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Effectiveness of an educational program in the development of creative thinking in Peruvian primary school students

Eficácia de um programa educacional no desenvolvimento do pensamento criativo em estudantes peruanos do ensino fundamental

Eficacia de un programa educativo en el desarrollo del pensamiento creativo en estudiantes peruanos de educación primaria

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The implementation of the educational program showed significant improvements in the development of creative thinking, highlighting the effectiveness of active methodologies in traditional educational contexts. This result emphasizes the need to transform pedagogical practices and integrate innovative strategies that prepare students to face real challenges, making this model a replicable alternative for improving educational quality.
Originality/value:
This research provides empirical evidence on the effectiveness of an educational program centered on problem-based learning to enhance creative thinking in traditional educational contexts. Its relevance lies in promoting active methodologies as innovative alternatives to transform pedagogical practices and foster essential skills in students, preparing them to face real-world challenges.

ABSTRACT

This research aimed to determine the effectiveness of an educational program centered on problem-based learning in developing of creative thinking in primary school students from the city of Huancavelica, Peru. The approach was quantitative, with a quasi-experimental design. The sample consisted of 50 fifth-grade primary school students from a public educational institution, evenly divided into an experimental group (n=25) and a control group (n=25). An educational program focused on problem-based learning was implemented, and its effectiveness was evaluated using a questionnaire. The results indicate that, during the pretest, most students in both the control group (64%) and the experimental group (72%) had low creative thinking development. However, posttest results indicate that in the control group, the level of creative thinking development remained predominantly low (60%), while in the experimental group, 100% of the students reached a high level of development. Additionally, it was determined that there were no statistically significant differences between the experimental and control groups before the implementation of the educational program (pretest) ($U= 241.000$; $p>0.05$). However, after the program's application (posttest), statistically significant differences were observed between the two groups ($U= 0.000$; $p<0.05$). In particular, the experimental group achieved results that were different from those of the control group. These findings confirm that implementing the educational program improved creative thinking skills in primary school students from Huancavelica, Peru.

Keywords: creative thinking; learning; students; educational program; primary education.

RESUMO

O objetivo da presente pesquisa foi determinar a eficácia de um programa educativo centrado na aprendizagem baseada em problemas no desenvolvimento do pensamento criativo em estudantes do ensino fundamental da cidade de Huancavelica. A abordagem foi quantitativa, com um delineamento experimental do tipo quase-experimental. A amostra foi composta por 50 estudantes do quinto ano do ensino fundamental de uma instituição pública, divididos igualmente em um grupo experimental (n= 25) e um grupo de controle (n= 25). Foi implementado um programa educativo focado na aprendizagem baseada em problemas, cuja eficácia foi avaliada por meio da aplicação de um questionário. Os resultados indicam que, durante o pré-teste, a maioria dos estudantes tanto do grupo de controle (64%) quanto do grupo experimental (72%) apresentavam um nível baixo de desenvolvimento do pensamento criativo. No entanto, os resultados do pós-teste indicam que, no grupo de controle, o nível de desenvolvimento do pensamento criativo permaneceu predominantemente baixo (60%), enquanto no grupo experimental, 100% dos estudantes alcançaram um nível alto de desenvolvimento. Além disso, foi determinado que não houve diferenças estatisticamente significativas entre os dois grupos antes da implementação do programa educativo (pré-teste) ($U= 241.000$; $p>0.05$). Contudo, após a aplicação do programa (pós-teste), foram observadas diferenças estatisticamente significativas entre os dois grupos ($U= 0.000$; $p<0.05$). Em particular, o grupo experimental obteve resultados diferentes do grupo de controle. Estes achados confirmam que a implementação do programa educativo foi eficaz para melhorar as habilidades de pensamento criativo em estudantes do ensino fundamental da cidade de Huancavelica.

Palavras-chave: pensamento criativo; aprendizagem; estudantes; programa educativo; ensino fundamental.

RESUMEN

El objetivo de la presente investigación fue determinar la eficacia de un programa educativo centrado en el aprendizaje basado en problemas en el desarrollo del pensamiento creativo en estudiantes de educación primaria de la ciudad de Huancavelica. El enfoque fue cuantitativo con un diseño experimental de tipo cuasiexperimental. La muestra estuvo compuesta por 50 estudiantes del quinto grado de educación primaria de una institución educativa pública divididos equitativamente en un grupo experimental (n=25) y un grupo control (n=25). Se implementó un programa educativo, cuya eficacia fue evaluada mediante la aplicación de un cuestionario. Los resultados indican que, durante el pretest, la mayoría de los estudiantes tanto del grupo control (64%) como del grupo experimental (72%) se encontraban en el nivel bajo de desarrollo del pensamiento creativo. No obstante, los resultados del postest indican que, en el grupo control, el nivel de desarrollo del pensamiento creativo siguió siendo predominantemente bajo (60%), mientras que, en el grupo experimental, el 100% de estudiantes alcanzó un nivel de desarrollo alto. Además, se determinó que no hubo diferencias estadísticamente significativas entre ambos grupos antes de la implementación del programa educativo (pretest) ($U= 241.000$; $p>0.05$). Sin embargo, después de la aplicación del programa (postest), se observaron diferencias estadísticamente significativas entre ambos grupos ($U= 0.000$; $p<0.05$). Específicamente, el grupo experimental obtuvo resultados diferentes a los del grupo control. Estos hallazgos confirman que la implementación del programa educativo fue efectiva para mejorar las habilidades de pensamiento creativo en estudiantes de educación primaria de la ciudad de Huancavelica.

Palabras clave: pensamiento creativo; aprendizaje; estudiantes; programa educativo; educación primaria.

INTRODUCTION

Today, the ability to adapt quickly to change, find innovative solutions to complex problems and think flexibly are skills that are increasingly in demand (Quispe et al., 2024; Thornhill et al., 2023). The speed with which technology advances, the challenges that arise globally and the constant evolution of social and economic needs require people not only to adjust to new realities, but also to have the ability to anticipate changes and contribute to the creation of new solutions (Ritter et al., 2020). These aspects are essential in a constantly changing context, where the ability to generate new ideas and approaches makes a difference in the personal, academic and professional spheres (Samaniego et al., 2024). In this sense, it is essential to develop processes that favor creativity and creative thinking from the early years of study.

Creative thinking is the ability to generate new and original ideas, solutions or approaches to a challenge, involving the use of imagination and non-linear thinking to explore possibilities outside conventional schemes (Rosen et al., 2020). It fosters mental flexibility, the ability to find multiple answers to a problem and the willingness to experiment without fear of failure (Ritter & Mostert, 2017). In the educational context, this type of thinking allows students to develop an active and autonomous approach to their learning, promoting innovative problem solving, the questioning of established concepts and the application of their creativity in various areas of knowledge (Muñoz et al., 2021). In addition, it favors the development of skills such as curiosity, resilience and willingness to take risks, preparing students to face the challenges of the future (Karunarathne & Calma, 2023).

According to Oppenheimer (2015), one of the main obstacles to the development of creative thinking is a social and legal culture that does not tolerate failure, where error is stigmatized and the result is valued more than the effort. This prioritizes the cognitive aspect over the affective and volitional, generating individuals with poor social skills, tendency to individualism, conformism and indifference to the economic, political and social context. In addition, it is related, in part, to an educational system that is still anchored in a traditional and behaviorist model, which limits creativity and the ability to adapt to new situations. As a result, new generations face difficulties in transferring what they have learned to different contexts and finding original solutions to problems. This scenario invites teachers at all educational levels to reflect on their pedagogical practices and make decisions that consider creativity as an essential tool to contribute to social progress (Espiritu, 2018).

On the other hand, creativity is enhanced through art and play, but it also faces challenges due to global phenomena such as innovation, economic productivity and marketing, which transform educational reality (Henriksen et al., 2018). It is essential that all students develop this type of thinking, a process that must start at home and be strengthened at school, where teachers play a determining role (Gregory et al., 2013). However, in the context of the pandemic, this work has been significantly affected, which further highlights the importance of fostering and understanding creative thinking (Castañeda & Tapia, 2021).

There are several strategies to foster creative thinking, such as problem solving, which involves posing open and complex situations that require original solutions; brainstorming techniques, which promote the generation of multiple proposals in a non-judgmental environment; and mind maps, tools that help structure and visualize ideas, encouraging association and divergent thinking (Villegas, 2022). In addition, active methodologies, such as problem-based learning, project-based learning and collaborative learning, are effective approaches to develop this skill in different contexts (Wambui, 2024).

According to Romo et al. (2016), creative thinking is composed of four dimensions. Fluency refers to the ability to generate multiple ideas or answers, showing imagination and communication skills to find diverse solutions. Flexibility involves approaching problems from different perspectives, adapting and reinventing strategies according to the circumstances. Originality consists of conceiving unique and innovative ideas, standing out for their novelty and authenticity. Finally, elaboration is the ability to deepen and systematize ideas, combining details and knowledge to produce complex and meaningful results.

One of the ways to develop creative thinking is through problem-based learning. Problem-based learning is a student-centered educational methodology that uses real problems as a starting point for learning (Phungsuk et al., 2017). According to Barrows & Tamblyn (1980), problem-based learning is characterized by presenting situations that lack a single correct solution, which challenges students to explore various perspectives and possible solutions. The above allows students to become active agents of their own learning, promoting research, reflection and knowledge construction from practical experiences (Ghani et al., 2021).

Problem-based learning not only enhances cognitive skills such as critical thinking and creativity, but also promotes autonomy, collaboration, and meaningful learning (Yu, 2024). In the context of primary education, problem-based learning has a significant impact on students' holistic development (Yew & Goh, 2016). This methodology not only enhances creative thinking, but also strengthens social skills, such as teamwork and communication, and values such as responsibility and

perseverance (Deep et al., 2019). In addition, by solving problems related to their environment, students manage to connect learning with their daily lives, which increases their motivation and commitment to the educational process (Rotgans & Schmidt, 2012).

This research is justified by the need to promote innovative pedagogical strategies that contribute to the integral development of elementary school students. In a context in which creative thinking is essential to face the challenges of the 21st century, it is imperative to implement educational programs that foster skills such as fluency, flexibility, originality and elaboration in children, as a basis for meaningful and sustainable learning. The focus on problem-based learning not only aligns teaching with constructivist theories but also provides a collaborative and dynamic environment that enhances creativity, problem solving and critical thinking. In addition, the choice of the city of Huancavelica responds to the need to generate evidence in specific contexts, often little explored, where access to innovative methodologies can make a significant difference in educational quality and in the development of key competencies in students.

Finally, the objective of this research was to determine the effectiveness of an educational program focused on problem-based learning in the development of creative thinking in elementary school students in the city of Huancavelica.

METHODS

Design

The research adopted a quantitative approach, focused on the collection and analysis of numerical data to identify behavioral patterns in the sample studied. The design was classified as experimental, since an educational program was implemented as an independent variable to evaluate its impact on the development of critical thinking, considered the dependent variable. In addition, it was a quasi-experimental design, since we worked with a pre-existing sample of students, assigned to an experimental group and a control group according to practical criteria.

Population and sample

An investigation was carried out with an initial population of 600 elementary school students in the city of Huancavelica. From this population, a sample of 50 students was selected, distributed between the experimental group and the control group. The inclusion criteria established that the participants had to be in the fifth grade, while the exclusion criteria ruled out those who were in different grades. The sampling method applied was non-probabilistic, which allowed choosing the participants according to the researcher's decisions and based on specific and appropriate criteria for the context of the study (Hernández & Mendoza, 2018).

Instrument

The technique used was the survey, and the instrument employed was an ad hoc questionnaire composed of 35 items distributed in four dimensions: fluency (10 items), flexibility (9 items), originality (8 items), and elaboration (8 items). The metric properties of the questionnaire were determined through validity and reliability procedures. In this sense, after submitting the instrument to expert judgment, it was found to have an adequate level of content validity (Aiken's V = 0.750). In addition, after conducting a pilot test with the participation of 20 students, the questionnaire was found to have an adequate internal consistency (α= 0.721).

Procedures

The research was carried out in three previously defined stages. In the first stage, the necessary permissions were obtained through coordination with the management team of the selected educational institution. After obtaining the corresponding authorization, a pretest was applied to both the experimental group and the control group. The second stage was dedicated to the implementation of the psychoeducational program, which was carried out over a period of three months and included 10 learning sessions of 90 minutes each, using an active methodology to encourage student participation. Finally, in the third stage, the post-test was applied to both groups in order to evaluate the effectiveness of the educational program.

Data analysis

Data analysis in this study integrated descriptive and inferential statistical techniques to provide a better understanding of the results. In the descriptive phase, frequency distributions and percentages were used, organized in tables that facilitated the visual and comparative interpretation of the data. On the other hand, in the inferential analysis we used the nonparametric Mann-Whitney U test, selected for its suitability when working with independent samples and distributions that do not meet the assumptions of normality. This test made it possible to evaluate whether there were statistically significant differences between the pretest and posttest results in the experimental group and the control group, providing evidence of the efficacy of the program implemented.

Ethical aspects

Regarding ethical considerations, this research was carried out in accordance with the principles stipulated in the Declaration of Helsinki. A letter of informed consent was given to each parent, detailing the purpose of the study and requesting their voluntary authorization. This ensured the participation of the students in the different phases of the research: the initial stage, the execution of the educational program and the final stage, guaranteeing respect for the rights and integrity of the participants.

RESULTS AND DISCUSSION

Table 1 shows that, during the pretest, most of the students in both the control group (64%) and the experimental group (72%) were at the low level of critical thinking development, while the rest reached the medium level (36% in the control group and 28% in the experimental group). In both groups, no student reached the high level. However, the results of the posttest show significant differences between the groups. In the control group, students continued to be distributed between the low (60%) and medium (40%) levels, with none reaching the high level. On the other hand, in the experimental group, 100% of the students reached the high level.

Table 1. Development of critical thinking during pretest and posttest, according to control and experimental groups.

Level	Group			
	Control		Experimental	
	fi	%	*fi*	%
Pretest				
Low	16	64.0%	18	72.0%
Medium	9	36.0%	7	28.0%
High	0	0.0%	0	0.0%
Posttest				
Low	15	60.0%	0	0.0%
Medium	10	40.0%	0	0.0%
High	0	0.0%	25	100.0%

Note. Authors' development with the research data

Table 2 shows that in the pretest, in both the control and experimental groups, most of the students (76%) were at the low level of fluency, while the remaining 24% were at the medium level. No student reached the high level at this stage. The posttest results show a clear difference between the groups. In the control group, the proportions remained unchanged, with 76% of the students at the low level and 24% at the medium level, with none making progress to the high level. In contrast, in the experimental group, a significant improvement was observed: 80% of the students reached the high level, while 20% were at the medium level and none remained at the low level.

Table 2. Development of fluency during pretest and posttest, according to control and experimental groups.

Level	Group			
	Control		Experimental	
	fi	%	*fi*	%
Pretest				
Low	19	76.0%	19	76.0%
Medium	6	24.0%	6	24.0%
High	0	0.0%	0	0.0%
Posttest				
Low	19	76.0%	0	0%
Medium	6	24.0%	5	20.0%
High	0	0.0%	20	80.0%

Note. Authors' development with the research data

Table 3 shows that, in the pretest, 44% of the students in the control group were at the low level of flexibility, while 56% reached the medium level. No student was at the high level. In the experimental group, 60% were at the low level and 40% at the medium level, with no students at the high level. In the posttest, a significant difference was observed between the two groups. In the control group, students continued to be distributed between the low (40%) and medium (60%) levels, with none reaching the high level. On the other hand, in the experimental group, 68% of the students reached the high level, while 32% remained in the medium level, and none remained in the low level.

Table 3. Development of flexibility during pretest and posttest, according to control and experimental groups

Level	Group			
	Control		Experimental	
	fi	%	*fi*	%
Pretest				
Low	11	44.0%	15	60.0%
Medium	14	56.0%	10	40.0%
High	0	0.0%	0	0.0%
Posttest				
Low	10	40.0%	0	0.0%
Medium	15	60.0%	8	32.0%
High	0	0.0%	17	68.0%

Note. Authors' development with the research data

Table 4 shows that, in the pretest, most of the students in the control group (72%) were at the medium level of originality, while 28% were at the low level. No student reached the high level. In the experimental group, 64% of the students were at the medium level, and 36% at the low level, with no students at the high level. When comparing the results of the post-test, differences between the groups are evident. In the control group, most of the students remained in the medium level (80%), with 20% in the low level, with none reaching the high level. On the other hand, in the experimental group, 72% of the students reached the high level, while 28% remained in the medium level and no student remained in the low level.

Table 4. Development of originality during pretest and posttest, according to control and experimental groups.

Level	Group			
	Control		Experimental	
	fi	%	*fi*	%
Pretest				
Low	7	28.0%	9	36.0%
Medium	18	72.0%	16	64.0%
High	0	0.0%	0	0.0%
Posttest				
Low	5	20.0%	0	0.0%
Medium	20	80.0%	7	28.0%
High	0	0.0%	18	72.0%

Note. Authors' development with the research data

Table 5 shows that, in the pretest, 60% of the students in the control group were at the low level of elaboration, while 40% were at the medium level. No student reached the high level. In the experimental group, 68% of the students were at the low level and 32% at the medium level, with no students at the high level. In the posttest, the results showed a notable difference between the groups. In the control group, most students remained at the low (56%) and medium (44%) levels, with none advancing to the high level. However, in the experimental group, 88% of the students reached the high level, while 12% were at the medium level, and none remained at the low level.

Table 6 shows that there were no statistically significant differences between the experimental group and the control group before the implementation of the educational program (pretest) ($p>0.05$). However, after the implementation of the program (posttest), statistically significant differences were observed between both groups ($p<0.05$). In particular, the experimental group obtained different results than the control group. These findings confirm that the implementation of the educational program focused on problem-based learning was effective in improving creative thinking skills in elementary school students in the city of Huancavelica.

Table 5. Development of processing during pretest and posttest, according to control and experimental groups.

Level	Group			
	Control		Experimental	
	fi	%	*fi*	%
Pretest				
Low	15	60.0%	17	68.0%
Medium	10	40.0%	8	32.0%
High	0	0.0%	0	0.0%
Posttest				
Low	14	56.0%	0	0.0%
Medium	11	44.0%	3	12.0%
High	0	0.0%	22	88.0%

Note. Authors' development with the research data

Table 6. Results of the Mann-Whitney U test in the experimental and control groups (pretest and posttest) regarding creative thinking.

	Groups	N	Average range	Sum of ranks	Statistical/contrast	
Creative thinking	Control/ pretest	25	28.36	709.00	Mann Whitney U	241.000
					W for Wilcoxon	566.000
	Experimental/ pretest	25	22.64	566.00	Z	-1.389
					p	0.165
	Control/ posttest	25	13.00	325.00	Mann Whitney U	0.000
					W for Wilcoxon	325.000
	Experimental/ posttest	25	38.00	950.00	Z	-6.066
					p	0.000

Note. Authors' development with the research data

Table 7 shows that no statistically significant differences were found between the experimental group and the control group before the implementation of the educational program (pretest) ($p>0.05$). However, after the implementation of the program (posttest), statistically significant differences were observed between both groups ($p<0.05$). In particular, the experimental group showed different results than the control group. These findings confirm that the implementation of the educational program focused on problem-based learning was effective in strengthening fluency in elementary school students in the city of Huancavelica.

Table 7. Results of the Mann-Whitney U test in the experimental and control groups (pretest and posttest) with respect to fluency.

	Groups	N	Average range	Sum of ranks	Statistical/contrast	
Fluency	Control/ pretest	25	25.00	625.00	Mann Whitney U	300.000
					W for Wilcoxon	625.000
	Experimental/ pretest	25	26.00	650.00	Z	-0.245
					p	0.807
	Control/ posttest	25	13.02	325.50	Mann Whitney U	0.500
					W for Wilcoxon	325.500
	Experimental/ posttest	25	37.98	949.50	Z	-6.065
					p	0.000

Note. Authors' development with the research data

Table 8 shows that there were no statistically significant differences between the experimental group and the control group before the implementation of the educational program (pretest) ($p>0.05$). However, after the implementation of the program (posttest), statistically significant differences were identified between both groups ($p<0.05$). Specifically, the experimental group presented results significantly different from those of the control group. These results confirm that the implementation of the educational program focused on problem-based learning was effective in improving flexibility in elementary school students in the city of Huancavelica.

Table 8. Results of the Mann-Whitney U test in the experimental and control groups (pretest and posttest) with respect to flexibility

	Groups	N	Average range	Sum of ranks	Statistical/contrast	
Flexibility	Control/ pretest	25	28.42	710.50	Mann Whitney U	239.500
					W for Wilcoxon	564.500
	Experimental/ pretest	25	22.58	564.50	Z	-1.423
					p	0.155
	Control/ posttest	25	13.00	325.00	Mann Whitney U	0.000
					W for Wilcoxon	325.000
	Experimental/ posttest	25	38.00	950.00	Z	-6.077
					p	0.000

Note. Authors' development with the research data

Table 9 shows that no statistically significant differences were found between the experimental group and the control group before the implementation of the educational program (pretest) ($p>0.05$). However, after the implementation of the program (posttest), statistically significant differences were observed between both groups ($p<0.05$). In particular, the experimental group presented results significantly different from those of the control group. These findings confirm that the implementation of the educational program focused on problem-based learning was effective in improving originality in elementary school students in the city of Huancavelica.

Table 9. Results of the Mann-Whitney U test in the experimental and control groups (pretest and posttest) with respect to originality.

	Groups	N	Average range	Sum of ranks	Statistical/contrast	
Originality	Control/ pretest	25	27.84	696.00	Mann Whitney U	254.000
					W for Wilcoxon	579.000
	Experimental/ pretest	25	23.16	579.00	Z	-1.146
					p	0.252
	Control/ posttest	25	13.08	327.00	Mann Whitney U	2.000
					W for Wilcoxon	327.000
	Experimental/ posttest	25	37.92	948.00	Z	-6.047
					p	0.000

Note. Authors' development with the research data

Table 10 shows that there were no statistically significant differences between the experimental group and the control group before the implementation of the educational program (pretest) ($p>0.05$). However, after the implementation of the program (posttest), statistically significant differences were identified between both groups ($p<0.05$). Specifically, the experimental group obtained significantly better results compared to the control group. These results confirm that the implementation of the educational program focused on problem-based learning was effective in improving elaboration in elementary school students in the city of Huancavelica.

Table 10. Results of the Mann-Whitney U test in the experimental and control groups (pretest and posttest) with respect to processing

	Groups	N	Average range	Sum of ranks	Statistical/contrast	
Elaboration	Control/ pretest	25	28.06	701.50	Mann Whitney U	248.500
					W for Wilcoxon	573.500
	Experimental/ pretest	25	22.94	573.50	Z	-1.251
					p	0.211
	Control/ posttest	25	13.12	328.00	Mann Whitney U	3.000
					W for Wilcoxon	328.000
	Experimental/ posttest	25	37.88	947.00	Z	-6.019
					p	0.000

Note. Authors' development with the research data

Discussion

Nowadays, creative thinking is considered an important skill in primary education, as it allows students to develop their ability to generate ideas, solve problems in an innovative way and adapt to a constantly changing context. This fosters not only meaningful learning, but also the integral development of children, promoting competencies such as fluency, flexibility, originality and elaboration. By stimulating creative thinking from the early school years, the foundations are laid to form critical, reflective citizens who are prepared to face the challenges of the future with creativity and ingenuity. In this sense, the present research focused on determining the effectiveness of an educational program in the development of creative thinking in elementary school students in the city of Huancavelica.

The main finding of this research shows that the implementation of the educational program focused on problem-based learning was effective in improving creative thinking skills in elementary school students in the city of Huancavelica. During the pretest, most of the students, both in the control and experimental groups, were at a low level of creative thinking development. However, the post-test results revealed that, while the control group maintained predominantly low levels, 100% of the students in the experimental group reached a high level of development. These results were supported by the Mann-Whitney U statistical test, which showed the absence of statistically significant differences between the groups before the intervention. In contrast, after program implementation, statistically significant differences were identified between the two groups.

Several investigations have reported similar results, which provide complementary perspectives on the effects of problem-based learning on students' educational and personal improvement. Hurtado & Salvatierra (2020), based on John Barell's approach, demonstrated how PBL significantly improved literal interpretation in fourth grade students in an elementary school in Peru, promoting an analytical and reflective approach to reading. For instance, Luy (2019) analyzed the impact of problem-based learning on the emotional intelligence of third grade students in Lima, evidencing notable advances in competencies such as self-awareness and stress management, in addition to a strengthening in their academic performance. Similar results were found by Revelo Trujillo & Ramírez Román (2024) regarding self-regulation. These studies highlight the versatility and effectiveness of problem-based learning as an educational methodology. While Hurtado & Salvatierra (2020) evidence improvements in specific textual comprehension and analysis skills, Luy (2019) shows how problem-based learning can enhance emotional skills that are fundamental for personal and social development. These findings are important for educators and educational policymakers, as they suggest that problem-based learning can not only improve academic performance but also contribute significantly to the holistic development of students in multiple dimensions.

Problem-based learning has a solid theoretical foundation in various learning theories. Cognitive constructivism, based on the ideas of Piaget (1966), postulates that learning is an active process of knowledge construction in interaction with the environment. In problem-based learning, students develop creative thinking skills by constructing new knowledge as they solve problems and assimilate new information. This approach facilitates discovery learning by encouraging students to explore and find solutions on their own, which stimulates their creativity. In addition, Vygotsky's (1978) Zone of Proximal Development (ZDP) theory emphasizes collaboration and social support in learning. Problem-based learning adheres to this theory by providing a collaborative environment where students work together to solve problems, overcoming their individual boundaries with scaffolding provided by peers and facilitators. This, by integrating the above theoretical elements, is closely related to enhancing creative thinking, as it not only fosters individual creativity by solving problems autonomously, but also promotes collaborative creativity, where innovative ideas emerge from interaction and mutual support among students.

It was also found that the implementation of the educational program focused on problem-based learning was effective in improving fluency, flexibility, originality and elaboration in elementary school students in the city of Huancavelica. This means that students not only managed to generate a greater number of ideas (fluency) but also showed greater ability to adapt to different situations and explore multiple approaches to a problem (flexibility). In addition, there was an increase in the production of novel and unconventional ideas (originality), as well as in the ability to develop and refine these ideas with greater detail and precision (elaboration). These results reinforce the importance of active methodologies such as problem-based learning, which promote a comprehensive development of creative thinking skills in educational contexts.

This finding is consistent with that reported by Charcape et al. (2022), who found that the playful strategies program increases the achievement levels of students' creative thinking, highlighting fluency, flexibility, elaboration and originality as determining factors. In their study, it was observed that the implementation of playful strategies not only favors the development of these skills but also allows students to approach problems in a more open and flexible manner, promoting a learning environment that stimulates innovative ideas and improves students' ability to think critically and reflectively. Similarly, these results align with the findings of Carrión (2024), who, when applying an experimental program, observed significant improvements in the dimensions of fluency, flexibility, originality and elaboration of creativity, supported by

statistically significant results in all dimensions evaluated (Wilcoxon test, $p<0.05$). This supports the idea that programs focused on the improvement of complex, critical and creative thinking are effective, since they promote meaningful learning and the integral development of learners.

One of the main strengths of this research lies in the relevance of the topic addressed: the development of critical thinking in elementary school students. This topic is important, since critical thinking is a fundamental skill for the learning and integral development of students, allowing them to address problems, make informed decisions and actively participate in their context. By focusing the research on an educational program aimed at improving this competency, we contribute to a need in primary education: to prepare students for the cognitive challenges of the 21st century. In addition, the methodology employed, which included pretest and posttest with control and experimental groups, allowed for an accurate and objective measurement of the program's impact. The selected sample and the experimental design open new opportunities to implement effective teaching strategies in other educational contexts.

Research limitations

Despite the positive results obtained, it is important to recognize the limitations of this study. First, the sample size was small, which could restrict the generalizability of the findings. In addition, the program intervention was implemented during a specific period, which could have influenced the results obtained. Also, the specific context in which the research was conducted, which encompasses geographic, socioeconomic and environmental aspects, could have influenced the results. Finally, there are uncontrolled variables that could have influenced the development of creative thinking. These limitations should be considered with caution when interpreting the results and applying the findings to broader educational contexts, in turn opening new opportunities for future research in this area of education.

FINAL REMARKS

The findings of the present research allow us to conclude that the application of an educational program is effective in the development of critical thinking in Peruvian elementary school students. This means that, through the implementation of the program, students have improved their ability to analyze, evaluate and reflect on the information they receive. As a result, they become more competent in identifying arguments, formulating relevant questions and considering diverse perspectives before making decisions. In addition, students develop problem-solving skills in a more structured and logical manner, which enhances their academic performance and prepares them to face the challenges that arise in their daily lives with greater autonomy and independent thinking.

Therefore, it is recommended to implement educational programs focused on the development of critical thinking from early stages in primary education. These programs should include strategies that encourage analysis, reflection and problem solving, allowing students to improve their cognitive skills and academic competencies. In addition, it would be beneficial to integrate activities that promote teamwork, the discussion of ideas and the formulation of questions, since these practices reinforce students' critical capacity.

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