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Artículos científicos

Estrategias para el desarrollo de habilidades blandas a partir del aprendizaje basado en proyectos y gamificación

Strategies for the Development of Soft Skills from Project-Based Learning and Gamification

Estratégias para o desenvolvimento de soft skills a partir da aprendizagem baseada em projetos e gamificação

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Resumen

Este trabajo tuvo la intención de profundizar y verificar la eficacia de estrategias didácticas activas puestas en práctica en el aula para sortear algunos de los problemas a los que se enfrentan tanto el maestro como el alumno: la falta de interés, confusión en los contenidos, dificultad para trabajar en equipo y expresarse, comprender y aplicar los conocimientos de manera cotidiana y en diversos contextos. Por tanto, se presenta una propuesta de una práctica educativa que ha combinado dos estrategias didácticas: aprendizaje basado en proyectos (ABP) y la gamificación, ambas para fortalecer el aprendizaje activo. El objetivo de este estudio fue evaluar las habilidades blandas logradas en un grupo de 50 alumnos durante el semestre de agosto-diciembre de 2021, periodo de confinamiento, en el que se implementó de manera virtual la gamificación y el ABP en la unidad de aprendizaje de Expresión Oral y Escrita I del nivel medio superior del Instituto Politécnico Nacional (IPN). La metodología está basada en el enfoque cuantitativo con un alcance descriptivo. La información se recopiló mediante un cuestionario, el cual fue organizado bajo una escala de Likert. Los resultados muestran que el empleo de estrategias activas y su combinación promueven el desarrollo de habilidades blandas, principalmente las interpersonales, de autocontrol y afrontamiento; en tanto las que representan un área de oportunidad son aquellas relacionadas con la toma de decisiones, pensamiento crítico y las comunicativas. Asimismo, los resultados indican que se desarrollaron equilibradamente los conocimientos, valores y actitudes y se logró que relacionen los aprendizajes en múltiples espacios, al igual que el aprendizaje autónomo.

Palabras clave: aprendizaje activo, *escape room*, gamificación, tecnología educativa.

Abstract

This work had the intention of deepening and verifying the effectiveness of active didactic strategies implemented in the classroom to overcome some of the problems faced by both the teacher and the student: lack of interest, confusion about the contents, difficulty in working in teams and expressing, understanding and applying knowledge on a daily basis and in different contexts. Therefore, a proposal is presented for an educational practice that has combined two didactic strategies: project-based learning (PBL) and gamification, both to strengthen active learning. The objective of this study was to evaluate the soft skills achieved in a group of 50 students during the August-December 2021 semester, confinement period, in which gamification and PBL were implemented virtually in the learning unit of Oral and

Written Expression I of the high school level of the Instituto Politécnico Nacional (IPN). The methodology was based on a quantitative approach with a descriptive scope. The information was collected by means of a questionnaire, which was organized under a Likert scale. The results show that the use of active strategies and their combination promote the development of soft skills, mainly interpersonal, self-control and coping skills; while those that represent an area of opportunity are those related to decision making, critical thinking and communication. Likewise, the results indicate that knowledge, values, and attitudes were developed in a balanced manner and that they were able to relate learning in multiple spaces, as well as autonomous learning.

Keywords: active learning, gamification, escape room, educational technology.

Resumo

Este trabalho teve a intenção de aprofundar e verificar a eficácia de estratégias didáticas ativas colocadas em prática em sala de aula para superar alguns dos problemas enfrentados tanto pelo professor quanto pelo aluno: falta de interesse, confusão nos conteúdos, dificuldade para trabalhar como equipe e se expressar, compreender e aplicar o conhecimento no dia a dia e em diversos contextos. Assim, apresenta-se uma proposta de prática educativa que combinou duas estratégias de ensino: aprendizagem baseada em projetos (ABP) e gamificação, ambas para fortalecer a aprendizagem ativa. O objetivo deste estudo foi avaliar as soft skills alcançadas em um grupo de 50 alunos durante o semestre de agosto-dezembro de 2021, período de confinamento, em que a gamificação e o PBL foram implementados virtualmente na unidade de aprendizagem de Expressão Oral e Escrita I da nível médio superior do Instituto Politécnico Nacional (IPN). A metodologia é baseada na abordagem quantitativa com escopo descritivo. As informações foram coletadas por meio de um questionário, que foi organizado em escala Likert. Os resultados mostram que o uso de estratégias ativas e sua combinação promovem o desenvolvimento de soft skills, principalmente interpessoais, de autocontrole e de enfrentamento; enquanto os que representam uma área de oportunidade são aqueles relacionados à tomada de decisão, pensamento crítico e comunicação. Da mesma forma, os resultados indicam que conhecimentos, valores e atitudes foram desenvolvidos de forma equilibrada e que conseguiram relacionar a aprendizagem em múltiplos espaços, bem como a aprendizagem autônoma.

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Palavras-chave: aprendizagem ativa, sala de fuga, gamificação, tecnologia educacional.

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Introduction

Currently, the training process of students presents different alternatives in terms of methodological strategies that can be used based on the level and context. Thus, the teacher, according to the objectives that he intends to achieve and the skills to develop, will choose the relevant methodologies (García, Sánchez and Solano, 2020).

Given the lack of interest, confusion in the contents, difficulty in teamwork and in expressing oneself, understanding and applying knowledge on a daily basis and in various contexts, it is necessary to look for physical or technological methods and materials that promote learning related to the needs and in the context of the students, although it seems hackneyed and in reality difficult to reach. To achieve this, one way is to relate the contents and curricular objectives with activities in which the student is the protagonist and that at the same time return the focus of attention to the needs of their environment in order to improve it, developing skills and knowledge as useful tools. for personal, academic and professional life, as well as participation in the solution of social problems in real scenarios.

The foregoing in the context caused by the 2019 coronavirus disease (covid-19) pandemic, which led to the confinement and which, as of March 2020, in order to continue with the academic training of the student body, led to the use of the scheme of distance education based on various means of communication with different approaches and supports, which led to a diversity of teaching methodologies by teachers (Díaz and Barrón, 2022). However, the deficiencies of the study plans, the obsolete teaching strategies at the various educational levels, as well as the lack of connectivity in various countries also began to be revealed (Barrón, 2020).

Therefore, one of the main challenges for teachers is to adopt active methodologies that favor the motivation and involvement of students (León, Arija, Martínez and Santos, 2020). In addition, the incorporation of information and communication technologies (ICT) in training processes is a priority because they promote significant learning and enrich educational opportunities. (Sierra y Fernández, 2017).

This article presents a proposal for educational practice that combines two teaching strategies: project-based learning (PBL) and gamification, both considered because they

allow active learning. In this sense, active learning has the purpose of getting students to go from a passive state to a dynamic one, in order to make them feel that they are not only attending a class, but that they are part of the class (Zepeda, Abascal and López, 2016). The goal of this learning is to provide students with the environment, activities and accompaniment to develop information search, analysis and synthesis skills, as well as problem solving, dialogue and expression (García-Bullé, March 11, 2021).

Therefore, active learning aims to make it meaningful. Ponce (2004) establishes that meaningful learning requires the student to carry out various activities to establish relationships between what is new and what he already knows, that is, reformulate, differentiate, discover, order, classify, rank, relate, integrate. , solve problems, understand a text, all with the intention of meeting the demands of the required graduation profiles.

For its part, the World Economic Forum (October 20, 2020) anticipates which skills will be most in demand by employers by 2025: 1) analytical thinking and innovation, 2) active learning and learning strategies, 3) problem solving complex, 4) critical thinking and analysis, 5) creativity, originality and initiative, 6) leadership and social influence, 7) use, control and monitoring of technology, 8) design and programming of technology, 9) resilience, stress tolerance and flexibility and 10) reasoning, problem solving and generating ideas (ideation). To achieve this, it is necessary to design and implement teaching strategies aimed at developing these skills in the classroom to prepare students for the future.

Therefore, this research focused on documenting an educational experience based on the escape room using PBL. It should be noted that the use of the escape room (both virtual and face-to-face) has received increasing attention as a pedagogical strategy in recent years (Sempere, 2020; Vergne, Smith, & Bowen, 2020).

Thus, the goal of this research is to provide useful information for educational institutions on different teaching methodologies and, as far as possible, determine their effectiveness so that those that prove their worth are permanently incorporated into the new normal, which it must be characterized as a period of substantial modifications to pedagogical practices that reconfigure both human and professional development, as well as for generating social, political and cultural ties without neglecting the environment (de Alba, 2020).

In this sense, it is necessary to promote the creation of online learning ecosystems, which combine virtual and face-to-face scenarios where it is possible to carry out activities for multidisciplinary training based on collaborative spaces and mediated by ICT (Loveless

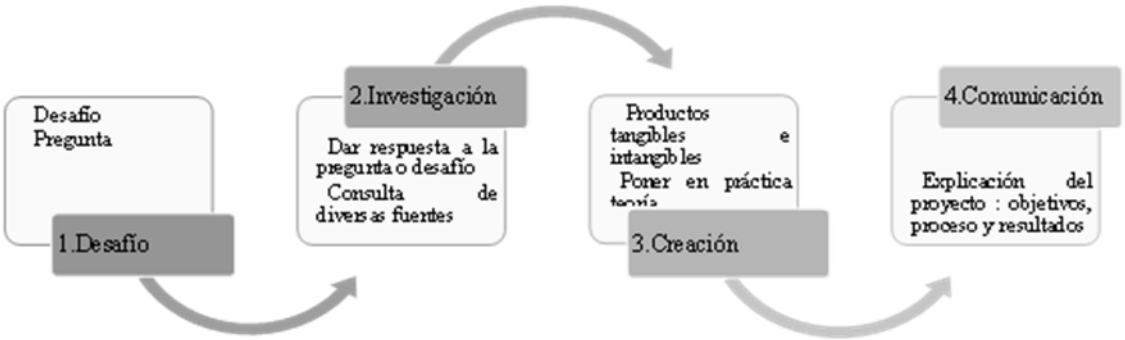
and Williamson, 2017). In order for education to fulfill its objective of transforming realities, empowering talents and training citizens who will shape future societies, it is necessary to convert educational spaces into places conducive to developing a wide range of skills, abilities and knowledge. (Vargas y Santillán, 2022).

Previous literature

PBL is a strategy that has been evolving and that as it progresses integrates more elements to promote learning that comes from the student's real life and is used to solve problems in their context, that is, based on previous experiences.

In these experiences, students are the protagonists of their training process, which favors the development of skills for the 21st century: critical thinking, creativity, collaboration, the use of ICT, autonomy and reflection on their own learning (Sotomayor, Vaccaro and Téllez, 2021). The stages or phases followed to develop a project of this nature are shown in figure 1.

Figure 1. PBL phases



Source: Sotomayor *et al*. (2021)

The teacher and the student, in co-responsibility, must follow these steps. Both, based on a challenge or question that is posed to them, get involved with a problem that will be addressed in the research phase through the consultation of various sources in which they explore, select reliable and rigorous information that will serve to move on to the creation of some tangible or intangible product, such as reports, diagrams, texts, drawings, mainly, which will be presented or communicated, the final stage, to publicize the results obtained.

Meanwhile, Majó and Baqueró (2014) point out that the objectives of project work are:

- Provide an answer or solution to a specific problem. As its name indicates, an intervention action is carried out to solve a problem
- Investigate or evaluate a problem, a specific issue or a complex topic. Focuses on topics relevant to students
- Design, develop or build a product. Students make or build a specific product.

These objectives have the advantage of being able to be combined and, without being sequential, they manage to complement each other according to the context: time, characteristics of the groups, teachers and learning environments.

Therefore, the PBL methodology is detonated when the students are directly and actively involved in their learning because they are the generators of the possible answers and solutions to the formulated project. Of course, it is necessary that the use of technological tools is based on an innovative didactic approach by the teacher that promotes a collaborative environment. (Villacís, Zea, Campuzano y Chifla, 2022).

Gamification

Within the active strategies based on the use of game principles or games put into practice in the classroom with the intention of breaking monotony, making the educational process more creative and motivating, the so-called gameful learning, learning based on games or game-based learning. It refers to the use of games to support the training process through principles and mechanisms focused on achieving specific learning outcomes (Contreras, 2016).

In this way, in the educational field, gamification has been incorporated as a strategy to motivate students in their learning process, where it is combined with the intensive use of digital resources in order to significantly promote expected behaviors (Prieto, Gómez and Said, 2022). In this sense, its main objective is to promote exploration, invention, imagination and soft skills through a series of contextualized games for the academic training of students (López, 2019).

For their part, Pascuas, Vargas and Muñoz (2017) explain that the word gamification is made up of its root game, 'game', and the affixes i-fica-ción, which would indicate a process, that is, 'do, convert into , produce'. In this way, it is understood as a 'putting into play' or a transformation of activities based on the activity of playing.

Meanwhile, Prieto (2020) and García and Morales (2020) define gamification as the use of significant elements of the game (digital or analog) in a non-ludic context such as the educational space. Thus, the viable strategy to gamify a session or a subject is carried out through the use of points, badges and leaderboards (PBL), the creation of narratives and characters or avatars or the incorporation of digital tools or platforms such as learning management systems (LMS).) typical of the institution (Hurtado, Gil and Aguilar, 2019; Llamas, Tejada, González and Fernández, 2019). Therefore, the game that is designed and implemented in the educational context must not only favor the fun and leisure of the students, but also, through it, the already established didactic objectives must be achieved (Santos, Miguel, Queiruga- God and Encinas, 2020). For his part, Nicholson (2015) indicates that an escape room is conceptualized as a game based on group interaction through which participants find challenges to overcome in order to complete a mission in a limited period of time. The mission is based on the objectives or competencies to be achieved, so that the students focus on escaping from a situation or solving a specific case (Veldkamp et al. 2020).

The main advantages of game-based learning compared to experience-based and traditional learning are shown in Table 1.

Table 1. Comparison of learning approaches

	Tradicional	Basado en experiencias	Basado en juegos
Brinda realimentación inmediata		X	X
Altamente atractivo		X	X
Motiva la participación activa		X	X
Supone bajo riesgo físico	X		X
Permite evaluaciones estandarizadas	X		X

Source: Tribes (citado en Moreno, Montaño y Duque, 2019)

Within the multiple games are escape rooms, also known as escape rooms. In teams, in person and in a physical space that adapts according to the theme, the participants are involved in solving sequential physical or mental challenges or tests that are solved in a setback to try to escape or leave a room. or space. At the end they have a reward that can be

to continue in the game, go to another level or conclude with a prize such as obtaining points, cumulative badges to be exchanged for an activity, an object or another prize of greater value.

As Sierra and Fernández (2019) mention, the fundamental aspects of escape rooms are: start by stating that the main objective that the participating team has to achieve is to escape from a closed space, because some disturbing event will happen that is not you want to be part; To achieve this, the team will have to cooperate and solve a series of questions that will lead to the solution strategy, which involves using a set of skills that are developed throughout the game, and, finally, if the answer is established , you will be able to escape or, if not, you will have missed some reward or you will not be able to get out.

Thus, the questions or enigmas require the use of various skills that are developed through sources of information or search, digital or visual materials, so the implementation of the escape room leads to improving the socialization of the participants, collaboration, negotiation, optimization the level of concentration and communication. Fotaris and Mastoras (2019) and Watermeier and Salzameda (2019) add that both critical and creative thinking are developed, there is a promotion of decision-making strategies, effective leadership and the use of varied techniques to solve problems.

Wu, Wagenschutz and Hein (2018), for their part, establish that the use of escape rooms develops skills such as teamwork, creative thinking, communication, time management and self-regulation, mainly.

Not long ago, escape games were conceived as action games in a real environment, where groups of people (teams) had to discover clues and solve a series of puzzles, solve a mystery or find a way out of a space at a given time. limited (Extremadura Youth Institute, 2018).

Now, Silva and Maturana (2017) propose a model of active methodologies, where the student is the main actor and where technology has no minor influence, as shown in figure 2.

Figure 2. Model of active methodologies focused on learning

Source: Silva y Maturana (2017)

For this educational practice, the use of Google Classroom, an accessible resource known by the students, was used as a virtual platform. Two years after it was implemented due to the pandemic, it has allowed contact and academic monitoring of students in order to achieve active and ideal educational training for the development of soft skills.

Soft skills

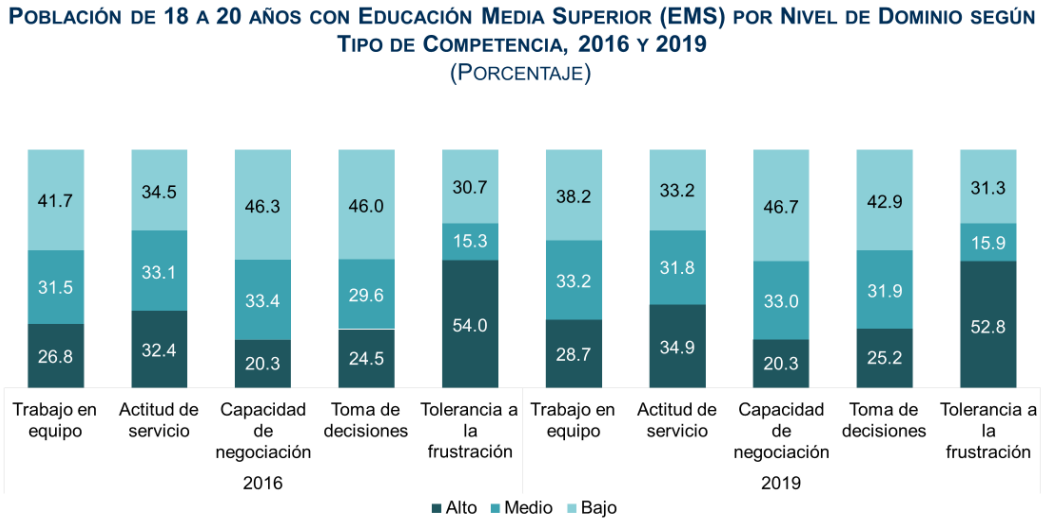
Soft skills or also known as soft skills are considered as the skills or abilities that a person performs related to inter and intrapersonal characteristics, such as motivation, creativity, communication and leadership, mainly. Today they hold the same importance as the specific knowledge of an area or discipline, which is why they are already required in job profiles.

Soft skills constitute the skills, attitudes, knowledge and values that allow the person to solve problems or a relevant response to a new or specific situation, mainly in the workplace. They also include work habits and basic socio-emotional skills relevant to on-the-job training (Secretariat of Labor and Social Welfare, January 9, 2019). Indeed, these skills have to do with the implementation, in an integrated manner, of attitudes, personality traits, knowledge and values (Cordero, Córdova, Moreira and Quevedo, 2020).

Based on the National Survey of Labor Insertion of Graduates of Higher Secondary Education applied by the National Institute of Statistics and Geography [Inegi] (2020) to identify, among other things, the level of mastery of soft skills, within which includes teamwork, service attitude, negotiation skills and conflict resolution, decision making and

tolerance to frustration, it was found that these skills have not been developed in a high percentage by the population of 18 to 20 years old in Mexico between 2016 and 2019. According to the perception of the graduates, a mastery of 50% of any of the soft skills has not been reached. The negotiation capacity is the most developed; and it is required to strengthen the tolerance to frustration and the attitude of service, as shown in figure 3.

Figure 3. Results of the survey applied to EMS graduates



Source: Inegi (2019)

The application of the survey allows us to identify the relevance of promoting soft skills in the workplace and the academic commitment to strive for their development and strengthening for personal, academic and work life.

Educative technology

It has been shown that the incorporation of ICT in training processes is effective as long as it is associated with specific educational purposes, as well as a didactic planning prepared by the teacher. The use of digital tools in the educational field is disruptive, but that does not necessarily imply an educational disruption (García, 2019).

Regarding the use of technology, here the Google Classroom and Zoom platforms were mainly used for the sessions, communication, activities and follow-up. In addition to the fact that videoconferences can be held in which large groups can be attended, they have the advantage that they allow the creation of rooms with small groups in which the teacher

can enter freely to follow up on the teams, which represented a great advantage. for the feedback of the work and in the end to share the integrating product.

Technological resources were also located within the reach of the students, due to availability and because they were free, which would allow the virtual creation of escape rooms. In Microsoft Office, the web application called OneNote, which also allows you to take notes, make lists and annotations. In this case, the course "Escape Room for the classroom" (https://academy.genial.ly/pildoras/como-crear-escape-game), which contains predesigned templates to create the escape rooms, was very useful. which you can make some adjustments.

Other technological resources used to create different digital challenges such as word searches, crossword puzzles, mathematical operations were: https://puzzlemaker.discoveryeducation.com, decipher a message with backwards writing (http://www.en.fliptext.net) and http://www.classtools.net.

In general, applying mechanics and dynamics in student-centered training processes has the purpose of motivating, fostering teamwork, responsibility, logical and creative thinking, analysis and reasoning to solve a problem or challenge, in short , to facilitate the construction of knowledge by the learner.

Active strategies with the use of technology are closely related to motivation, it is one of the causes of its rise: solution of challenges, prizes and rewards, levels of complexity, receiving points, medals, etc.; what is required of the teacher is to conceive gamification as a form of innovation and readjustment to the constant change of students and technological evolutions.

Research method

The purpose of the study

Evaluate by the student the skills achieved with the implementation of gamification and PBL in the Oral and Written Expression I learning unit of the upper secondary level of the National Polytechnic Institute (IPN).

Kind of investigation

The methodology used in the study is based on the quantitative approach with a descriptive scope, which has the purpose of analyzing the characteristics of the phenomenon to determine its presence in a certain human group. Data analysis is applied in the quantitative process. In this case, the intention was to evaluate the development of skills achieved in a group of students with the implementation of PBL and gamification.

Participants

The participants in the study were officially 50 students who were studying virtually the first semester, from August to December 2021, of the bivalent baccalaureate, in particular the Oral and Written Expression I learning unit, at the IPN.

Didactic intervention

Regarding soft skills, interpersonal, decision-making, thinking, self-control, coping and communication skills were considered for this study, each one integrates variables that can be seen grouped in Table 2.

Table 2. Soft skills

Habilidades interpersonales	Habilidades de toma de decisión y pensamiento crítico	Habilidades de autocontrol y afrontamiento	Habilidades comunicativas
Comunicación interpersonal	Resolución de problemas	Aumentar la confianza personal	Escuchar
Negociación	Toma de decisiones	Responsabilidad	Leer
Trabajo en equipo	Investigación documental	Fijarse objetivos y metas	Expresión oral
Desarrollo de la creatividad	Liderazgo		Expresión escrita

Source: Leiva (2018)

In order to promote and implement active methodologies, this educational practice has combined PBL and gamification. The students, on the one hand, experienced gamification and, on the other, were creators of an escape room. This during the first semester

of 2021, in the confinement stage, so the modality used was virtual as a training space. Thus, skills were developed through the identification of a problem related to their environment, they investigated it and, as a final product, an escape room was elaborated, whose design was carried out with the use of available and free technological tools.

On the one hand, gamification was applied in class by creating a group story ("The problems that will take us to the end of the world"), which led to solving the challenges proposed to save the world, as the narrative progressed. , all in relation to the programmatic contents of the Oral and Written Expression course, that is, various communicative situations where messages, codes, levels, variations and deformations of the language were involved in the same way in which they are presented in daily life (This emphasizes the usefulness and functionality of learning in real scenarios to be able to communicate).

Once the group experienced gamification, the four PBL phases proposed by Sotomayor et al. (2021) and that are closely linked to the Classroom Project institutionalized within the IPN (2008):

1) Challenge. Assembly to group analyze the problem to be addressed: pollution, animal experimentation, femicides, economic crisis, water shortage and poverty, which originated as a question: what can we do to save the world?

2) Research. The group was divided into teams freely and out of interest in some of the problems identified to start the search in reliable sources of information, the causes-consequences, evolution or chronology, etc. And finally, relate the topic to one of the United Nations Sustainable Development Goals and identify the global problems that we face on a day-to-day basis and the proposals that are put forward, from the simplest, most immediate and individual to the most complex and collective.

3) Creation. Each team made the products or partial evidence based on the selected topic: elaboration of an investigation report, elaboration of the story or narrative (investigating a crime, being adventurers and traveling through time, a supernatural event, a space mission, etc.), prepare a double-entry table with the challenges, tests, enigmas, relate them to the information investigated as causes, consequences, evolution, etc., and with the sequence of the story, select the technological tool in which it is going to be designed the escape room, assess whether the challenges are sufficient and consistent with the characteristics of the technological tool or whether they need to be adapted or replaced, elaboration of the escape rooms.

4) Communication. On the one hand, each team made presentations on various topics in a traditional way, and on the other hand, they shared the escape room with the group and people close to them.

In the four phases, the teacher coordinated, supported and followed up on the work of the teams, providing feedback, leading them to self-assessment, identifying areas of opportunity and making improvements in the work carried out.

Instrument

The information was collected through a questionnaire that was organized under a Likert scale with five options for each of the items: Not at all (N = 1), Little (P = 2), Neutral (NE = 3), Very satisfied (MS = 4) and totally satisfied (TS = 5). The design and content of the initial instrument was validated using the expert judgment technique with the intention of identifying its consistency and wording. Subsequently, the respective adjustments were made for the final version, which was applied to the research participants. In this way, the instrument was made up of four dimensions, each one made up of different abilities. Table 3 lists the significant results: those with the highest percentage obtained within the Likert scale, which represent the assessment made by the students of their training experience.

Table 3. Dimensions of soft skills developed

Habilidades blandas	El proyecto de elaboración de salas de escape te permitió:	1 = Nada	2 = Poco	3 = Neutral	4 = Muy satisfecho	5 = Totalmente satisfecho
Habilidades interpersonales	*1)* La comunicación con otras personas					64%
	2) La negociación para llegar a acuerdos					64%
	3) El trabajo en equipo					48%
	4) Desarrollo o fomento de la creatividad				48%	
Habilidades de toma de decisión y pensamiento crítico	*5)* La solución o resolución de problemas				36%	
	6) La toma de decisiones					40%
	7) La investigación documental			48%		
	8) Asumirse en cierto momento como líder en el equipo					36%
Habilidades de autocontrol y afrontamiento	*9)* Aumentar la confianza personal					50%
	10) La responsabilidad					61%
	11) Fijarse objetivos y metas					90%
Habilidades comunicativas	*12)* Escuchar					56%
	13) Leer				48%	
	14) Expresión oral					56%
	15) Expresión escrita				52%	

Source: self made

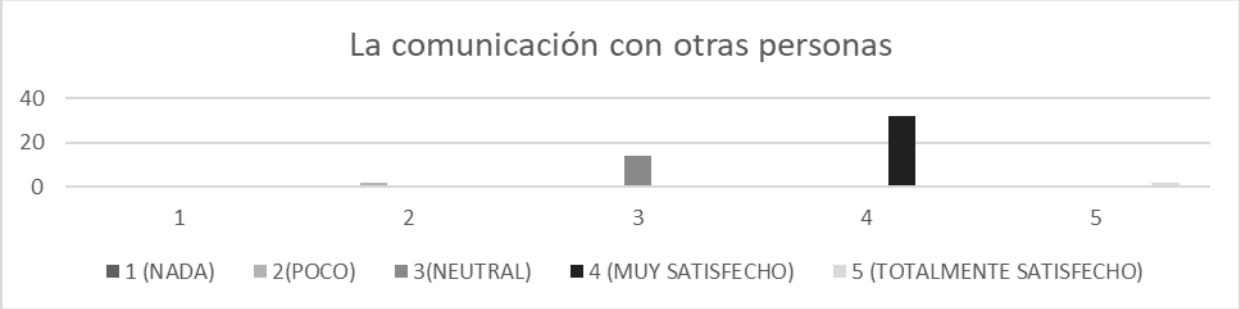
Also, its internal consistency was evaluated using Cronbach's alpha coefficient and a value of 0.885 was obtained, which indicates reliability. This gave way to the application electronically; the objective and importance of the research was explained to the students and their confidentiality was guaranteed. Once the information was collected, descriptive

statistics (absolute and relative frequency and graphs) were used, which allowed the analysis of the data.

Results

Each figure illustrates the results obtained from the questionnaire with which soft skills were evaluated.

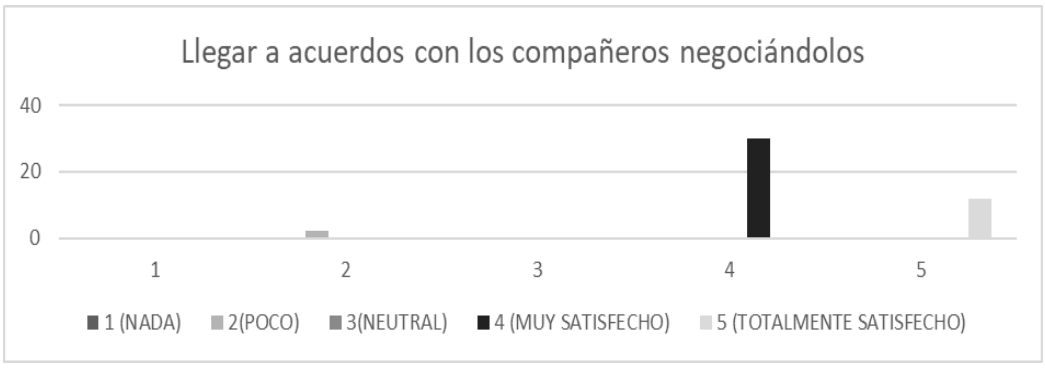
Figure 3. Communication with other people



Source: self made

According to the participants, the option that prevails over communication with other people is, with 64% (32 students out of 50), very satisfied and neutral, with 28% (14 students), so it follows that communication is an area for improvement, as it was only partially developed and through technological means and applications on devices. These results confirm what was expressed by Sierra and Fernández (2017) regarding the incorporation of ICTs in training processes as a priority because they promote significant learning and even the development of communication skills.

Figure 4. negotiated agreements



Source: self made

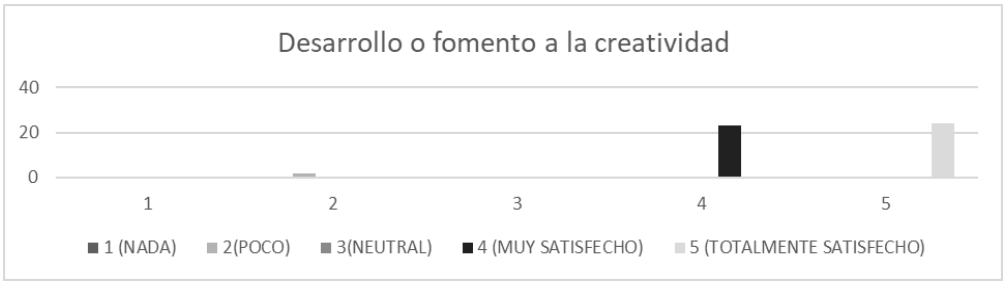
As for reaching an agreement with classmates through negotiation, 64% state that they are very satisfied and 28% totally satisfied, so it can be said that this soft skill has been developed favorably in the students.

Figure 5. Teamwork

Source: self made

Regarding teamwork, the predominant option is very satisfactory (48%, which is equivalent to 24 students), while 36% (18 students) are totally satisfied. On the other hand, some of the teams had frequent dissatisfactions or disagreements that affected the product to be obtained. According to Silva and Maturana (2017), active methodologies involve the collaboration of students in activities in a virtual community.

Figure 6. Development or promotion of creativity

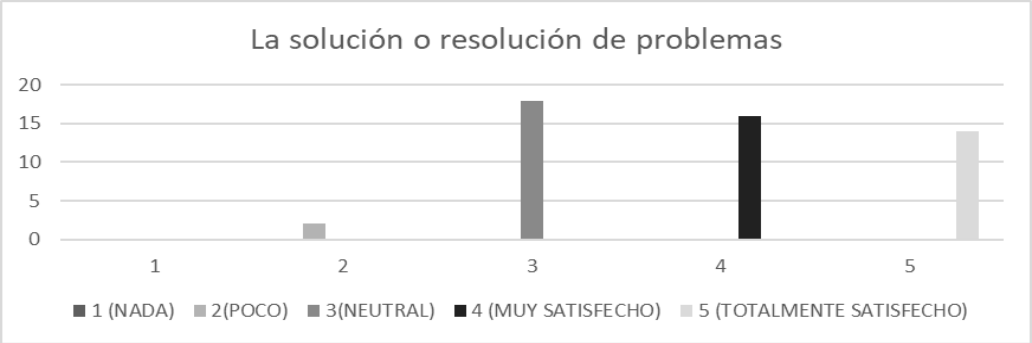


Source: self made

In the development or promotion of creativity, the option that predominates is very satisfied (46%, 23 students) and according to the opinion of one more student, totally satisfied (48%, 24 students). In view of these results, it follows that creativity was a skill developed in the group due to the strategies and activities used that gave the students the opportunity to conceive new stories, relationship of concepts and challenges, design of escape rooms . This is not minor if one takes into account that among the skills most demanded by employers are

analytical thinking and innovation, creativity, originality and initiative, as established by the World Economic Forum (20 de octubre de 2020).

Figura 7. Desarrollo o fomento a la creatividad

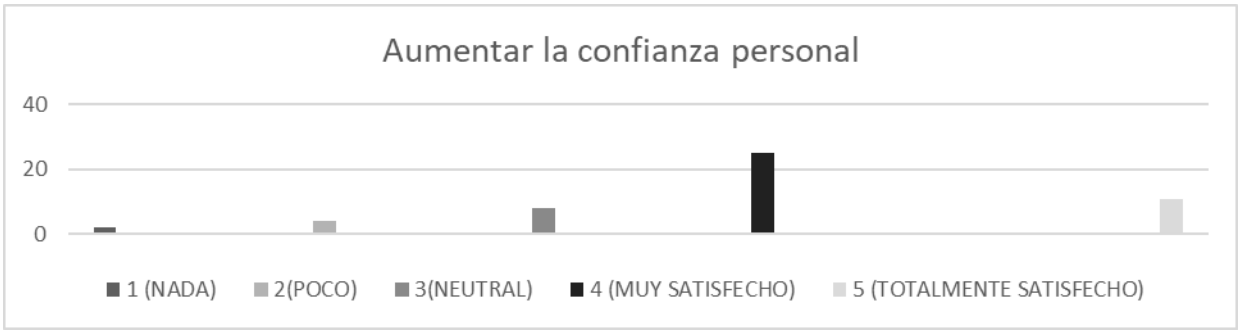


Source: self made

In general, it is identified that there were not many inconveniences for the teams or the members of each team when solving the problems; they knew how to act in the face of setbacks or adversities in most cases. The options that stand out the most in the figure are: very satisfied with 36%, which is equivalent to 18 students, and totally satisfied with 32%, equal to 16 students. However, there were cases in which the solution or resolution of problems was not identified, according to the result, 28% is neutral, equivalent to 14 students, and two students, who represent 4%, express that the ability was little developed. .

Therefore, this category, problem solving, represents an area for improvement, since it is related to meaningful learning, since the student is required to carry out various activities to establish relationships between what is new and what they already know. that is, reformulate, differentiate, discover, order, classify, rank, relate, integrate, solve problems, as established by Ponce (2004).

Figure 8. Increase self-confidence



Source: self made

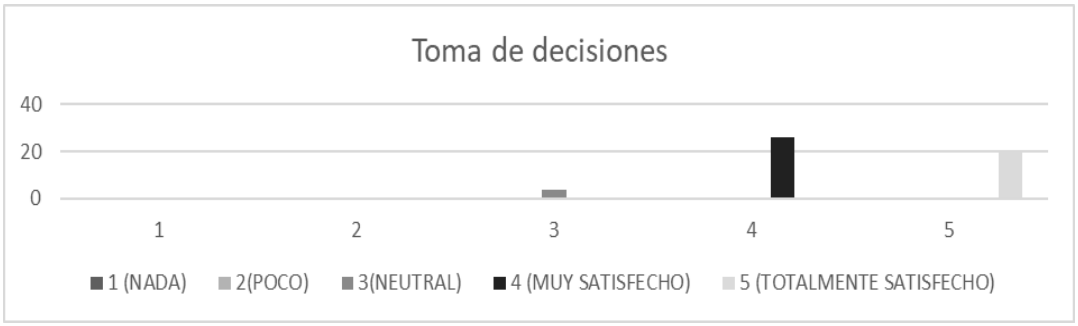
Personal confidence is a difficult quality to develop, and the results confirm this assessment: 2%, corresponding to two students, state that they did not develop it at all, twice as many, 4%, developed it little. On the other hand, 25 students, which is equivalent to 50%, say they are very satisfied by increasing their confidence and in the same way, 22% or 11 students express their total satisfaction. Although the majority of the positive results are, it is necessary to reflect on those who gave a neutral opinion and did not manage to increase their confidence, since active and innovative strategies also include or promote work habits and basic socio-emotional skills relevant to training in the job (Secretaría del Trabajo y Previsión Social, 9 de enero de 2019).

Figure 9. Responsibility

Source: self made

The results in this area, that of responsibility, are inclined towards the positive; in effect, 31 students (62%) were totally satisfied and 14 students (28%) expressed being very satisfied with the responsibility assumed; 10% took little responsibility for activities or obligations.

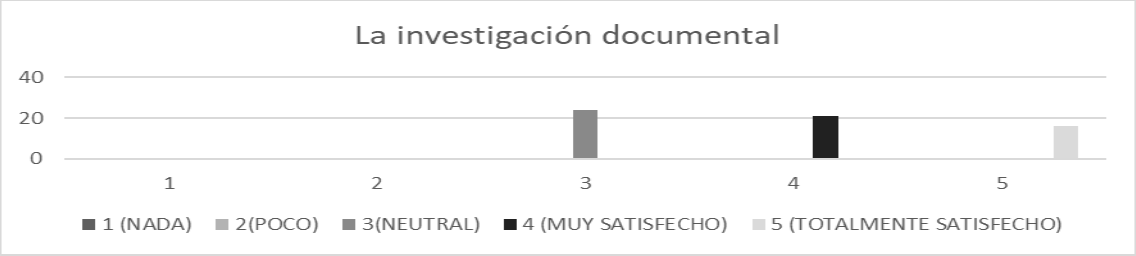
Figure 10. Decision making



Source: self made

Regarding decision-making, the predominant opinion was that of very satisfied with 32% (26 students); Similarly, the second option was totally satisfied with 40% (20 students) and with 8% (4 students) the opinion of neutral. Therefore, this ability developed favorably, due to the organization of the teams to make decisions regarding responsibilities, activities and products to be carried out, which corroborates that the strategies used encouraged decision-making, the use of effective leadership and the use of of varied techniques to solve problems, as indicated by both Fotaris and Mastoras (2019) and by Watermeier and Salzameda (2019).

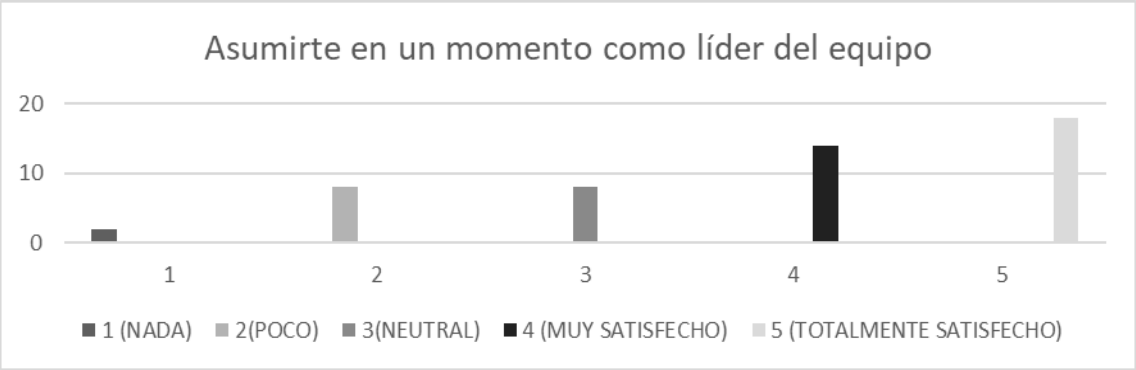
Figure 11. Documentary research



Source: self made

The perception of this category was good; 42% (21 students) were very satisfied with having developed documentary-type research and 34% (17 students) were totally satisfied. However, it is an area for improvement, since there were 48% (24 students) with a neutral assessment, a figure that represents the majority. In this way, the results obtained are appreciated and related to those expressed by García-Bullé (March 11, 2021) in that the goal of this learning is to provide students with activities and support to develop search analysis skills. and synthesis of information, as well as problem solving, dialogue and expression.

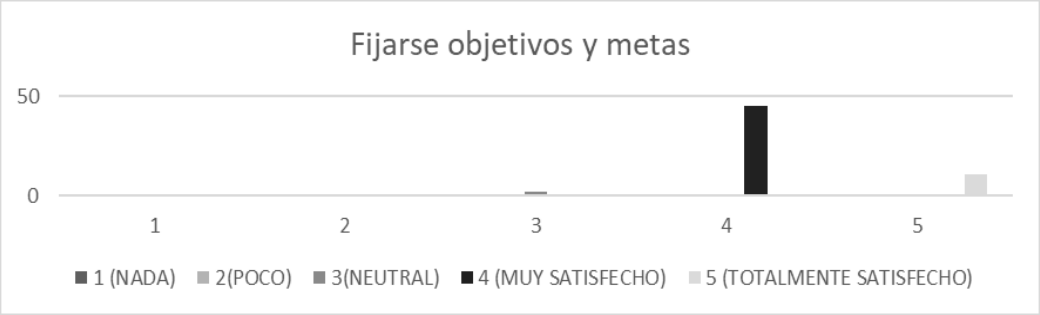
Figure 12. team leader



Source: self made

The outstanding options in this option in descending order are: totally satisfied with 36% (18 students), very satisfied with 28% (14 students), neutral and little with the same result: 16% (8 students) and not at all with 4%. (two students). Confidence in themselves and assuming themselves as team leaders is developed in 64% in total, which implies the need to continue with the work that allows consolidating this soft skill.

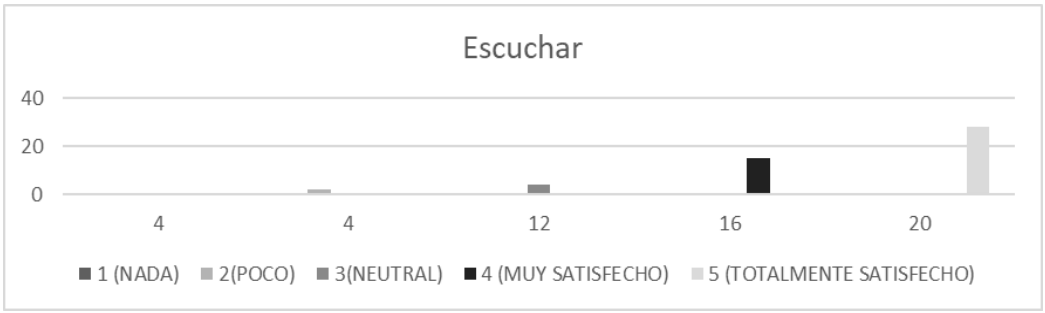
Figure 13. Set goals and objectives



Source: self made

Most students (90%, 45 students) are very satisfied; as for the rest, totally satisfied (6%, three students) and neutral (4%, two students). Taking these results into account, the objectives and goals of the teams were successfully developed, thus confirming what was established by Wu et al. (2018) regarding the use of escape rooms contributes to the development of skills such as teamwork, creative thinking, communication, time management and self-regulation, mainly.

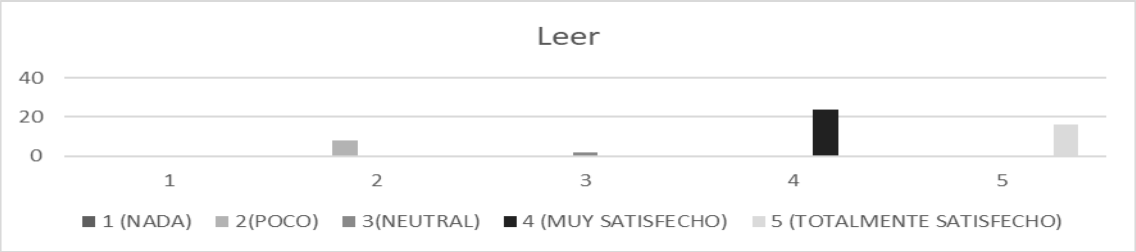
Figure 14. Listen



Source: self made

Most of the opinions of the group members were heard and they learned to listen to others, so this soft skill was developed. The prevailing options are totally satisfied with 56% (28 students), very satisfied with 30% (15 students) and neutral with 18% (four students).

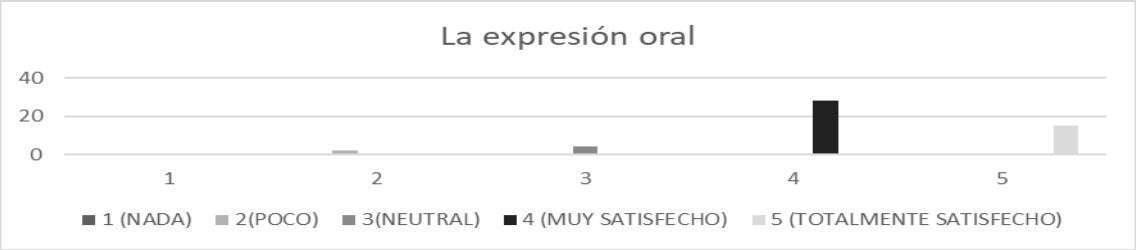
Figure 15. Reading



Source: self made

The participants showed a good reading performance, according to the results obtained, since the prevailing option was very satisfied with 48% (24 students), totally satisfied 32% (16 students), neutral 16% (eight students) and little 8% (two students); However, although most of the students feel very satisfied and satisfied with the promotion of reading, it is important to continue it the way it was done, through activities that led them to practice it with pleasure and motivation, and not by obligation.

Figure 16. Oral expression

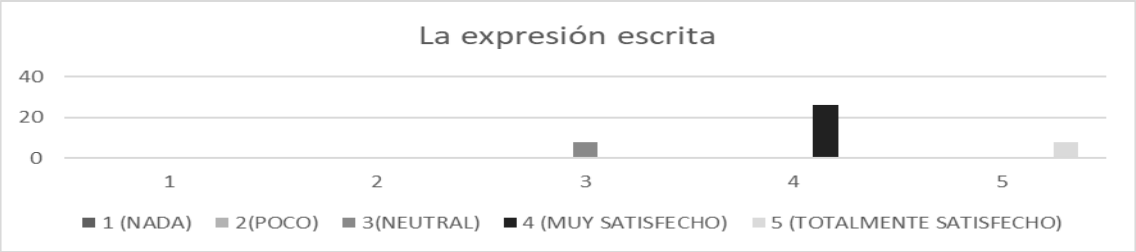


Source: self made

The item of oral expression is a strong point in the group, because if the options are considered globally, totally satisfied with 30% (15 students) and very satisfied with 56% (28 students), the result is 86%. , which is a significant participation that implies a consolidated development of this skill. Oral expression is one of the necessary skills to develop others such as decision making, creativity, leadership; It is the natural and immediate form of communication.

These results reflect the idea that the goal of this type of learning is to provide students with the environment, activities and accompaniment to develop information search, analysis and synthesis skills; also to solve problems, dialogue and expression.

Figure 17. Written expression



Source: self made

Figure 17 shows high satisfaction on the part of the members of the group, given that the predominant options are very satisfied (32%) and totally satisfied (52%); in aggregate, a rating of 84%. However, this item should have greater promotion because it is a skill that requires more time to achieve higher quality performances. Data that allow reaffirming what was expressed by Santos et al. (2020) regarding the use of the game, the educational context should not only favor the fun and leisure of the students, but through it the already established didactic objectives should be achieved.

In this sense, the advantages of applying PBL in the classroom and, as a final product, having developed escape rooms to promote different soft skills were: reaching negotiated agreements, teamwork, fostering creativity in challenges. to solve, decision making, setting goals and objectives to solve a problem and skills that are closely related to communication: listening, reading, oral and written expression.

Discussion

PBL, which is a strategy mostly used in different areas such as education and business, is widely accepted, however, putting it into practice requires knowledge of the stages and a clear objective of what you want to achieve, as well as as the experience of the coordinator, who must be flexible so that within the stages that the methodology implies, he can consider and integrate the interests and needs of the students, without losing sight of the purpose that he has. Undoubtedly, the use of PBL and gamification, escape rooms in this case, is conducive and can be continuously incorporated into the new normality because they develop the various soft skills, as well as there is a link with the professional development that they require. students for their insertion into the workplace, which confirms what is stated by both de Alba (2020) and Vargas and Santillán (2022).

Based on the foregoing, it coincides with Loveless and Williamson (2017) regarding the fact that online learning ecosystems, where active methodologies such as PBL and gamification are integrated, constitute relevant strategies to promote learning. collaborative work, written and oral communication, as well as leadership in a context mediated by technology.

Although the IPN has the well-known Classroom Project, a methodology based on PBL and implemented since 2004, it is not always carried out or is carried out with a teacher's own methodology and away from the basic principles. From the date of its implementation to the current date, two problems are perceived: the teacher has not been updated on the PBL to confirm the theoretical-methodological principles, as well as the integration of other tools such as the technological ones, and on the other hand, it is not has made an institutional evaluation of the operation, evolution and follow-up.

Having integrated the escape rooms to achieve the development of soft skills is also a success as an active methodology, the students have prior knowledge about how video games work. This finding confirms what was indicated by Villacís et al. (2022) regarding that PBL encourages active learning and collaborative work, fostered by teaching planning. Meanwhile, it coincides with what was pointed out by Santos et al. (2020), López (2019) and Wu et al. (2018) in regard to the fact that gamification is a methodology that encourages student motivation and that allows, simultaneously, both the development of soft skills and the achievement of didactic objectives, which is why it affects an academic training of students. quality in students.

However, the main difficulty was moving from a commercial and merely recreational game to a serious educational game that considered the individual, community and social needs of the moment of confinement that was being experienced.

Both active methodologies have to start from the application in daily life, where the student is the center of all activity, however, it must also be considered that not all the students involved have the minimum technological tools available to develop projects such as the that was carried out, which at one point can be an obstacle and limiting communication and other skills, which could be remedied with the distribution of roles within the teams.

Conclusions

The active strategies and their combination promote the integral formation of the student in two ways: combining scientific, technological and humanistic quality and by developing balanced knowledge, values and attitudes through teamwork (putting into practice tolerance, solidarity and responsibility), decision making, creativity and the solution to real or contextualized problems, in this case through the approach of communicative codes and contexts, which will immediately be knowledge and skills for personal and academic life, and later on in professional life.

Likewise, it is necessary to consider that soft interpersonal, self-control and coping skills were developed to a greater degree; It is necessary to continue reinforcing the skills related to decision-making, critical thinking and communication skills, possibly due to the close relationship that exists between documentary research with reading and written expression.

On the other hand, an educational practice of this type facilitates learning to learn, putting into practice the skills developed and developing similar or more complex projects, in different contexts and in multiple spaces inside and outside the classroom, thus promoting autonomous and meaningful learning. , research, communication, the use of ICT and provide an answer or solution to a palpable problem in the design or construction of a product, the result of a project that develops or strengthens skills required by employers for 2025 expressed in knowledge, skills and attitudes.

Finally, it should be noted that the use of a single active methodology by teachers is not recommended, but it is important that their teaching practice is made up of a repertoire of these that allow them to even compare their effectiveness in the development of soft skills according to the educational level in which the student is attending.

Future lines of research

The foregoing leads us to propose that in the future users, both teachers and students, could be followed up, mainly on connectivity, equipment and digital knowledge that they possess. In the same way, know what are the options available to access the digital content necessary to promote research.

Like any other didactic tool, it will be necessary to carry out the evaluation by the user or player of the pedagogical and technological design of the escape rooms carried out, as well as to assess the effectiveness during the training journey of the students.

And finally, it will be interesting to do a comparative study on the active strategies used: PBL, gamification and flipped classroom to know the advantages and areas of opportunity that exist between them.

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Adquisición de fondos	María Elena