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Student perceptions of teachers' communication skills in spanish and mathematics in the third cycle of basic education at instituto departamental la fraternidad

Percepciones estudiantiles sobre habilidades comunicativas docentes en español y matemáticas del tercer ciclo de educación básica, instituto departamental la fraternidad

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ABSTRACT

Introduction: Teacher communication guided the understanding of instructions, participation, and completion of assignments in basic education.
Objective: The study described students' perceptions of teachers' communication skills in Spanish and Mathematics in the third cycle at Instituto Departamental La Fraternidad, Juticalpa, Honduras, during 2025.
Methodology: A quantitative, non-experimental, descriptive study was conducted. Structured questionnaires completed by 169 students for both subjects were analyzed. Three teachers reviewed the instruments, and a pilot test was conducted with 15 students and five teachers. Results were expressed as descriptive percentages.
Results: In the language subject, clarity of written instructions reached 91.4%, while adaptation of tone, pace, and vocabulary reached 91.3%. In Mathematics, guidance on meeting quality criteria reached 90.9%, perceived confidence when instructions were understandable reached 90.5%, and clarity of directions reached 89.9%. Additionally, 85.2% perceived a positive contribution of teacher communication to their grades.
Conclusions: Favorable assessments of explanations, instructions, and feedback predominated. The findings described perceptions and did not demonstrate statistical associations or effects on official grades, which were not examined. Opportunities were identified to improve message clarity, participation, and pedagogical support in everyday classroom activities, while respecting differences between the indicators used in each

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subject. The findings remained limited to the reported experiences of the participating students, without direct assessment of their learning outcomes or academic achievement.

Keywords: communication skills; teacher communication; student perceptions; basic education; pedagogical feedback

RESUMEN

Introducción: La comunicación docente orientó la comprensión de instrucciones, la participación y el desarrollo de tareas en la educación básica.
Objetivo: Se describieron las percepciones estudiantiles sobre las habilidades comunicativas de los docentes de Español y Matemáticas del tercer ciclo del Instituto Departamental La Fraternidad, en Juticalpa, Honduras, durante 2025.
Metodología: Se desarrolló un estudio cuantitativo, no experimental y descriptivo. Se analizaron cuestionarios estructurados de 169 estudiantes, correspondientes a las dos asignaturas. Los instrumentos fueron revisados por tres docentes y se realizó una prueba piloto con 15 estudiantes y cinco docentes. Los resultados se expresaron mediante porcentajes descriptivos.
Resultados: En el área lingüística, la claridad de instrucciones escritas alcanzó 91,4 % y la adaptación del tono, ritmo y vocabulario obtuvo 91,3 %. En el área matemática, las orientaciones para cumplir criterios de calidad alcanzaron 90,9 %, la seguridad percibida ante instrucciones comprensibles obtuvo 90,5 % y la claridad de las consignas registró 89,9 %. Asimismo, el 85,2 % percibió una contribución positiva de la comunicación docente a sus calificaciones.
Conclusiones: Predominaron valoraciones favorables de las explicaciones, instrucciones y retroalimentación. Los hallazgos describieron percepciones y no demostraron asociaciones estadísticas ni efectos sobre las calificaciones oficiales, que no fueron examinadas. Se identificaron oportunidades para mejorar la claridad de mensajes, la participación y el acompañamiento pedagógico en las actividades cotidianas del aula, respetando las diferencias entre los indicadores de cada asignatura.

Palabras clave: habilidades comunicativas; comunicación docente; percepción estudiantil; educación básica; retroalimentación pedagógica

INTRODUCTION

Teacher communication is central to teaching because it organises activities, formulates questions, guides understanding and provides feedback. Its quality depends on the timeliness, clarity and suitability of messages for students' characteristics as well as linguistic correctness. Communication skills are expressed through written instructions, oral explanations, gestures, examples and forms of listening that support pedagogical interaction. Developing these capabilities has been addressed as part of teachers' professional competencies (1). In the third cycle of Basic Education, where tasks progressively require greater autonomy, understanding students' perceptions provides relevant information on everyday practices that can be strengthened.

Educational literature has recognised communication skills as pedagogical competencies associated with guiding educational processes (2). This perspective places communication beyond one-way content transmission: it includes exchanging meanings, understanding instructions and opportunities to raise questions. In school settings, ambiguous messages may hinder task completion, while organised explanations help identify procedures and assessment criteria. However, a favourable assessment of a communicative practice does not, by itself, demonstrate improved performance.

Such a claim requires verifiable grades and statistical analyses that were not part of the design used here.

Research on communication skills in primary education has focused on reading comprehension and the ability to interpret school messages (3). Although educational levels and study conditions differ, this background provides a reason to examine instruction clarity as an indicator of student experience. Oral communication is also relevant because explanations, questions and comparisons structure participation and clarify procedures. Students' perceptions provide a direct source for describing these dimensions, provided they are distinguished from external observations and objective learning outcomes. This delimitation guided indicator selection in this analysis.

The teaching context may also modify opportunities for interaction. Experiences with technology-mediated education documented changes in how communication between teachers and students was organised (4). Development of communication and research skills has also been related to academic education processes requiring expression of ideas and understanding of guidance (5). Both approaches show that discourse clarity and feedback are components of a broader pedagogical environment rather than isolated elements. However, their findings should not be automatically transferred to a Honduran school or interpreted as causal evidence concerning its students' grades.

Tasks in the curricular areas analysed require different modes of communication. Language teaching involves understanding directions, reading, written production and text revision; mathematics education requires explaining sequences, representing relationships and clarifying solution criteria. Research on communication in mathematics classes has emphasised integrating communication skills into learning activities (6). It was therefore appropriate to examine each questionnaire's specific indicators without treating their percentages as directly interchangeable. Differences between proportions may reflect different content, item wording or classroom experiences rather than necessarily greater communicative competence of a teacher or subject.

Instituto Departamental La Fraternidad, located in Juticalpa, Honduras, was the research setting during the 2025 school year. The recorded third-cycle student population was 285, and the analysed sample comprised 169 participants. Questionnaires covered both subjects, with indicators of clarity, interaction and perceived academic usefulness. The quantitative, descriptive design summarised responses as percentages but included neither objective performance measurement nor correlational analysis. The study therefore focused on describing reported communication experiences and avoided attributing demonstrated grade changes to teaching practices.

The research question was: how did third-cycle Basic Education students at Instituto Departamental La Fraternidad perceive their Spanish and Mathematics teachers' communication skills during the 2025 school year? The general objective was to describe these perceptions and assessments of their usefulness for understanding instructions, participating and completing academic activities. A descriptive approach was adopted without an inferential hypothesis because no association tests were conducted and no variables were manipulated. This delimitation allowed percentages to be interpreted as student responses and pedagogical recommendations to be aligned with the information actually obtained.

LITERATURE REVIEW

Communication skills as a pedagogical competence

Teachers' communication skills integrate the production and reception of messages appropriate to a teaching situation. They encompass verbal clarity, written organisation, listening, body language and the ability to adapt discourse to group needs. Research on professional competency development has highlighted that these capabilities develop through contextualised practices as well as subject knowledge (1). Pedagogically, communication involves creating conditions for students to understand objectives, instructions and assessment criteria. This conceptualisation contributed to the study by justifying separate examination of oral, written and non-verbal expression rather than reducing communication to an overall assessment of a teacher's friendliness or fluency.

Professional guidance has also placed communication skills among the resources needed for pedagogical interaction (2). A message's appropriateness depends on its content and how it is constructed with students. Explaining, questioning and providing feedback are distinct but complementary actions and may receive different assessments. This distinction helped organise the study's indicators and prevented favourable views of written instructions from being automatically interpreted as equivalent views of body language. It also supported presentation of percentages by indicator, respecting response specificity and the design's descriptive nature.

Oral communication and understanding instructions

Pedagogical oral communication requires understandable messages, relevant examples and verification that guidance has been understood. Presentation pace, vocabulary choice and willingness to listen to questions influence how an explanation is experienced, although learning effects require independent measurement. Methodological studies on oral communication skills development emphasise attention to expression and interaction processes (7). This approach provided a conceptual basis for interpreting responses about tone, language adaptation and student participation. These responses were treated as perceptions of communication quality rather than direct indicators of curricular mastery.

Reading comprehension and instruction interpretation are dimensions closely related to teacher communication. A study with primary school pupils addressed strengthening communication skills to improve text comprehension (3). Although that research had a different objective, it demonstrated the relevance of understanding comprehension as a process requiring explicit mediation. This article therefore distinguished clarity of directions from opinions about academic performance. This separation is essential: a student's statement that a task is better understood does not necessarily mean a higher grade was obtained, particularly without verifiable school records.

Written expression and organisation of teaching materials

Teachers' written communication appears in directions, guides, rubrics, comments and resources guiding independent work. An effective written message must specify actions, sequences and review criteria without unnecessary ambiguity. Formative research has considered expression and organisation of ideas as capabilities associated with academic competency development (5). In this

study, that perspective helped interpret instruction clarity and material precision as specific components of student experience. It also guided interpretation of lower percentages as opportunities to improve communication rather than evidence of a general teaching deficit.

Teaching units can structure classroom communication skills development through activities combining explanation, participation and message production (8). Their contribution to this study is the recognition that written communication becomes meaningful within specific pedagogical sequences. A direction may be grammatically correct yet insufficient if it does not specify the expected product or completion steps. Indicators concerning instructions, coherence and feedback were therefore interpreted as complementary facets. This approach also avoids equating questionnaire percentages with observational evidence about the actual quality of each classroom material.

Non-verbal communication and educational relationships

Body language accompanies discourse through gestures, posture, spatial orientation and eye contact. These resources may help highlight information, regulate speaking turns and express willingness to interact. However, interpretation depends on cultural context and activity characteristics. Research on social cognition and communication skills in primary education has addressed the importance of understanding school interaction processes (9). This background justified including movement, facial expression and posture indicators while also interpreting results cautiously. Responses reflected how students perceived these resources rather than systematic observation of each teacher's behaviour.

Pedagogical mediation, feedback and participation

Feedback is an exchange communicating what has been achieved, what requires revision and how a task can be continued. Its usefulness depends on message clarity, timing and students' actual opportunities to act. Literature on teacher–student relationships has examined pedagogical bonds' role in participation and academic engagement (10). Although this evidence comes from different contexts, it helped interpret support and confidence responses as perceptions related to interaction. These indicators were not assumed to represent objective grade improvements because questionnaires did not replace consultation of official records.

Research on technology-mediated communication and teaching has also highlighted accessible instructions and understandable interaction channels (11). In face-to-face classrooms, this principle can apply to guides, examples and explanations without equating research contexts. For this article, the literature supported an integrated interpretation of clarity, dialogue and feedback as complementary practices. It also distinguished favourable perceptions of support from experimental evaluation of effectiveness. This distinction is particularly important when percentages derive from self-reports rather than comparisons of academic outcomes before and after an intervention.

Communication and specific characteristics of curricular areas

Content communication varies according to each discipline's characteristic languages and operations. Reading and writing activities require guidance on interpreting, producing and revising texts; mathematical problem-solving emphasises procedural sequencing, representations and explanation

of criteria. A study on communication skills during mathematics classes highlighted integrating communication into activities in that area (6). This background helped justify differentiated indicators in this study's questionnaires. Percentages were therefore described within each subject without constructing a superiority ranking the instruments were not designed to support.

Research on discourse markers in algebra teaching through digital resources examined instructor communication characteristics in a specific setting (12). Its conceptual contribution shows that language guiding mathematical processes can be analysed in relation to the activity. However, a digital environment and a face-to-face perception questionnaire provide different types of evidence. Findings here were therefore restricted to student opinions about guidance clarity and usefulness. Possible consequences for procedural accuracy, conceptual understanding or grades must be evaluated through designs incorporating independent measurements.

Student perceptions and communication assessment

Student perceptions are judgements about specific educational experiences. Structured scales can summarise them quantitatively, but they are not equivalent to direct observations or achievement test results. Research on perceived improvement in university students' communication skills has demonstrated interest in how participants assess these capabilities (13). Although that population differs from this study's, it helped establish perceptual responses as a legitimate subject of description. It also emphasised precise definition of what each indicator measures and avoiding conclusions exceeding instrument scope.

Literature on communication competencies and educational quality has proposed understanding these skills as part of participation and meaning construction at school (14). From this perspective, positive assessments can guide teacher development decisions, provided their limits are recognised. This study retained each indicator's percentages without transforming them into non-existent association coefficients. Responses about instructions, examples and dialogue were also distinguished from subjective statements about grades. This separation keeps pedagogical recommendations consistent with the descriptive objective and avoids presenting perceived usefulness as demonstrated academic improvement.

Recent research and contributions to the study

Educational experiences during the pandemic demonstrated the need to adapt teaching and communication practices to changing settings (4). Reflection on that period also highlighted understanding institutional context before generalising findings (15). Both sources provided criteria for situating the study in its specific setting and avoiding automatic extrapolation. Assessments collected in Juticalpa during 2025 described a particular school reality, potentially influenced by classroom dynamics and questionnaire wording. Discussion therefore considered conceptual similarities with the literature alongside population, period and methodological differences.

Research on schoolchildren's communication skills has highlighted the value of examining these capabilities from early ages (16). Studies on educational relationships and communicative competence have also explored teacher–student bonds (17). These studies provided complementary

frameworks for interpreting responses about participation, support and clarity. However, none replaced the manuscript's own empirical evidence: percentages came from questionnaires administered to a defined sample, and interpretation remained descriptive. The study contributed by identifying practices receiving better assessments and aspects that could be strengthened rather than estimating causal effects.

Other research on communication skills among students in different degree programmes shows the influence of educational context on assessments of these competencies (18). Studies on pedagogical planning emphasise teaching organisation as a relevant institutional dimension, although they did not measure the perceptions examined here (19). Research on leadership and collaborative work likewise provides a contextual framework for understanding educational interaction without offering findings directly comparable with this article's student questionnaires (20).

METHOD

Research approach and design

A quantitative, non-experimental, descriptive study was conducted during the 2025 school year. No variables were manipulated and no intervention was implemented to compare outcomes. Responses to structured questionnaires on teacher communication skills and their perceived academic usefulness were examined. Analysis presented reported percentages for each indicator, distinguishing the two subjects and communication dimensions assessed. No inferential tests or correlation estimates were performed. Responses about grades were therefore interpreted exclusively as student assessments. The design described assessment trends in a defined institutional context without attributing causality or establishing statistically tested differences between teachers or curricular areas.

Context, population and sample

The research was conducted at Instituto Departamental La Fraternidad in Juticalpa, Olancho department, Honduras. The reported institutional population comprised 285 third-cycle students, distributed across seventh grade (80), eighth grade (87) and ninth grade (118), alongside 16 teachers of both subjects. The reported sample included 169 students and 12 teachers. The same 169 students provided the basis for questionnaires in both areas; the sample size was therefore not doubled when describing results by subject. The institutional report identified stratified probability sampling, with a confidence level of 95 % and an estimated maximum error of 5 %. The final breakdown by grade was unavailable for reproducing stratified allocation.

Instruments and validation

Structured Likert-type questionnaires recorded assessments of oral, written and body communication, alongside perceptions of instructions, participation, tasks and academic performance. The report documented item review for clarity, coherence, relevance and appropriateness by three teachers and a pilot test with 15 students and five teachers. Cronbach's alpha coefficients of 0.98 and 0.97 were reported for the language-area instruments and 0.79 and 0.93 for Mathematics. This analysis emphasised student values of 0.97 and 0.93, respectively, without

attributing them to particular dimensions. Questionnaires contained different indicators by area, so percentages were interpreted individually rather than as directly equivalent scores.

Data collection and processing procedure

Instruments were administered during the school period specified in the institutional report. Responses were organised by subject and indicator and summarised through descriptive percentages. Results published in the study matrices were retained without reconstructing absolute frequencies where specific denominators were unavailable. Teacher questionnaire information was used only to contextualise the institutional design; this article's analysis focused on student perceptions. Official grades, coded classroom observations and academic test results were not included. This delimitation maintained correspondence among the objective, data nature and conclusions, avoiding inferences about unmeasured associations or performance changes.

Statistical analysis and interpretation

Findings were examined through descriptive statistics, emphasising reported percentages for clarity, exemplification, interaction, non-verbal communication and perceived academic usefulness. Correlation coefficients and significance values were not estimated because the objective was not to test variable associations. Nor were the subjects compared through a difference-of-proportions test because their questionnaire indicators were not fully equivalent. Percentages about confidence, participation or grades were considered participants' reported opinions. Cronbach's alpha values were presented as reported instrument internal consistency properties without recalculation from individual responses. Descriptive treatment delimited inference and recommendation scope.

Ethical considerations

According to the institutional documentation described, written authorisation was obtained for the study. Informed consent was obtained from participating teachers and students of legal age. For minors, representatives were informed and their agreement obtained alongside student assent. Participation was voluntary and questionnaire information was used for academic and research purposes. Results were presented in aggregate without individual participant identification. The article did not include personal data, named school histories or official grade records. These measures enabled description of collected perceptions without disclosing identities while maintaining the ethical boundaries of the data used.

RESULTS

Descriptive percentages of student assessments are presented, organised by communication dimension and subject. Questionnaire indicators were not identical; tables therefore show trends within each area rather than an inferential comparison between them. Academic performance assessments represent opinions rather than verified grades.

Assessments of communication in the language area

Table 1. Perceptions of communication skills in Spanish

Dimension and indicator	Assessment
Clarity of written instructions	91.4 %
Adaptation of tone, pace and vocabulary	91.3 %
Dialogue and participation	89.8 %
Use of examples and comparisons	87.3 %
Appropriate distance and movements	88.8 %
Gestures reinforcing explanations	88.3 %
Motivating facial expressions	82.1 %

Note. Percentages correspond to indicators reported in the institutional study and represent student perceptions. Source: prepared by the authors.

Table 1 shows that clarity of written instructions and adaptation of oral discourse received the highest assessments, both above 91 %. Dialogue and use of examples also received favourable responses. Among non-verbal communication indicators, motivating facial expressions recorded the lowest percentage, 82.1 %. This distribution suggests students particularly recognised explanation and instruction practices, while certain expressive resources offer opportunities for pedagogical strengthening.

Assessments of communication in Mathematics

Table 2. Perceptions of communication skills in Mathematics

Indicator	Assessment
Guidance on meeting quality criteria	90.9 %
Confidence with understandable instructions	90.5 %
Clarity of task instructions	89.9 %
Examples, questions and comparisons	88.4 %
Participation through everyday situations	84.6 %

Note. Percentages are presented for specific indicators in this subject's questionnaire. Source: prepared by the authors.

Table 2 shows favourable assessments of the clarity and perceived usefulness of guidance for completing tasks. Quality criteria received the highest percentage, 90.9 %, followed by reported confidence with understandable instructions, 90.5 %. Examples and comparisons reached 88.4 %, while participation through everyday situations recorded 84.6 %. Findings describe students' experiences without establishing that instructions produced objective improvements in academic performance.

Perceived academic usefulness

Table 3. Perceptions of support and academic experience

Indicator	Assessment
Communication associated with better grades	85.2 %
Support associated with better assignments	86.2 %

Indicator	Assessment
Clarity related to attendance and participation	86.2 %
Guidance associated with understanding and creativity	83.7 %
Confidence in expressing ideas	82.7 %
Greater participation with clear explanations	82.6 %

Note. Indicators express students' attributions; they do not come from official grade records. Source: prepared by the authors.

Table 3 presents assessments of the academic usefulness of communication practices. Support and clarity linked to participation reached 86.2 %, while 85.2 % attributed a favourable contribution to grades. Lower percentages concerned confidence in expressing ideas and participation with clear explanations. These responses suggest students recognised communication as supporting their school experience but cannot quantify actual changes in grades or attendance.

DISCUSSION

Findings showed favourable student assessments of instruction clarity and language appropriateness. This trend agreed with Boizán Mesa and colleagues (2), who placed communication skills among professional pedagogical competencies. However, while those authors addressed development through professional guidance, this study described student opinions about specific practices.

In the language area, clarity of written instructions reached 91.4 %, exceeding other body-language indicators. Espinoza-Rivera (3) examined communication skills associated with reading comprehension in primary education, while Reinoso Gómez (8) analysed development through teaching units. Both supported the importance of organising understandable messages and activities. The substantive difference was that this study neither assessed reading competencies nor applied a teaching intervention: it only recorded student assessments.

Adaptation of tone, pace and vocabulary reached 91.3 %, suggesting particular recognition of oral communication. Martínez Villar (7) emphasised methodological development of oral communication skills, while Hernández-Jorge and de la Rosa Curbero (13) studied perceived improvement of these capabilities in university students. Despite different educational contexts, the studies agreed in treating communication as a multidimensional competence. By contrast, this research neither measured progress before and after training nor compared groups.

In Mathematics, guidance on meeting quality criteria reached 90.9 % and perceived confidence with understandable instructions reached 90.5 %. Khaliqberdiyeva (6) addressed communication skills development during mathematics lessons, while Shin and colleagues (12) analysed teacher discourse markers in online algebra learning. The background studies agreed on language's relevance to guiding procedures. However, the second used computational discourse analysis, whereas this study used perception questionnaires.

Support associated with better assignments was reported by 86.2 % of participants. Pan and Yao (10) studied teacher support and teacher–student rapport in connection with academic engagement,

while Zhou and Li (17) analysed educational relationships and communicative competence. Their approaches helped interpret feedback as a relational rather than merely informational practice. However, academic engagement and communicative competence were operationalised differently in those studies. Equivalent scales were not used here and variable relationships were not examined, so theoretical similarity did not permit inferences about associations or explanatory mechanisms.

Non-verbal communication indicators received favourable assessments, although motivating facial expressions recorded 82.1 %, below written clarity. Valverde Mamani and colleagues (9) examined social cognition and communication skills in primary education, providing an interaction perspective. This background broadened interpretation of gestures, posture and expressiveness but offered no directly comparable measure for this questionnaire's responses. The relatively lower percentage identified an area for pedagogical attention rather than a demonstrated deficiency.

Comparison between subjects required particular caution. Instruments contained different indicators, so similar percentages did not necessarily represent the same dimension. Hernández-Jorge and de la Rosa (18) showed that communication skills can be examined across different populations and educational pathways; this diversity reinforced the need to specify each measurement's context. Results were therefore interpreted within each area rather than as a ranking of teachers.

Limitations included a single-school setting, self-reported responses, absence of a definitive sample breakdown by grade and lack of individual data for inferential tests. Ruiz Cuéllar (15) emphasised interpreting education in relation to contextual circumstances; this precaution was relevant to avoiding generalisations. Future research should incorporate classroom observation, equivalent questionnaires across areas, anonymised performance records and analyses planned in advance. These procedures would distinguish more precisely among perceived communication clarity, actual participation and measured academic outcomes without attributing causality to current descriptions.

CONCLUSIONS

First. The 169 students' perceptions showed favourable assessments of teacher communication skills in both areas analysed. Instruction clarity and language appropriateness stood out as particularly recognised components of school experience. Findings addressed the descriptive objective and provided information about teaching practices students considered understandable and useful. Interpretation was limited to collected responses and established neither causal nor statistical differences between subjects.

Second. In the language area, clarity of written instructions and adaptation of tone, pace and vocabulary received the highest assessments. Non-verbal communication also received positive views, although some indicators had relatively lower percentages. This distribution identified opportunities to improve expressive resource use and support for activities. Findings justified recommendations for professional development and pedagogical reflection without constituting external assessment of individual teacher competence.

Third. In Mathematics, students valued guidance explaining quality criteria, clarity of directions and perceived confidence in completing tasks. Different indicators across the questionnaires prevented a

valid hierarchy between subjects. Proportions were therefore interpreted within each question set. This decision preserved methodological coherence and highlighted the relevance of sequenced explanations and examples to reported learning experience.

Fourth. Responses about support, participation and grades showed that a substantial proportion of students attributed academic usefulness to teacher communication. However, official performance records were not examined and correlations were not calculated. The study therefore demonstrated neither grade improvements nor statistical associations or causal effects. Strengthening instructions, dialogue and feedback was recommended, alongside further research using objective measurements, comparable instruments and analytical procedures appropriate to explanatory questions.

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ETHICAL CONSIDERATIONS

The study was conducted through a literature review based exclusively on previously published documentary sources. It did not involve direct participation of humans or animals, interventions, biological samples or access to identifiable personal data. Consequently, it did not require ethics committee approval or informed consent. The research process observed the principles of scientific integrity, appropriate authorship attribution, rigorous citation and responsible use of consulted sources.

DECLARATION OF ARTIFICIAL INTELLIGENCE (AI) USE

The authors state that the artificial intelligence tool was used exclusively to support article organisation and text translation. Its use did not determine scientific content, study design, source

selection, data analysis, interpretation of results or conclusions. Full responsibility for the content remains with the authors.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest related to this study and that all procedures followed comply with the journal's ethical standards. They also confirm that this work is original and has not been published, in whole or in part, in any other publication.

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