Program of Artificial Intelligence Tools to Optimize Autonomous Learning in Students of an Educational Institution in Chiclayo, 2025

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Research line: Pedagogical Innovations,University Social Responsibility Line: Support for the reduction of gaps and shortcomings in education at all levels , LIMA – PERU , 2026

HOW TO CITE:

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(2026). Program Of Artificial Intelligence Tools to Optimize Autonomous Learning in Students of an Educational Institution in Chiclayo, 2025.

International Journal of Special Education, 41(17s), 430-443

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ABSTRACT:

The objective of this study was to determine whether the application of an artificial intelligence program enhances autonomous learning in second-year secondary school students at a public educational institution in Chiclayo during 2025. A quantitative, applied, quasi-experimental study was conducted, with a control group and an experimental group, both assessed through pre-tests and post-tests. The sample consisted of 70 students divided into two groups of 35 participants each. The intervention was organized into five modules and integrated the pedagogical use of Perplexity, Gemini, ChatGPT, Quizziz, Doctrina AI, and Replika to strengthen self-planning, self-regulation, self-evaluation, and the affective-emotional component of autonomous learning. In the pre-test, both groups were predominantly at the regular level; in the post-test, the experimental group reached 100% at the proficient level, while the control group remained predominantly at the regular level. The Mann-Whitney U test showed statistically significant differences favoring the experimental group in the overall variable and in all its dimensions, with significance values of $p = 0.000$. It is concluded that the artificial intelligence program significantly contributed to enhancing autonomous learning by promoting self-management, progress monitoring, and reflection on one's own performance.

Keywords: artificial intelligence, autonomous learning, secondary education, quasi-experimental study.

Introduction

The incorporation of artificial intelligence in education has opened up new possibilities to promote more personalized, interactive learning aimed at the development of metacognitive skills (Menacho et al., 2024; Mendoza et al., 2022). In this framework, AI tools can cease to be simple generators of answers to become pedagogical supports that guide the search for information, decision-making, and reflection on one's own academic performance (Tomanguilla et al., 2025; Xu et al., 2026). This potential is especially relevant in secondary education, where the strengthening of autonomous learning is a key condition for student performance and

comprehensive education (Guerrero Suárez, 2025; Sáez-Delgado et al., 2022).

Autonomous learning comprises the ability of students to organize their tasks, monitor their strategies, evaluate their results, and sustain a favorable affective disposition towards study (Sánchez et al., 2023; Albor Rodríguez, 2022). Therefore, it is not limited to independent work, but involves self-management, self-monitoring, motivation, and self-regulation of the training process (Garrison, 1997, as cited in Sánchez et al., 2023). Various recent studies have shown that academic autonomy improves when students have teaching accompaniment, formative feedback, and digital resources that favor reflection and control of their learning decisions (Conde et al., 2024; Ventosilla et al., 2021).

In the public educational institution where the study was developed, the diagnostic evaluation showed a predominance of the regular level of autonomous learning in both the control group and the experimental group, as well as weaknesses in the affective-emotional dimensions, self-planning, self-regulation and self-evaluation. This situation justified the design of a structured pedagogical intervention that articulated AI tools with sessions aimed at the progressive strengthening of school autonomy.

In response to this need, an artificial intelligence program was designed based on the pedagogical use of AI tools such as Perplexity, Gemini, ChatGPT, Quizziz, Doctrina AI, and Replika. The general objective was to determine if the application of the artificial intelligence program enhances autonomous learning in second-grade high school students from a public educational institution in Chiclayo, 2025. Specifically, its influence on the affective-emotional aspect, self-planning, self-regulation and self-evaluation was analyzed. The central hypothesis was that the intervention would produce statistically significant differences in favor of the experimental group compared to the control group after its implementation.

The program is based, firstly, on connectivism, a theory that maintains that learning in the digital age occurs through information networks distributed inside and outside the classroom, where knowledge does not reside only in the individual but also in multiple nodes and interconnected resources (Cruz Bailón, 2021; Gómez, 2024; Mufungizi, 2024). From this perspective, access to and critical use of digital tools, including artificial intelligence, expand the possibilities of building knowledge, solving problems, and learning with greater autonomy (Cruz Bailón, 2021; Mufungizi, 2024).

Second, the proposal is based on Garrison's theory of self-directed learning, which integrates self-management, self-monitoring, and motivation as essential components of autonomous learning (Sánchez et al., 2023). This vision dialogues with the theory of self-determination, according to which autonomy, competence, and social relationships favor the intrinsic motivation of the student and strengthen their commitment to learning (Albor Rodríguez, 2022). Together, these contributions allow us to understand that autonomous learning requires not only cognitive strategies, but also affective and contextual conditions that favor decision-making about the study itself (Ayllón et al., 2025; Sáez-Delgado et al., 2022). Recent literature supports the relevance of integrating technologies and artificial intelligence to enhance student autonomy. Portfolios, gamification, and other active methodologies have been reported to strengthen critical thinking, self-assessment, and learning progression (Castellanos et al., 2024). Likewise, the use of digital tools and artificial intelligence favors autonomous information management, immediate feedback, and performance monitoring, although its effects depend on adequate training and ethical use of technology (Liga et al., 2024; Moreira Espinoza, 2024; Menacho et al., 2024).

In relation to the dimensions of autonomous learning, different studies show that motivation, time organization, self-regulation, and self-evaluation are sensitive components of technology-mediated pedagogical interventions (Lozano et al., 2024). In secondary school, moreover, generative AI seems to have particularly noticeable effects in the task

execution phase and in the regulation of schoolwork, as long as it is integrated as a strategic scaffolding and not as a substitute for the student's effort (Tomanguilla et al., 2025; Xu et al., 2026). Therefore, the present study assumes that artificial intelligence tools can act as a pedagogical resource to strengthen school autonomous learning when incorporated into a planned and ethically oriented didactic sequence.

Methodology

The research adopted a quantitative approach, was applied and used a quasi-experimental design with a control group and an experimental group, both evaluated by pre-test and post-test. This design made it possible to compare the behavior of both groups before and after the intervention to identify changes associated with the implementation of the program.

The sample consisted of 70 second-grade high school students from a public educational institution in Chiclayo, distributed in two groups of 35 participants each. One group formed the control and the other the experimental. In the pretest, both groups showed a predominance of the regular level in the general variable, which allowed establishing a basis of comparison for the subsequent analysis.

An instrument was used to measure autonomous learning in four dimensions: affective-emotional, self-planning, self-regulation, and self-evaluation. The results were organized into three levels of achievement: efficient, fair and deficient. In addition, during the implementation of the program, checklists, rubrics, and entry and exit tests were used as pedagogical follow-up resources.

The intervention was structured in five modules developed in ten sessions of 90 minutes each. The first module introduced the program, introduced AI in education and applied the pretest; the second worked with Perplexity to strengthen its own planning; the third incorporated Gemini and ChatGPT to enhance self-regulation; the fourth used Quizziz and AI Doctrine to promote self-evaluation; and the fifth integrated Replika to reinforce the affective-emotional component and close the intervention with the application of post-test. The sessions included motivation, recovery of previous knowledge, problematization, guided practice, collaborative work, metacognitive reflection and feedback.

The normality of the autonomous learning variable was explored using the Kolmogorov-Smirnov test, based on a sample of more than 50 participants. The results showed a normal distribution in the pretest and absence of normality in the posttest, which is why a non-parametric test was chosen for hypothesis testing. Consequently, the Mann-Whitney U test was used with a significance level of 0.05.

Results

Table 1. Frequency and percentage of the autonomous learning variable.

		Control group		Experimental group	
		Pretest		Pretest	
		f	**%**	**f**	**%**
Valid	Efficient	6	17	3	9
	Regular	23	66	20	57
	Poor	6	17	12	34
	Total	35	100,0	35	100,0
		Post test		Post test	

		f	%	f	%
Valid	Efficient	6	17	35	100
	Regular	27	77	0	0
	Poor	2	6	0	0
	Total	35	100,0	35	100,0

Table 1 indicates in its results that in the pre-test both groups started with a higher percentage at the regular level, in the case of the control group it had 66% (23 students) while the experimental group had 57% (20 students) this shows that both groups started in almost the same conditions. In contrast, in the post-test a significant change can already be evidenced, since, in the case of the experimental group, it is observed that 100% (35 students) have achieved the efficient level, while in the control group only 17% (6 students) have reached this level and 77% (27 students) remained at the regular level. Overall, these findings allow us to affirm that the 35 students in the experimental group, thanks to the implementation of the program, have managed to improve their autonomous learning, that is, they can now assume control of their own learning by improving self-management and self-evaluation of their goals (Lozano et al., 2024).

Table 2. Specific Hypothesis Test 1

	GROUP	N	Range average	Sum of Ranks	U de Mann-Whitney	Sig. Salt. (bilateral)
PRETEST	CONTROL	35	32,54	1489,00	366,000	,004
	EXPERIMENTAL	35	28,46	996,00		
	Total	70				
POSTEST	CONTROL	35	18,00	630,00	,000	,000
	EXPERIMENTAL	35	53,00	1855,00		
	Total	70				

In the results of the first specific hypothesis, it was evident that in the pre-test the difference was not significant because it was obtained between the ranges of both groups was 4.08 points, on the other hand, in the post-test the difference reached 35 points, showing a considerable increase compared to the initial evaluation of the pretest. In addition, it was observed that the experimental group presented a higher rank in the post-test compared to that obtained in the pre-test, reflecting improvements after the application of the program. Additionally, the analysis showed a significance value of sig=0.000, a figure lower than the 0.05 established in the research. This result allowed us to reject the null hypothesis and accept the first specific hypothesis of study, concluding that the application of the artificial intelligence tools program contributed significantly to the optimization of affective-emotional aspects in students of an educational institution in Chiclayo, 2025.

Table 3. Specific Hypothesis 2 Range Test

	GROUP	N	Range average	Sum of Ranks	U de Mann-Whitney	Sig. Salt. (bilateral)
PRETEST	CONTROL	35	38,99	1364,50	490,500	,150
	EXPERIMENTAL	35	32,01	1120,50		
	Total	70				
POSTEST	CONTROL	35	18,11	634,00	4,000	,000
	EXPERIMENTAL	35	52,89	1851,00		
	Total	70				

Regarding the results of the second specific hypothesis, it was evidenced that in the pre-test the difference was not significant because it was obtained between the ranges of both groups was 6.98 points, on the other hand, in the post-test the difference reached 34.78 points, showing a considerable increase compared to the initial evaluation of the pre-test. In addition, it was observed that the experimental group presented a higher rank in the post-test compared to that obtained in the pre-test, reflecting improvements after the application of the program.

Additionally, the analysis showed a significance value of sig=0.000, a figure lower than the 0.05 established in the research. This result allowed us to reject the null hypothesis and accept the second specific hypothesis of study, concluding that the application of the artificial intelligence tool program contributed significantly to the optimization of self-planning in students of an educational institution in Chiclayo, 2025.

Table 4. Specific Hypothesis 3 Range Test

	GROUP	N	Average Range	Sum of ranks	U de Mann-Whitney	Sig. Salt. (bilateral)
PRETEST	CONTROL	35	38,77	1357,00	498,000	,176
	EXPERIMENTAL	35	32,23	1128,00		
	Total	70				
POSTEST	CONTROL	35	18,01	630,50	,500	,000
	EXPERIMENTAL	35	52,99	1854,50		
	Total	70				

In reference to the results of the third specific hypothesis, it was evidenced that in the pre-test the difference was not significant because it was obtained between the ranges of both groups was 6.54 points, on the other hand, in the post-test the difference reached 34.98 points, showing a considerable increase compared to the initial evaluation of the pretest. In addition, it was observed that the experimental group presented a higher rank in the post-test compared to that obtained in the pre-test, reflecting improvements after the application of the program.

Additionally, the analysis showed a significance value of sig=0.000, a figure lower than the 0.05 established in the research. This result allowed us

to reject the null hypothesis and accept the third specific hypothesis of the study, concluding that the application of the Artificial Intelligence tool program contributed significantly to the optimization of self-regulation in students of an educational institution in Chiclayo, 2025.

Table 5. Specific Hypothesis 4 Range Test

	GROUP	N	Range average	Sum of Ranks	U de Mann-Whitney	Sig. Salt. (bilateral)
PRETEST	CONTROL	35	34,01	1540,50	314,500	,000
	EXPERIMENTAL	35	26,99	944,50		
	Total	70				
POSTEST	CONTROL	35	18,79	657,50	27,500	,000
	EXPERIMENTAL	35	52,21	1827,50		
	Total	70				

In reference to the results of the fourth specific hypothesis, it was evidenced that in the pretest the difference was not significant because it was obtained between the ranges of both groups was 7.02 points. On the other hand, in the post-test the difference reached 33.42 points, showing a considerable increase compared to the initial evaluation of the pre-test. In addition, it was observed that the experimental group presented a higher rank in the post-test compared to that obtained in the pre-test, reflecting improvements after the application of the program.

Additionally, the analysis showed a significance value of sig=0.000, a figure lower than the 0.05 established in the research. This result allowed us to reject the null hypothesis and accept the third specific hypothesis of study, concluding that the application of the Artificial Intelligence tools program contributed significantly to the optimization of self-assessment in students of an educational institution in Chiclayo, 2025.

Discussion

The general objective was to determine to what extent the Artificial Intelligence tools program optimizes autonomous learning in second-grade students of the secondary level of a public educational institution in Chiclayo, 2025. This objective is based on the connectivism theory of Siemens (2004) and Downes (2008) who state that, in the digital age, learning is not limited only to the individual acquisition of content, but also occurs from the formation of connections in knowledge and information networks (Sánchez et al., 2023). In this sense, connectivism complements the idea that the use of technology improves learning (Cruz & Bailón, 2021), which is the basis that the Artificial Intelligence tool program favors the development of autonomous learning measured through its four dimensions, which according to Lozano et al. (2024) are the affective-emotional aspect, the planning of their own schoolwork, self-regulation and self-evaluation of their learning. This argument is complemented by Garrison's (1997) theory of self-directed learning, which proposes a three-dimensional model that integrates self-management, self-monitoring and motivation as key elements for autonomous learning, aspects that can be taken into account in the specific description of this type of learning.

Based on this information, the results obtained in the present research are shown, which show that the application of the artificial intelligence

tools program optimized autonomous learning in second-grade students of the secondary level in an educational institution in Chiclayo, 2025 by having that in the experimental group in the pre-test there were 12 students (34%) at the deficient level, 20 students (57%) at the regular level and only 3 students (9%) at the efficient level, and after the intervention of the program of ten learning sessions, in the post-test it reached 35 students (100%) at the efficient level. This statistical difference shows a significant increase between the measurements before and after the intervention, which confirmed the general hypothesis raised, where the application of the program based on artificial intelligence managed to optimize autonomous learning in the thirty-five students of the experimental group in all its dimensions, since a significant improvement in the results of the post-test was verified. These results coincide with the study by Guerrero and Suárez (2025), who analyze autonomy in student learning and show that, after the implementation of the STEM program, there were significant advances in critical thinking, self-regulation, and with it the control of their own learning. In a convergent way, Puglia et al. (2024) demonstrate that personalized counseling aimed at academic accompaniment through the application of a student support program reduces anxiety and school stress, causing them to improve global autonomous learning (self-management, self-regulation, and self-evaluation) and with them their grades in various areas of study. Finally, Ayllón (2025) argues from a formative perspective that perseverance and confidence are significant predictors to consolidate student autonomy, emphasizing that this implies strengthening responsibility so that the student can manage their learning independently, improving the ability to self-regulate their learning and plan tasks.

Regarding the first specific objective, which was to determine to what extent the Artificial Intelligence tools program optimizes the affective-emotional aspect in second-grade students of the secondary level of a public educational institution in Chiclayo, 2025. This is also based on the connectivism theory of Siemens (2004) and Downes (2008) who state that, in the digital age, it occurs from the formation of connections in knowledge and information networks (Sánchez et al., 2023). In this sense, connectivism complements the idea that the use of technology improves learning (Cruz & Bailón, 2021), which argues that the artificial intelligence tool program favors the development of the affective-emotional aspect, which can be improved by using technology in learning.

Based on this first specific objective, the results achieved in the research are shown, which show that the application of the Artificial Intelligence tools program optimized the affective-emotional aspect in second-grade students of the secondary level in an educational institution in Chiclayo, 2025 by having that in the experimental group in the pre-test there were 16 students (46%) at the deficient level, 15 students (43%) in the regular level and only 4 students (11%) in the efficient level, and after the intervention of the program of ten learning sessions, in the post-test it reached 35 (100%) in the efficient level. This statistical difference shows a significant increase between the before and after measurements of the intervention, which confirmed the specific hypothesis one raised, where the application of the program based on artificial intelligence managed to optimize the affective-emotional aspect in the thirty-five students of the experimental group, since a significant improvement in the results of the post-test was verified.

These results are in line with Guerrero and Suarez (2025) who showed that students with greater autonomy achieve better results in STEAM areas when they properly organize their time thanks to family support, achieving confidence and intrinsic motivation. Learning In a convergent way, Puglia et al. (2024) demonstrate that personalized counseling reduces anxiety and academic stress, consequently, increases autonomy and perseverance to meet objectives and goals, resulting in improved academic performance, as

a positive effect of teacher accompaniment. Ayllón et al. (2025) point out that perseverance and confidence is a significant predictor for consolidating autonomy and self-improvement. In addition, Menacho et al. (2024) add that 94% of university students perceive that Artificial Intelligence tools improved the quality of their work and this reinforced the affective-emotional part of students since they increased confidence and perseverance in the interest in learning, thanks to the support of technology. Finally, Mendoza et al., (2022) show that the use of information and communication technologies (ICT) favors attention and intrinsic motivation, which supports the emotional impact of students.

Regarding the second specific objective, which was to determine to what extent the Artificial Intelligence tools program optimizes self-planning in second-grade students of the secondary level of a public educational institution in Chiclayo, 2025. This second specific objective is based on the connectivism theory of Siemens (2004) and Downes (2008) who state that, in the digital age, it occurs from the formation of connections in knowledge and information networks (Sánchez et al., 2023). In this sense, connectivism complements the idea that the use of technology improves learning (Cruz & Bailón, 2021), which is the basis that the artificial intelligence tools program favors the development of students' own goal planning.

Based on this, the results of this research are presented, which show that the application of the Artificial Intelligence tools program optimized the self-planning of second-grade students of the secondary level in a educational institution of Chiclayo, 2025, given that the experimental group in the pre-test had 12 students (34%) at the deficient level, 21 students (60%) at the regular level and only 2 students (6%) at the efficient level, and after the intervention of the program of ten learning sessions, in the post-test it reached 35 students (100%) at the efficient level. This statistical difference shows a significant increase between the measurements before and after the intervention, which confirmed the specific hypothesis two, where the application of the program based on artificial intelligence managed to optimize the own planning in the thirty-five students of the experimental group, since a significant improvement in the results of the post-test was verified.

These results are in line with Bonifaz and Sánchez (2022) who show that, in virtual education, conceptualization, active participation, and task planning strategies give good academic results, but they highlight that the student must organize their time well without procrastinating, since if they do not self-regulate their time, they can become very distracted and cause non-compliance with tasks. In addition, the study by Puglia et al. (2024) found that teacher counseling contributes to consolidating task planning and study organization, since teachers and tutors can teach effective strategies to improve time organization, giving schedules, schedule models, goal models, and choosing tasks that should be prioritized in the study. Moreira and Espinoza (2024) also agree that they show that the use of Chatbots among university students improves the management and planning of time for research workers in work teams, however, they highlight that this issue must continue to be deepened, because there are still gaps in the appropriate use of technology in research. Ligña et al. (2024) show that the use of digital tools in secondary school students in Ecuador is associated with the achievement of high levels of informational, technological, and communicative autonomy because they learned to become aware of the importance of meeting objectives, but they also emphasize that work must continue to train teachers and students so that they learn to plan their time and thus better project their goals in the fulfillment of tasks. Finally, Castellanos et al. (2024) show that the use of portfolios and gamification allows students to organize their time and project their progress when doing their homework, suggesting that devices can be integrated technological tools such as Artificial Intelligence tools to reinforce the planning and monitoring

of goals, but under the supervision of the teacher.

Regarding the third specific objective, which was to determine to what extent the Artificial Intelligence tools program optimized self-regulation in second-grade students of the secondary level of a public educational institution in Chiclayo, 2025. This third specific objective is also based on the connectivism theory of Siemens (2004) and Downes (2008), who state that, in the digital age, it is produced from the formation of connections in knowledge and information networks (Sánchez et al., 2023). In this sense, connectivism complements the idea that the use of technology improves learning (Cruz & Bailón, 2021), which is the basis that the Artificial Intelligence tools program favors the development of self-regulation in students.

Considering the above, the results of the present research that demonstrate that the application of the Artificial Intelligence tools program optimized self-regulation in second-grade students of the secondary level in an educational institution in Chiclayo, 2025 by having that in the experimental group in the pre-test had 14 students (40%) at the deficient level, 17 students (49%) at the regular level and only 4 students (11%) at the efficient level, and after the intervention of the program of ten learning sessions, in the post-test it reached 35 students (100%) at the efficient level. This statistical difference shows a significant increase between the measurements before and after the intervention, which confirmed the specific hypothesis three, where the application of the program based on artificial intelligence managed to optimize self-regulation in the thirty-five students of the experimental group since a significant improvement in the results of the post-test was verified.

These results are aligned with Ujhelyi (2022) who demonstrates in his study that Project-Based Learning increases motivation and the development of metacognitive and self-regulatory skills that allows the conscious adjustment of strategies and actions during the learning process, strengthening autonomy to learn a new language such as Latin, similarly in this research, activities guided by Artificial Intelligence promote step planning, resource review, and decision making in the studio to meet their goals. In addition, Ventosilla et al. (2021) also show that the flipped classroom model significantly increases autonomy in all its dimensions, especially in regulatory and metacognitive skills, since, thanks to the use of technologies and pre-class work, the student can investigate the subject in a personal way, self-regulating how far they can go in their learning, before the learning sessions. Conde et al. (2024) also highlight that continuous and formative feedback strengthens the self-regulation of academic activities, this aspect is observed when using technology, students receive immediate feedback from Artificial Intelligence tools to correct their assignments and work before presenting them to the teacher in class. Likewise, Xu (2026) presents a paper on the technological applications of Artificial Intelligence in Zimmerman's self-regulated learning model, which points out that generative Artificial Intelligence improves the execution of tasks and academic performance in secondary school students, achieving improvements in the ability to independently manage their learning goals under the control of emotions to fulfill their academic tasks. But he stresses that there is a persistent gap in the construction of authentic autonomy, and warns that self-regulation must continue to be improved in students so that they regulate that technology is a support, but not who does the homework for them. And finally, Menacho et al. (2024) complement that students perceive Artificial Intelligence tools as virtual tutors that support them in their academic tasks. However, the authors recommend that students must be trained in the use of their learning process in planning and control, a condition that becomes necessary in the accompaniment to achieve self-regulation of student learning.

With respect to the fourth specific objective, to determine to what extent the Artificial Intelligence tools program optimized self-

assessment in second-grade students of the secondary level of a public educational institution in Chiclayo, 2025. This fourth specific objective is based on the connectivism of Siemens (2004) and Downes (2008) who state that, in the digital age, it occurs from the formation of connections in knowledge and information networks (Sánchez et al., 2023). In this sense, connectivism complements the idea that the use of technology improves learning (Cruz & Bailón, 2021), which is the basis that the Artificial Intelligence tools program favors the development of self-assessment in students.

Based on this, the results of the research show that the application of the artificial intelligence tools program optimized self-assessment in second-grade students of the secondary level in an educational institution in Chiclayo, 2025 as the experimental group in the pre-test had 12 students (34%) at the deficient level, 18 students (51%) at the regular level and only 5 students (14%) at the efficient level, and after the intervention of the program of ten learning sessions, in the post-test it reached 35 students (100%) at the efficient level. This statistical difference shows a significant increase between the measurements before and after the intervention, which confirmed the specific hypothesis four, where the application of the program based on artificial intelligence managed to optimize the self-assessment in the thirty-five students of the experimental group since a significant improvement in the results of the post-test was verified.

These results are in line with Castellanos et al. (2024) who found that the use of student portfolios facilitates the self-evaluation of their learning, since they strengthen autonomy and critical thinking. In the university context, Suárez (2025) evidenced that when students have high levels of autonomous learning, they significantly influence formative assessment and insisted on the importance of strategies that enhance self-assessment and self-management of learning. Also, the study by Tomanguilla et al. (2025) shows that the artificial intelligence tool ChatGPT increases motivation towards autonomous learning in 4th grade students, highlighting that students must learn to design specific activities to critically assess their performance Bonifaz and Sánchez (2022), this approach provides useful criteria to continue improving self-assessment activities with the use of technology. Finally, Mendoza et al. (2022) emphasize that Information Technologies facilitate the implementation of active techniques that promote making meaningful judgments about their own performance, which makes it easier to take control of the process and with it the reflection of their own process, while Menacho et al. (2024) emphasize that the appropriate use of Artificial Intelligence tools can support the review of achievements and difficulties, supporting the review of achievements and difficulties AND providing a broad technological framework that supports the progress of self-evaluation.

Conclusions

1. In relation to the general objective, it was concluded that the application of the Artificial Intelligence Tools Program significantly optimized autonomous learning in second-grade students of a public educational institution in Chiclayo, 2025, given that the experimental group reached 100% in the efficient level of autonomous learning and significant statistical differences were obtained in their favor in the Mann-Whitney U test. which evidenced substantial progress in autonomous learning.
2. Regarding the first specific objective, it was concluded that the program significantly optimized the affective-emotional aspect, since the experimental group went from the regular level in the pre-test, to the efficient level in the post-test, while the control group maintained high percentages in the regular and deficient level, confirming by the Mann-Whitney U test that the intervention favored confidence and positive affective disposition in the students.
3. In relation to the second specific objective, it was concluded that the program significantly

optimized the students' own planning, since, after the intervention, the experimental group reached 100% at the efficient level, far surpassing the control group that remained at the regular level, this result is supported by the Mann-Whitney U test that showed that the intervention facilitated the strategic use of time to do tasks.

4. Regarding the third specific objective, it was concluded that the program contributed significantly to the optimization of self-regulation, because the experimental group managed to place itself entirely at the efficient level, after the intervention, something that the control group could not achieve. This result is based on the differences of the Mann-Whitney U test, which showed that the program contributed significantly to the self-regulation of supervision and adjustment of strategies during student learning.
5. Finally, regarding the fourth specific objective, it was concluded that the intervention significantly improved the students' self-evaluation, since the experimental group managed to reach 100% at the efficient level, in contrast to the control group, a result that is based on the Mann-Whitney U test that showed that the intervention made it possible for students to assess their performance through the practice of self-evaluation.

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