlight significant improvements in critical thinking through problem-based, project-based, cooperative, and flipped classroom learning. This proficiency improves understanding and facilitates an educational environment where students feel more engaged and capable of facing challenges. Therefore, it is essential that teachers adopt these pedagogical strategies, as they develop students who are more critical, reflective, and prepared for current challenges. Developing autonomy and critical thinking, essential skills in learning natural sciences, requires the

implementation of methodologies that allow students to analyze environmental problems and promote awareness of care, as pointed out by (Marcelo, 2024). These methodologies allow students to apply concepts in practice within their context, fostering meaningful learning. Authors such as Amador et al. (2024) propose a guide that transforms the teaching of natural sciences by integrating strategies such as project-based learning (PBL) and scientific inquiry. This guide emphasizes the importance of cultural and contextual adaptation in teaching, incorporating content relevant to students' social, cultural, and economic environments. Therefore, the integration of these methodologies ensures meaningful learning by connecting theory with practice and respecting students' cultural context. The interest in improving cognitive skills, and especially the development of critical thinking in students, is a central theme in many countries. Gutiérrez (2021) applied active methodologies to elementary school students, demonstrating their positive impact on critical thinking skills. These results confirm previous research that highlights active methodologies as effective pedagogical strategies for enhancing students' cognitive skills. Therefore, the use of active methodologies is presented as one of the best options to enhance the teaching-learning process and foster critical thinking in educational contexts (Pazos & Aguilar, 2024).

According to Guamán and Espinoza (2022), these methodologies allow teachers to teach more effectively and encourage active student participation, in addition to stimulating research skills, independent knowledge, and social and communication skills through group work. They also promote analysis, reflection, and argumentation in the activities carried out, strengthening the educational process. For example, project-based learning has gained relevance, establishing itself as an active methodology that stimulates collaboration and meaningful learning between students and teachers (Barrera et al., 2022).

In the current educational context, where meaningful learning is valued, it is essential that students not only acquire knowledge but also develop critical thinking, research skills, and a meaningful connection with their natural environment. For this reason, the Unidad Educativa del Milenio 10 de Noviembre, designed a proposal for active methodologies that address the need to improve educational quality and develop fundamental skills in students. Its implementation fosters more dynamic and participatory teaching, engaging students in their own learning process and facilitating a deeper understanding of the content. Furthermore, students not only acquire academic knowledge but also become individuals capable of applying their skills to solve real-

world problems and improving their critical and analytical skills, which lends importance and novelty to the work conducted.

The research began with the scientific problem: How to improve the learning of Natural Science content in the eighth year of Basic General Education? To address this problem, the following objective was proposed: design active methodologies for learning natural sciences in the eighth year, taking into account their training needs and the context in which they are developed.

This article presents the results of the development and evaluation by specialists of the proposed active methodologies, which place eighth-year students in Basic General Education, in the area of Natural Sciences, at the center of the teaching-learning process, in order to improve the quality of their educational process.

Materials and methods: The research was conducted at the Unidad Educativa del Milenio "10 de Noviembre," specifically in the eighth year of Basic General Education, during the 2024-2025 school year. The institution is located in Los Encuentros parish, Yantzaza canton, in the Ecuadorian province of Zamora Chinchipe. The sample consisted of four teachers and 35 students who attend the eighth-grade Natural Sciences course. This sample was consistent with the researchers' interest in studying all the subjects involved.

The research has a mixed approach (qualitative and quantitative), allowing for a quantitative study to address the qualitative relationships manifested in the subject. This approach combines empirical methods (surveys and documentary analysis), theoretical methods (analysis-synthesis, inductive-deductive), and statistical-mathematical methods, using percentage analysis and descriptive statistics to ensure the relevance and reliability of the results.

An initial questionnaire was administered to teachers and students to gather information on the use of methodologies in the teaching-learning process. This demonstrates the persistence of a traditional didactic approach and a lack of contextualization in solving problems related to the natural world, as well as the need to foster student motivation.

A documentary analysis of the national curriculum, academic documents, and scientific articles was conducted to support the design of active methodologies to foster meaningful learning in the area of Natural Sciences. Likewise, the analysis-synthesis and inductive-deductive methods allowed for establishing relationships between pedagogical theories,

enunciating fundamental theoretical and methodological results, and arriving at conclusions and recommendations.

Mathematical-statistical methods allowed for descriptive and inferential statistical analysis for the interpretation of the data obtained through the application of instruments such as surveys and questionnaires, tabulation, and graphical representation.

The methodological process consisted of the following stages: Stage 1: Initial diagnosis. Stage 2: Proposal design. Stage 3: Proposal validation with specialists.

This study highlights the importance of proposing active methodologies to promote meaningful learning in the natural sciences. Incorporating project-based learning, gamification, and the flipped classroom into the curriculum increases student interest and active participation, creating a dynamic and effective educational environment.

The stages for developing these methodologies in the natural sciences classroom are described below.

Stage 1: Initial Diagnosis

Surveys of teachers and students regarding the use of active methodologies in teaching natural sciences reveal their need for autonomy and responsibility. They also highlight the need to refine them to improve learning.

Stage 2: Proposal Design

A proposal for active methodologies was designed, providing relevant and innovative material aligned with the objectives of the subject. It integrates active methodologies such as project-based learning, gamification, and the flipped classroom, using technological resources to enrich the learning experience in natural sciences.

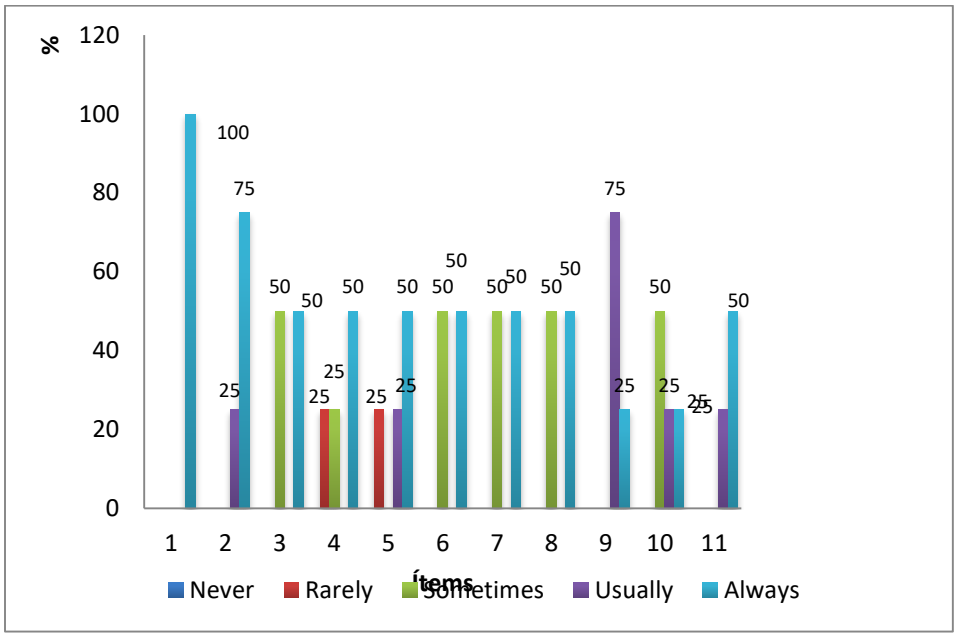
Stage 3: Proposal Validation with Specialists

In this phase, the proposals were validated using the criteria of four specialists in the field of education with extensive knowledge of technology and pedagogy to assess the relevance and feasibility of the proposed active methodologies to promote the learning of natural science content by eighth-grade students at the Unidad Educativa del Milenio "10 de Noviembre."

Analysis and discussion of results: The results of the survey conducted among eighth-grade natural science teachers are presented. The items analyzed relate to: use of ICT, use of projects, flipped classrooms, and game dynamics to improve understanding of natural science topics.

Stage 1: Initial diagnosis

**Figure 1. Results of the Teacher's Survey**

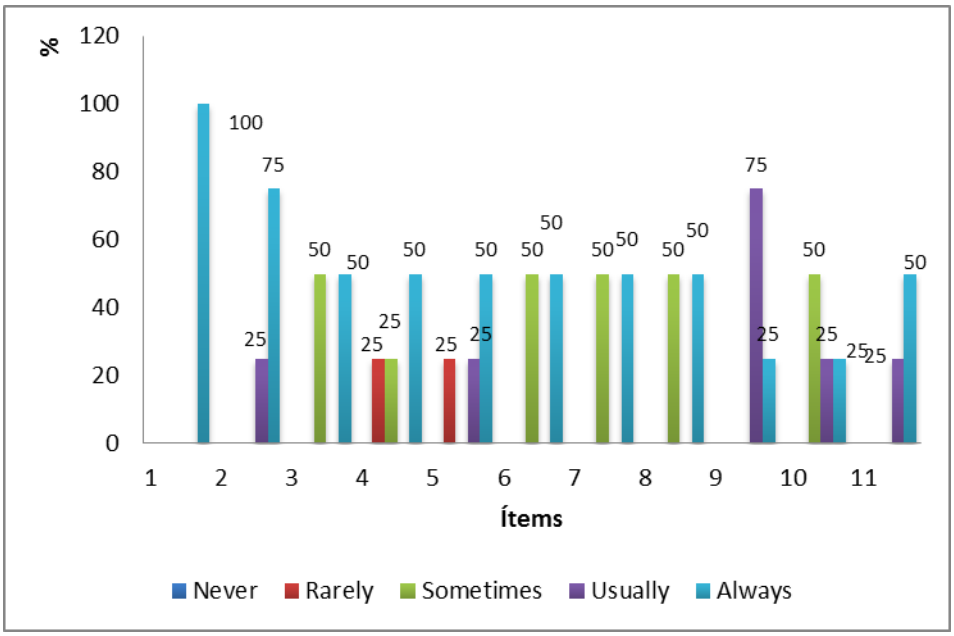



**Source: Eighth-grade natural science teachers (2025).**

The results in Figure 1 show that teachers consider it important to strengthen the use of ICTs and technological applications. Educational projects are positively valued for their alignment with the natural sciences program. They believe the flipped classroom facilitates comprehension and encourages autonomy, especially when students review the material beforehand. They believe that game dynamics motivate students and improve concept retention. They emphasize that for more effective gamification, the use of technological resources is necessary to improve the understanding of natural sciences topics.

Figure 2 shows the results of the student survey. The items analyzed relate to: Use of game dynamics, concept retention, and motivation; Use of ICTs and platforms; Use of the flipped classroom; and Project-based learning for identifying and solving problems to improve understanding of natural sciences topics.

**Figure 2. Results of the students´ Survey**




**Source: Eighth-grade natural science students in Basic General Education (2025).**

Students acknowledge that game dynamics and flipped classrooms are sometimes used and believe they motivate them and improve learning. Project-based learning is also useful for identifying and solving problems. Although the use of technology is limited, there is a need to optimize active methodologies and technological resources.

Both teachers and students accept active methodologies and value their importance in improving the quality of the teaching-learning process in natural sciences.

Stage 2. Design of the Active Methodologies proposal

Title: Educational Innovation in Natural Sciences: Active Methodologies to Transform Learning in Eighth Grade at Unidad Educativa del Milenio 10 de Noviembre.

Active Methodology: Project-Based Learning

Curricular Block 4: The Environment of Living Beings

Topic: How does human activity affect food webs in different ecosystems?

Learning Objective: To assess the impacts of human activities on food webs in various ecosystems, identifying the ecological consequences and proposing actions to mitigate these effects.

Skill with performance criteria: To observe and explain food chains, networks, and pyramids in different ecosystems, identify producer, consumer, and decomposer organisms, and analyze the effects of human activity on food webs CN.4.1.10.

Phase 1: Preparation: Introduction to the topic, showing a video about the influence of human activity on food webs in different ecosystems.

Phase 2: Challenges: The question is asked: What happens when an ecosystem changes due to human activity?

Phase 3: Application: To delve deeper into the effects of human activities on species and their relationship with the food chain, students are divided into groups of four and assigned to analyze a specific ecosystem to conduct their research activities. Each team will seek information on the impacts of human activity on the ecosystem's food web.

Example: How does deforestation affect forest food chains? How does overfishing affect the marine food chain? How do forest fires affect the ecosystem? Each group of students must create a visual presentation (presentations in Canva, Prezi, Genially, or others) that shows the original food chains and the changes they have experienced over time due to human interaction. They must also prepare a report with their conclusions about the ecological consequences they reached in their research.

Phase 4: Presentation of Results: Each team presents their project in class, explaining the assigned ecosystem, the human activity investigated, and the observed effects on the food chain. After each presentation, students can ask questions, which facilitate discussion, clarify doubts, and encourage collective analysis.

Phase 5: Reflection and Evaluation: Evaluate learning and encourage self-criticism and ecological awareness in students through reflection on the project. The impact of human actions on ecosystems and how they can contribute to their conservation are analyzed, answering questions such as: What legacy do we want to leave for future generations? How did yesterday's decisions influence today's ecological balance? How will our decisions today influence future ecological balance? What can we do today to avoid future ecological imbalance?

Project Evaluation: It is recommended to consider the following indicators: Understanding of the human impact on the food web of the assigned ecosystem. Skills to explain and visually represent changes in the food web. Presentation quality, clarity of presentation, and ability to answer questions, participate, and collaborate within the team.

Active Methodology: Flipped Classroom

Topic: Water pollution in rivers and lakes in Ecuador.

Learning Objective: Analyze the causes of water pollution in rivers and lakes in Ecuador, infer the consequences of this problem, and propose practical solutions to mitigate its impact, using digital tools and collaborative work.

Performance-based Skill: Investigate, using ICTs and other resources, the causes of the impacts of human activity on habitats CN.4.5.5.

Resources: Projector, computer, internet, poster board, markers, white paper, thumbtacks, magazine and newspaper clippings, erasers, digital platforms, educational videos.

Phase 1: Preparation (asynchronous): Watch the video Water Pollution - Causes and Consequences. Read a short article about specific cases of river and lake pollution in Ecuador. Complete the activities based on the video and the reading.

Phase 2: Classroom Activity (Synchronous): During class time, students analyze the causes of pollution and delve deeper into the problems facing Ecuador. Working groups of four students are formed, each selecting a topic: a) Causes of water pollution in rivers and lakes. b) Consequences of water pollution in rivers and lakes. c) Possible solutions to mitigate the impact of pollution. To conclude, each of the topics being researched is presented, using technological tools and audiovisual aids (infographics, educational videos). After the presentations, a space is provided for groups to formulate questions and discuss and clarify doubts about their classmates' presentations.

Phase 3: Feedback and Evaluation: Students will create a collage, explaining the causes, consequences, and solutions to prevent water pollution.

Phase 4: Reflection and Closure: In this phase, each student writes a personal commitment to reducing water pollution, which will be displayed on the class bulletin board.

Active Methodology: Gamification.

Topic: Interaction of Carbon, Oxygen, and Nitrogen in Ecosystems

Learning Objective: Explain the interaction of the carbon, oxygen, and nitrogen cycles in ecosystems. Apply this knowledge to their environment and reflect on the human impact on biogeochemical cycles, offering proposed solutions.

Performance-based skill: Relate the elements carbon, oxygen, and nitrogen to the flow of energy in food chains CN.4.1.12.

Audience: Eighth-year students of Basic General Education, average age between 12 and 13 years old.

Game objectives: Use playful dynamics to help students understand the processes and interactions of the carbon, oxygen, and nitrogen cycles in a practical and fun way.

Establish challenges or missions where students create innovative strategies to mitigate the negative effects of human activities on ecosystems.

Use gamified elements, such as quizzes, challenges, or simulations, to assess understanding of concepts and develop skills in a non-traditional way.

Game space: Green areas of the school, classroom, computer lab.

Motivation: The student prepares for an exciting adventure about the interaction of the carbon, oxygen, and nitrogen cycles in ecosystems. Through games and challenges, they will see how their actions affect the environment and life on Earth. Teams are formed, and their efforts will be rewarded. This way, they learn in a fun way and can become true EcoGuardians of the Future.

Narrative: Students are part of a fictional organization called EcoGuardians of the Future. Their mission is to investigate how the carbon, oxygen, and nitrogen cycles sustain life on Earth and confront an environmental crisis caused by human activities. They must analyze data, solve challenges, and design innovative solutions to restore ecological balance. Each stage of the activity can be presented as a mission or level within this narrative, encouraging engagement with a clear and exciting purpose.

Mission: The EcoGuardians must investigate the effects of human activities on the carbon, oxygen, and nitrogen cycles in a specific ecosystem. Using mobile devices and 3D augmented reality applications, they will conduct a series of observations to understand how these cycles develop. Game Rules: Students form teams of four, watch a video about the carbon, oxygen, and nitrogen cycles. They then answer questions using their mobile devices or tablets. This will help assess understanding of the concepts in a fun and competitive way. Points are awarded for each correct answer. Students cannot move on to the next activities until they complete all the actions in each challenge. The team with the most points at the end of the activity wins.

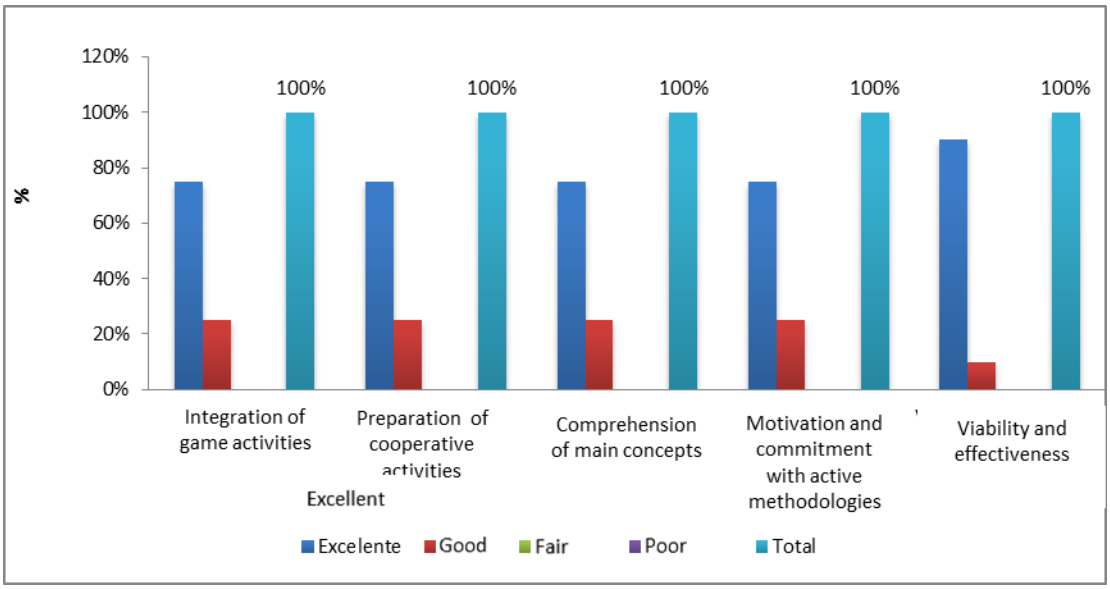
Materials/Resources: Mobile devices or tablets, video on Edpuzzle, worksheets for teams.

Testing: Pre- and post-activity quizzes are conducted on Kahoot to measure understanding of the concepts. In addition, participation and collaboration will be observed during the game.

Stage 3. Proposal Validation

The validation of the proposed active methodologies is carried out. through the criteria of specialists, who assess the relevance and feasibility of the proposal.

**Figure 3. Validation of the proposal by specialist criteria**




**Source: Own elaboration.**

The specialist criteria show that motivation and commitment to active methodologies were positively evaluated, with 75% of specialists rating the application of project-based learning, gamification, and the flipped classroom as excellent. These methodologies have proven effective in engaging students in an active and participatory manner. The relevance and feasibility of the design of the active methodologies were highly valued, with 100% of specialists giving them an excellent rating, indicating that they consider these methodologies feasible for improving the learning of concepts and increasing the motivation of eighth-grade students toward the study of natural sciences. These results reinforce the idea that active methodologies are essential for transforming the educational process and enriching the students' learning experience. Analysis and discussion of the results: The results obtained from the initial assessment reveal the need to implement active methodologies among eighth-grade students of Basic General Education at the Unidad Educativa del Milenio "10 de Noviembre," which strengthen meaningful learning. The survey results reveal that teachers and students agree that active methodologies increase interest, motivation, participation, and academic performance, as they focus on active participation during learning. This approach transforms education by allowing students to acquire knowledge and develop fundamental skills such as creativity,

autonomy, and the practical application of what they have learned. As stated by Ávalos et al. (2021), teachers must implement active methodologies that promote more dynamic and meaningful student participation in their own learning process.

The specialists' criteria corroborate the possibility of applying the proposed active methodologies, as they are relevant to the natural science content taught this year and the objectives set out in the program.

This research addresses educational innovation in Ecuador, highlighting the importance of active methodologies to improve student learning. Teachers at the Upper Secondary Level of Basic General Education play a decisive role in the implementation of these methodologies to foster scientific skills according to the natural sciences curriculum (Ministerio de Educación de Perú, 2016). The need to train teachers and provide institutional support to create an environment that promotes innovation and critical thinking is emphasized.

It is essential that teachers adopt a flexible and dynamic approach, where students are the protagonists of their learning, developing their knowledge and skills. This will not only improve standardized assessments but also strengthen key skills for personal development and educational quality. As mentioned Pozo and Gómez (1998), this practice helps teachers face challenges, encourage critical thinking and active participation, and strengthen their connection with the natural and social environment.

**Conclusions**

As a result of the analysis of the literature, the analysis of regulatory documents, and the initial diagnosis, it is concluded that active methodologies contribute to a more dynamic education, generating student interest in academic content, particularly in the natural sciences, which enables higher quality learning and skill development.

The design of active methodologies such as project-based learning, gamification, and the flipped classroom are positively valued by specialists. They respond to the content of the natural sciences, the object of study, are innovative, and provide answers to the solution of the scientific problem and the objectives set. Therefore, their application and assessment in practice constitute a necessity in the research process.

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