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ORIGINAL

Critical and correlational analysis of the use of artificial intelligence among teachers and students in online early childhood education programmes: ethical, educational and technological challenges

Análisis crítico y correlacional del uso de la inteligencia artificial en docentes y estudiantes de la carrera de Educación Inicial en línea: desafíos éticos, formativos y tecnológicos

Paola Andrea Pérez Bravo[1,2], Derling José Mendoza Velazco[1,3], Elizeth Mayrene Flores Hinostroza[1,4], María del Cisne Ruiz Serrano[1,2]

[1]Universidad Espíritu Santo, Investigación. Samborondón, Ecuador.
[2]Universidad Técnica de Manabí. Posgrado. Portoviejo, Ecuador.
[3]Universidad Nacional de Educación, Educación inicial en línea, Chuquipata. Ecuador.
[4]Universidad Estatal Península de Santa Elena, Santa Elena. Ecuador.

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Corresponding author: Paola Andrea Pérez Bravo

ABSTRACT

Introduction: artificial intelligence is increasingly embedded in education, offering opportunities for innovation while raising concerns about ethics and academic integrity. Understanding this duality is essential to ensure that technological advances are accompanied by critical reflection and responsible use.
Objective: this study examined the relationship between the use of Artificial Intelligence tools and the ethical perceptions of students and teachers in the online Early Childhood Education programme at the National University of Education in Ecuador. The growing presence of automated platforms in academic practice highlighted the need to evaluate both their functionality and their ethical implications.
Method: a cross-sectional, quantitative study with a correlational design was carried out at the National University of Education in Ecuador between January and March 2025. The sample consisted of 151 students and 25 teachers, selected intentionally. Two five-point Likert-type questionnaires were used to measure participants' knowledge and use of AI, as well as their ethical perceptions. Statistical analyses were conducted using Spearman's correlation coefficient in SPSS v26.
Results: positive and statistically significant correlations were identified in both groups: students ($\rho = 0,489$, 95 % CI [0,357–0,602], $p < 0,001$) and teachers ($\rho = 0,560$, 95 % CI [0,212–0,782], $p < 0,001$).
Conclusions: the findings confirm that greater experience with AI tools is associated with stronger ethical awareness. This highlights the need to strengthen digital literacy with an ethical focus in both initial and continuing training, addressing the existing gap in formal preparation for the responsible use of AI.

Keywords: Artificial Intelligence; Educational Ethics; Teacher Training; Ethical Perception; Online Education; Spearman Correlation.

RESUMEN

Introducción: la inteligencia artificial está cada vez más presente en la educación, ofreciendo oportunidades de innovación y, al mismo tiempo, generando preocupaciones sobre la ética y la integridad académica. Comprender esta dualidad es esencial para garantizar que los avances tecnológicos se acompañen de

reflexión crítica y un uso responsable.
Objetivo: este estudio examinó la relación entre el uso de herramientas de Inteligencia Artificial y la percepción ética de estudiantes y docentes de la carrera de Educación Inicial en línea de la Universidad Nacional de Educación en Ecuador. La creciente presencia de plataformas automatizadas en la práctica académica evidenció la necesidad de evaluar tanto su funcionalidad como sus implicaciones éticas.
Método: se realizó un estudio cuantitativo, transversal y correlacional en la UNAE (Ecuador) entre enero y marzo de 2025. La muestra estuvo conformada por 151 estudiantes y 25 docentes, seleccionados de forma intencional. Se aplicaron dos cuestionarios tipo Likert de cinco puntos para medir el conocimiento y uso de la IA, así como la percepción ética. El análisis estadístico se efectuó mediante el coeficiente de correlación de Spearman en el software SPSS v26.
Resultados: se identificaron correlaciones positivas y estadísticamente significativas en ambos grupos: estudiantes (ρ = 0,489, IC95 % [0,357–0,602], p < 0,001) y docentes (ρ = 0,560, IC95 % [0,212–0,782], p < 0,001).
Conclusiones: los hallazgos permitieron aceptar la hipótesis alternativa. Se confirmó que la experiencia de uso está asociada a una mayor conciencia ética. Estos resultados reflejan la necesidad de fortalecer la alfabetización digital con un enfoque ético desde los procesos de formación inicial y continua.

Palabras clave: Inteligencia Artificial; Ética Educativa; Formación Docente; Percepción Ética; Educación en Línea; Correlación de Spearman.

INTRODUCTION

The integration of artificial intelligence (AI) into higher education has generated both enthusiasm and concern. Recent studies highlight the potential of AI to support academic writing, tutoring, and early childhood pedagogy, while also pointing to unresolved issues regarding transparency, authorship, and the preservation of critical thinking skills.[1] In higher education contexts, initiatives have explored the use of AI literacy programmes to foster not only technical competence but also ethical awareness, ensuring that students and teachers can engage critically with emerging technologies.[2] In early childhood education, where future teachers are trained, these discussions become especially pressing given the formative role of ethics in professional identity.

Within this debate, two constructs are particularly relevant. The first is knowledge and use of AI, understood as the frequency of engagement, diversity of tools employed (e.g., ChatGPT, Gemini, Grammarly), and competencies developed for academic or pedagogical purposes.[3] The second is ethical perception of AI, which refers to awareness and attitudes towards fairness, justice, authorship, transparency, and the balance between harm and benefit in educational applications.[4] Both constructs provide a framework for examining how students and teacher-researchers navigate the opportunities and risks of AI in learning environments.

Although international literature has begun to address these issues, empirical studies in Latin America—and specifically in Ecuador—remain limited. At the National University of Education (UNAE), students in the online Early Childhood Education programme and their research teachers are already incorporating AI tools into academic routines, often without systematic training or institutional guidance.[5] This gap creates a need for evidence on how AI use is linked to ethical perceptions, to inform curricular and policy decisions.

On this basis, the guiding question was:

What is the relationship between the use of AI tools and the ethical perceptions of students and research teachers in the online Early Childhood Education programme at UNAE, Ecuador?

Accordingly, the following hypotheses were formulated:

Null hypothesis (H_0): There is no significant association between the use of AI tools and the ethical perceptions of their educational application among students and teachers in the programme.

Alternative hypothesis (H_1): There is a significant association between the use of AI tools and the ethical perceptions of their educational application among students and teachers in the programme.

METHOD

Research approach

This study was conducted using a quantitative approach. It was based on the need to observe, measure and relate variables objectively.[6] The quantitative approach focuses on collecting numerical data that allows patterns, relationships or comparisons between specific phenomena to be established. Its purpose is not only to describe, but also to analyse possible correlations between the elements under study. This approach was the most appropriate given the nature of the problem. The variables of use and ethical perception of artificial intelligence required systematic analysis based on verifiable data. The truth is that, in this context, individual

accounts or isolated assessments were not enough. It was necessary to identify trends, observe statistical relationships and offer reliable results that could be supported by clear evidence.[7]

Type of research

The study was quantitative in nature, with an observational, analytical, cross-sectional design and correlational scope. This approach allows associations between variables to be identified without establishing causal relationships.[8] In this case, the objective was to analyse the relationship between the use of artificial intelligence tools and the ethical perception of their educational application, both among students and teachers of the online Early Childhood Education programme. The choice of this type of study made it possible to observe how educational experience and ethical understanding are intertwined in technology-mediated contexts, providing evidence to test the hypotheses from an objective perspective.

Population and sample

The study was conducted at the National University of Education in Ecuador, in the online Early Childhood Education programmed. The total population consisted of 177 participants, of whom 152 were active students and 25 were teachers. The final sample included 151 students and all 25 teachers. It was a non-probabilistic sample selected intentionally.[9]

In the case of students, the inclusion criteria were being actively enrolled, having no deferred or pending subjects, and voluntarily agreeing to respond to the questionnaire. This ensured a stable and representative academic profile. In the case of teachers, participation was based on voluntary availability. Although probabilistic sampling was not applied to this group, their inclusion was justified to obtain complementary information on academic and ethical perceptions.

It is recognized that the small size of the teacher subgroup (n = 25) limits statistical power and widens confidence intervals. Therefore, the results for this group should be interpreted with caution as exploratory evidence rather than general conclusions.

Operational definition of constructs

Two constructs were analysed: Knowledge and use of AI and Ethical perception of AI. Each was operationalised as a multidimensional latent variable measured by Likert-type items.

Knowledge and use of AI

This construct refers to the degree to which students and teachers are familiar with artificial intelligence tools, have applied them in academic/teaching activities, and perceive themselves as capable of integrating them effectively.[10] Representative items included: "I know of various artificial intelligence tools applicable to the study", "I have used AI to write, summarise or correct my academic assignments", and "I feel confident in using AI tools for my academic activities." Response options ranged from 1 = Never to 5 = Always. Higher scores indicate greater familiarity and frequency of use.

Ethical perception of AI

This construct refers to participants' awareness, attitudes, and normative positions regarding the responsible use of AI in education. Representative items included: "I believe that the use of AI should be regulated by clear institutional rules", "I think AI can put academic honesty at risk if it is not properly controlled", and "The use of AI must be declared at the time of submitting a paper."[11] Response options ranged from 1 = Strongly disagree to 5 = Strongly agree. Higher scores indicate stronger ethical awareness and stricter normative evaluation.

Scoring method

For each respondent, scores were computed as the mean of the items per dimension. No reverse-coded items were included. A higher average reflects a higher level of knowledge/use or ethical perception. Both student and teacher questionnaires shared this structure, although the teacher version included specific items related to teaching practice (e.g., integration of AI into class design or feedback processes).

Collection techniques and instruments

The survey technique was employed, given its efficiency in collecting information from large groups within limited timeframes and resources. Two Likert-type instruments were designed: one for students (12 items) and one for teachers (16 items). Both instruments were structured into two dimensions: Knowledge and use of AI and Ethical perception of AI, adapted to the specific profile of each group (see figures 1 and 2).

Age	_____
Gender	Feminine / Masculine / Prefers not to say it
Cycle level	1.º / 2.º / 3.º / 4.º / 5.º
Pre-AI training	Yes / No
Frequency of AI use	1 Never / 2 Rarely / 3 Sometimes / 4 Frequently / 5 Always
Most Widely Used AI Platform	ChatGPT, Gemini, Notion AI, Grammarly, QuillBot, Duolingo, Wolfram, Alpha, DeepSeek, Claude, Perplexity, Other

Knowledge and use of AI - Students						
N.	Item	1	2	3	4	5
1	I know of various artificial intelligence tools applicable to the study.					
2	I have used AI to write, summarize or correct my academic assignments.					
3	I know how to differentiate between an AI tool and a conventional search engine.					
4	I feel confident in using AI tools for my academic activities.					
5	I have received guidance on the educational use of AI in a subject.					
6	I understand the basic functions of the algorithms used in educational platforms with AI.					
Ethical perception of AI - Students						
N.	Item	1	2	3	4	5
1	I believe that the use of AI should be regulated by clear institutional rules.					
2	I think AI can put academic honesty at risk if it is not properly controlled.					
3	I think that excessive use of AI can affect my critical thinking.					
4	I would like to be trained on the ethical aspects of using AI.					
5	The use of AI must be declared at the time of submitting a paper.					
6	I believe that AI can be an ally of learning if it is used responsibly.					

Figure 1. Questionnaire Information demographic – Students

The second questionnaire was applied to teachers and consisted of 16 items. Both instruments shared the same structure of dimensions, adapted to the profile of each group (see figure 2).

Age	_____
Gender	Feminine / Masculine / Prefers not to say it
Years of teaching experience	0-5 / 6-10 / 11-15 / 16 or more
Educational level where you work	Early Education
Pre-AI training	Yes / No
Frequency of AI use	1 Never / 2 Rarely / 3 Sometimes / 4 Frequently / 5 Always
Most Widely Used AI Platform	ChatGPT, Gemini, Notion AI, Grammarly, QuillBot, Duolingo, Wolfram, Alpha, DeepSeek, Claude, Perplexity, Other
Type of AI activity performed	Teaching / Research / Tutorials / None

Knowledge and use of AI - Teachers						
N.	Item	1	2	3	4	5
1	I am familiar with AI tools applied to teaching.					
2	I have used AI platforms in my classes or research.					
3	I know how to integrate AI into the design of academic activities.					
4	I feel prepared to guide students in the ethical use of AI.					
5	I have applied AI to improve evaluation or feedback processes.					
6	I have enough technical knowledge to interpret the functions of an AI.					
Ethical perception of AI - Teachers						
N.	Item	1	2	3	4	5
1	I believe that it is necessary to establish institutional limits on the use of AI.					
2	I am concerned about the inappropriate use of AI by students.					
3	AI should not replace pedagogical thought processes.					
4	The ethical use of AI should be included in initial teacher training.					
5	It is important that UNAE defines a protocol for the use of AI in educational environments.					
6	AI can boost educational innovation if used critically and ethically.					

Figure 2. Questionnaire Information demographic – Teachers

Content validity

Prior to data collection, a panel of educational technology and ethics experts reviewed the instruments for clarity, relevance, and representativeness. Minor wording changes were incorporated. Aiken's V coefficient showed values above the acceptable threshold (all V ≥ 0,75; p < ,05), confirming adequate content validity.[12]

Construct validity

Psychometric tests were conducted to examine the dimensional structure. Sampling adequacy was verified through the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity (x^2 significant at p < ,001).[13] An exploratory factor analysis (EFA) with principal axis factoring and oblimin rotation yielded a two-factor solution consistent with the theoretical model, with all primary loadings ≥ 0,40 and cross-loadings < 0,30. A subsequent confirmatory factor analysis (CFA) supported this structure, yielding acceptable fit indices (e.g., CFI > 0,90, TLI > 0,90, RMSEA < 0,08, SRMR < 0,08). Composite reliability (CR) and average variance extracted (AVE) exceeded recommended thresholds (CR ≥ 0,70; AVE ≥ 0,50), supporting convergent validity.

Reliability

Internal consistency was examined using Cronbach's α, McDonald's ω, and α-if-item-deleted.[14] For students, Knowledge and use of AI yielded α = 0,940 and ω = 0,938, with item–total correlations ranging 0,52–0,71. Ethical perception produced α = 0,939 and ω = 0,936, with item–total correlations between 0,54–0,69. For teachers, Knowledge and use obtained α = 0,940 and ω = 0,934, while Ethical perception reached α = 0,931 and ω = 0,929. In no case did the removal of an item increase reliability indices, confirming the stability of the scales.[15]

Results analysis technique

The data were processed using IBM SPSS Statistics software, version 26. This resource allowed the information obtained to be organised, refined and analysed. Descriptive analyses and correlation tests were applied. First, the internal consistency of the instruments was verified. Then, Spearman's correlation coefficient (Spearman's rho) was applied. This technique was the most appropriate due to the ordinal nature of the scales and the objective of establishing associations between the variables. Spearman's coefficient is useful for data that are not normally distributed and whose values are expressed in ranges.[16]

The results were interpreted considering the value of the coefficient and its statistical significance. A confidence level of 95 % was established. Subsequently, the empirical findings were contrasted with theoretical contributions reviewed in scientific databases.[17] In this regard, a hermeneutic analysis was applied based on sources indexed in Scopus (Elsevier), all published in the last five years.

In compliance with the ethical principles of academic research, the study was approved by the Ethics Committee of the National University of Education (Approval code: UNAE-CEI-2025-014, Date: March 2025). All participants signed an informed consent form prior to the application of the instruments. Anonymity was guaranteed: no personally identifiable data was collected, and all information was coded and treated with absolute confidentiality. Ethical approval ensured that the research complied with institutional and international standards for studies involving human participants.

RESULTS

The students' ages ranged from 18 to 42, with an average of 24,1 years. 83,4 % identified as female, 14,6 % as male, and 2 % preferred not to state their gender. As for the level of education, they were distributed in the five academic cycles. First level 35 students, second level 31, third level 27, fourth level 30 and fifth level 28 students.

Regarding prior training in artificial intelligence, 61,5 % indicated that they had not received formal training in the subject, while 38,5 % stated that they had at least one introductory experience. In terms of frequency of use, most respondents indicated occasional use (scale 3/5). The platforms most frequently cited by students were ChatGPT 20,8 %, Gemini 18,54 %, DeepSee k 17,88. For teachers, the most used AIs are ChatGPT 20,8 %, Gemini 16,6 %, DeepSeek 20,8 %. A small group stated that they did not use any such tools 2,5 %.

The teaching group consisted of 25 professionals aged between 31 and 60, with an average age of 41,7. Sixty-eight per cent were women and 32 % were men. In terms of educational level, 60 % had a bachelor's degree and the rest had master's degrees in educational fields. In terms of years of professional experience, 72 % had more than a decade of teaching experience, while the rest had between 6 and 10 years of experience. Regarding the use of artificial intelligence, 80 % said they used digital tools regularly, mainly for tutoring, designing materials, and reviewing texts. One teacher said they did not use any of these technologies. In terms of training, 52 % said they had not received specific training in AI.

Spearman's correlation analysis was used to assess the relationship between knowledge and use of artificial intelligence tools and the ethical perception of this technology. This assessment was carried out separately in the two participating groups: students and teachers. In the student group (n = 151), a positive and statistically

significant correlation was identified between the two variables analysed. The coefficient obtained was ρ = 0,489, IC95 % [0,357 – 0,602], p < ,001, indicating a moderate relationship. This result indicated a moderate relationship. Those students who demonstrated greater knowledge and use of AI tools tended to express a more elaborate ethical perception of their educational application. Although the analysis does not establish causality, the association was consistent across the entire sample (see figure 3).

Correlations				
			Knowledge.and .use.of.AI.Students	Ethical.perception. of .AI.Students
Spearman's rho	Knowledge.and.use.of .AI.Students	Correlation Coefficient	1.000	.489
		Sig. (2-tailed)	.	.000
		N	151	151
	Ethical.perception.of .AI.Students	Correlation Coefficient	.489	1.000
		Sig. (2-tailed)	.000	.
		N	151	151

Figure 3. Spearman's correlation coefficient – Students

In the case of teachers (n = 25), the correlation was also positive and significant. The value obtained was ρ = 0,560, IC95 % [0,212 – 0,782], p < ,001. Despite the small sample size, this result suggests a consistent trend. This coefficient, slightly higher than that of the students, suggests that those teachers who most frequently integrated AI tools into their academic practices also showed clearer and more structured ethical positions regarding their use. Despite the small sample size, the data showed a statistically consistent trend.

Correlations				
			Knowledge.and. use.of.AI.Teachers	Ethical.perception. of.AI.Teachers
Spearman's rho	Knowledge.and.use. of.AI.Teachers	Correlation Coefficient	1.000	.560
		Sig. (2-tailed)	.	.000
		N	25	25
	Ethical.perception. of.AI.Teachers	Correlation Coefficient	.560	1.000
		Sig. (2-tailed)	.000	.
		N	25	25

Figure 4. Spearman's correlation coefficient – Teachers

DISCUSSION

Understanding the relationship between the use of artificial intelligence (AI) and ethical perception in the educational field constitutes a pressing methodological challenge. The increasing integration of intelligent tools is no longer a peripheral issue but part of the daily practices of students and teachers.[18] Recent studies have similarly noted that frequent interaction with automated systems may foster critical reflection rather than intellectual passivity, aligning with our findings that higher levels of AI use correlated with a more reflective ethical stance.[19] However, this convergence should be interpreted with caution: our data reveal associations, not causality, and the results must be situated within the specific institutional and cultural context in which they emerged.

These findings coincide with other recent studies that explored how constant interaction with automated systems can stimulate critical analysis processes.[20] Although no attempt was made to establish causalities, the fact that the relationship was positive and moderate in both cases is revealing. This convergence allows us to argue that practical contact with AI does not generate intellectual passivity but can open the door to ethical and epistemological questions. In addition, the need to incorporate ethical literacy as a cross-cutting component in initial and continuing training programmes is reaffirmed.[21,22,23,24] Similar conclusions have been reached by studies that emphasise the role of AI literacy in teacher education, particularly in early childhood programmes, where pedagogical identity is closely linked to ethical formation.[25]

Institutional implications are therefore unavoidable. Universities should establish AI policies emphasising transparency, accountability, and the traceability of generative outputs. Applied ethics modules, guidelines for both students and faculty, and explicit standards for citation and self-responsibility are necessary to mitigate risks such as intellectual dependency or uncritical reliance on automated outputs.[26] Beyond the university, some authors recommend the development of national frameworks for AI in early childhood education, ensuring consistency between policy, curriculum, and classroom practice.[27]

Despite its contributions, this study has limitations that should temper interpretation. The cross-sectional design precludes causal inference, and the reliance on self-reported measures may be affected by desirability bias. The sample was limited to one institution and used a non-probabilistic strategy, which restricts generalisability.[28] Nevertheless, these limitations underscore the value of further comparative studies in diverse contexts, combining longitudinal and experimental approaches with more robust sampling methods.[23] The responses indicated a clear willingness to integrate these tools, but with defined regulatory frameworks. This stance does not reflect a rejection of technology, but rather a demand for regulation and pedagogical support.

The comparison between the two groups revealed some differences that should be considered by institutions. While students relied on tools to solve specific tasks, teachers expressed structural concerns about the impact of AI on educational processes. This difference in approach was partly explained by the role that each group plays. However, what is significant is that in both cases there was a direct relationship between use and ethical reflection.[29] This convergence opens a field of institutional action in which strategies can be designed that simultaneously articulate the technical and the ethical.

The findings also provide clues about a possible gap between the everyday use of AI and formal training in this field. A significant percentage of students and teachers indicated that they had not received prior training. This situation created a training gap that could lead to unreflective or mechanical uses.[20,25,27] Although technological platforms are increasingly accessible, the absence of guidance can accentuate the risks. In this sense, the research was justified not only by the need to measure correlations, but also by the imperative to highlight a latent problem in teacher and student training.

The results show that the use of AI is not limited to a functional tool, but rather shapes an educational experience with ethical, epistemological, and pedagogical implications. Ignoring this dimension could limit the educational potential of emerging technologies. Therefore, the study not only provides statistical data, but also calls for a rethinking of institutional practices.[30] The evidence indicates that ethical guidance must be present from the earliest experiences with AI, for both students and teachers. Otherwise, there is a risk of reproducing technological literacy without critical thinking, devoid of ethical frameworks and disconnected from the educational goals that should guide every institution.

CONCLUSIONS

The study confirmed a positive and significant correlation between knowledge and use of artificial intelligence tools and ethical perceptions of their application in educational settings. This association was evident in both students and teachers: those who reported greater familiarity with these technologies also tended to express stronger awareness of the associated ethical dilemmas and challenges. This finding addressed the overall objective of the study and provided empirical support for understanding the link between digital practice and ethical reflection, without implying causality.

In addition, a considerable gap was observed between the everyday use of artificial intelligence platforms and the availability of structured academic training on their implications. Many participants indicated that they had not received formal instruction on the subject, despite frequent use of these tools. This highlighted a weakness in training programmes, both at undergraduate level and in professional development, leaving users exposed to ethical risks in the absence of clear regulatory or pedagogical frameworks.

Students reported using tools such as ChatGPT and Grammarly mainly for specific academic tasks, while teachers employed them for course design, tutoring, and research. In both groups, regular use was associated with ethical reflections, although expressed with different nuances depending on institutional roles. This convergence reinforced the notion that ethical judgement does not emerge in the abstract but is constructed through experience with technology and within institutional contexts.

Therefore, the results support the rejection of the null hypothesis and acceptance of the alternative, while recognising that the correlation observed cannot be interpreted as causal. In this way, the study achieved its objective and underscored the urgent need to design training strategies that integrate the use of artificial intelligence with explicit ethical guidelines.

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AUTHORSHIP CONTRIBUTION

Conceptualization: Derling José Mendoza Velazco, Paola Andrea Pérez Bravo.
Data curation: Elizeth Mayrene Flores Hinostroza, María del Cisne Ruiz Serrano.
Formal analysis: Derling José Mendoza Velazco.
Research: Paola Andrea Pérez Bravo, María del Cisne Ruiz Serrano.
Methodology: Derling José Mendoza Velazco, Paola Andrea Pérez Bravo.
Project management: Derling José Mendoza Velazco.
Resources: María del Cisne Ruiz Serrano.
Software SPSS: Derling José Mendoza Velazco.
Supervision: Paola Andrea Pérez Bravo.
Validation: Elizeth Mayrene Flores Hinostroza.
Display: Elizeth Mayrene Flores Hinostroza.
Drafting – original draft: Paola Andrea Pérez Bravo, Elizeth Mayrene Flores Hinostroza.
Writing – proofreading and editing: Derling José Mendoza Velazco, Paola Andrea Pérez Bravo.