ORIGINAL

Exploring the relationship between metacognition and motivation in Peruvian basic education students

Explorando la relación entre la metacognición y la motivación en estudiantes peruanos de educación básica

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ABSTRACT

Introduction: metacognition is essential in the teaching-learning process, as students who are aware of their own thinking processes tend to be more effective in acquiring knowledge and skills.
Objective: to determine if there is a relationship between metacognition and motivation in Peruvian basic education students.
Methods: quantitative research, non-experimental design with correlational scope. The sample consisted of 130 students who responded to two questionnaires characterized by adequate metric properties.
Results: preliminarily, it was found that students applied metacognitive processes efficiently and their level of motivation was high. On the other hand, it was determined that the Kendall's Tau b correlation coefficient for both variables was equal to 0,501 and the p-value was lower than the significance level ($p<0,05$). This implies that those students who were more aware and reflective about how they approached their academic activities, how they planned and executed learning strategies, tended to be more motivated in their studies.
Conclusions: it was determined that there is a direct and significant relationship between metacognition and motivation in Peruvian basic education students. Therefore, it is suggested that teachers promote activities that develop self-reflection and awareness of thinking processes. This may include self-assessment exercises and learning journals.

Keywords: Metacognition; Motivation; Basic Education; Reflection; Students.

RESUMEN

Introducción: la metacognición es esencial en el proceso de enseñanza - aprendizaje, ya que los estudiantes que son conscientes de sus propios procesos de pensamiento tienden a ser más efectivos en la adquisición de conocimientos y habilidades.
Objetivo: determinar si existe relación entre la metacognición y la motivación en estudiantes peruanos de educación básica.
Métodos: investigación cuantitativa, diseño no experimental y de alcance correlacional. La muestra fue conformada por 130 estudiantes quienes respondieron a dos cuestionarios caracterizados por mostrar adecuadas propiedades métricas.
Resultados: preliminarmente, se halló que los estudiantes aplicaban los procesos metacognitivos de manera eficiente y su nivel de motivación era alto. Por otro lado, se determinó que el coeficiente de correlación

Tau b de Kendall para ambas variables fue igual a 0,501 y el valor de p resultó inferior al nivel de significancia (p<0,05). Esto implica que aquellos estudiantes que eran más conscientes y reflexivos acerca de cómo abordaban sus actividades académicas, cómo planificaban y ejecutaban estrategias de aprendizaje, tendían a estar más motivados en sus estudios.

Conclusiones: se determinó que existe una relación directa y significativa entre la metacognición y la motivación en estudiantes peruanos de educación básica. Por lo expuesto, se sugiere a los docentes fomentar actividades que desarrollen la autorreflexión y la conciencia sobre los procesos de pensamiento. Esto puede incluir ejercicios de autoevaluación y diarios de aprendizaje.

Palabras clave: Metacognición; Motivación; Educación Básica; Reflexión; Estudiantes.

INTRODUCTION

The vertiginous advance of science has positively influenced the quality of education,[1] progressively transforming the educational paradigm from a teacher-centered approach to a student-centered one.[2] The transition to student-centered education implies recognizing the importance of students becoming active and reflective learners, capable of directing their learning autonomously.[3] In this context, metacognition emerges as a skill to enhance students' ability to self-regulate their learning, which contributes significantly to improving the quality and effectiveness of education.[4]

Metacognition is defined as the ability of individuals to understand, monitor, and regulate their own cognitive and learning processes.[5] From this, two critical components of metacognition can be distinguished: one of a declarative nature, known as metacognitive knowledge, which encompasses a person's understanding of themselves and the task they are performing. The second component, procedural in nature, is known as metacognitive control or self-regulated learning. This latter component is always goal-oriented and is actively controlled by the learner in order to direct and adjust his or her learning process.[6]

In the context of primary education, metacognitive strategies constitute fundamental tools that allow students to reflect on their learning process, employing a variety of resources to plan, monitor, and evaluate their progress.[7] Examples of these strategies include concept mapping, summarizing, and reflective reading, among others.[8] These strategies involve the development of skills that allow them to argue, recognize relationships, evaluate evidence and authority, reach conclusions, and make accurate inferences.[9] Therefore, it is crucial to promote educational models that encourage the use of these strategies, as they have the potential to achieve academic goals by connecting learning to everyday situations and encouraging awareness of limitations in reasoning, thinking, and problem-solving.[10]

Metacognition, as conceptualized by Flavell,[5] encompasses three interrelated dimensions that are fundamental to the learning process. First, self-knowledge involves understanding and awareness of one's own cognitive and learning processes. Self-regulation refers to the ability to actively monitor and control these processes, including task planning, strategy selection, and adaptation as needed. Finally, self-assessment involves the ability to critically reflect on one's performance and understanding, identifying areas for improvement and taking action to address them. These three dimensions work together to promote effective and autonomous learning.

Another important factor involved in the educational process is motivation, which is closely related to metacognition. During primary education, motivation can significantly influence students' commitment to learning, academic achievement, and personal development.[11] Motivation can be understood as the internal drive that directs and energizes behavior toward the achievement of specific goals.[12] In the school context, motivation can manifest itself in a variety of ways, from the intrinsic desire to learn and explore new knowledge to the search for external recognition or tangible rewards.

Several critical theories have been established in research on motivation in education to describe, explain, and predict the direction, onset, intensity, and persistence of learning behaviors.[13] For example, self-determination theory[12] argues that motivation can be intrinsic or extrinsic, and high intrinsic motivation is associated with greater engagement in academic tasks. Expectancy-value theory[14] focuses on the interaction between students' beliefs about their abilities and the value they attach to a specific task. Finally, achievement goal theory[15] emphasizes that mastery goals are associated with greater intrinsic motivation and commitment to learning.

Significantly, student motivation can be influenced by a variety of factors, both internal and external.[16] Internal factors include students' own beliefs and expectations about their ability to succeed in academic tasks (perceived self-efficacy), as well as their interest in and curiosity about learning content and activities.[17] On the other hand, external factors may include the school environment, teacher and family support, social and cultural expectations, and the reward and recognition system within the school context.[18]

In this study, two dimensions of motivation were explored: intrinsic and extrinsic. Intrinsic motivation is characterized by the internal and personal drive that leads them to participate in school activities due to the enjoyment, interest, and satisfaction they experience when performing them, such as the pleasure of learning or the search for intellectual challenges. On the other hand, extrinsic motivation is manifested when students engage in school activities motivated by external factors, such as external rewards or social pressures, rather than by a genuine interest in the activity itself.[19]

The present research is justified because of its potential to significantly improve the educational process. Understanding how these two variables are related can provide valuable insights into how to design more effective and personalized teaching strategies. By better understanding how metacognition, i.e., students' ability to monitor and regulate their learning, relates to motivation, which is crucial for engagement and persistence in academic tasks, educators can develop pedagogical approaches more tailored to student's individual needs, which in turn can improve their academic performance and all-round development.

Finally, the present research aimed to determine whether there is a relationship between metacognition and motivation in Peruvian primary education students.

METHODS

A quantitative approach was used, since this method allows the use of statistical techniques to analyze numerical data objectively. The design adopted was non-experimental, which implies that no intentional manipulations of the variables were carried out but rather observations and recordings in their natural environment. In addition, this is a cross-sectional correlational study in which data were collected at a specific time to describe and analyze possible relationships between variables.[20]

The sample consisted of a total of 130 students of both sexes enrolled in a primary education institution located in the city of Puerto Maldonado (Peru). It is essential to emphasize that the selection of this number of participants was carried out by means of stratified probability sampling, with a confidence level of 95 % and a significance level of 5 %, thus ensuring the representativeness and statistical validity of the results obtained.

The data collection technique was the survey, while the instruments were the Metacognition Questionnaire and the Motivation Questionnaire. The Metacognition Questionnaire[21] is composed of 33 Likert-type items, each with 5 response alternatives (never, seldom, regularly, almost always, and always). It is structured in 3 dimensions: self-knowledge, self-regulation, and self-evaluation. In the present investigation, it was determined to have adequate metric properties (Aiken's V: 0,850; α= 0,919). As for the Motivation Questionnaire,[22] it also consists of 33 Likert-type items with 5 response alternatives (never, seldom, regularly, almost always, and always), and is structured in 2 dimensions: intrinsic motivation and extrinsic motivation. The present investigation also determined that it had adequate metric properties (Aiken's V: 0,900; α= 0,957).

Data collection was carried out after obtaining the corresponding authorizations from the educational authorities. In order to ensure the active participation of the students, the survey was conducted face-to-face at the educational institution. Students were cordially invited to participate and were given detailed instructions for completing both instruments. This process lasted approximately 20 minutes.

The data analysis was structured in two stages through the use of SPSS version 25 and Microsoft Excel software. In the first stage, a descriptive analysis was carried out through the generation of figures, which facilitated an initial understanding of the distribution of the percentages of the variables and dimensions under study. Subsequently, in the second stage, an inferential analysis was performed. Given that the variables did not have a normal distribution, we chose to use Kendall's Tau-b correlation coefficient to explore possible relationships between the variables and dimensions. A statistically significant relationship was considered when the p-value was less than 0,05 ($p < 0,05$).

The present investigation was carried out in compliance with strict ethical standards. Informed consent was obtained from the parents of all participating students, who were fully informed about the purpose and procedures of the study, as well as their children's rights of participation and confidentiality. In addition, the confidentiality of the data collected was guaranteed, using identification codes instead of personal information at all stages of the study. Similarly, the principles of the Declaration of Helsinki were respected at all times, ensuring the well-being and integrity of the participants. Finally, any information obtained was used exclusively for research purposes and was kept strictly confidential.

RESULTS

Figure 1 shows that the level of metacognition of 56,2 % of students was moderate, 34,6 % was high, and 9,2 % was low. Regarding the self-knowledge dimension, the predominant level was moderate, with 73,1 %, followed by high, with 14,6 %, and low, with 12,3 %. Regarding the self-regulation dimension, the predominant level was moderate, with 50,8 %, followed by the high level, with 37,7 %, and the low level, with 11,5 %. In relation to the self-evaluation dimension, it was the best rated since 60 % of students were at the high level, 33,1 % at the moderate level, and 6,9 % at the low level. Based on the data presented, it follows that most

students have partially developed their awareness of cognitive processes and self-regulation skills. However, they show a positive perception with regard to their abilities to evaluate and discern their learning process.
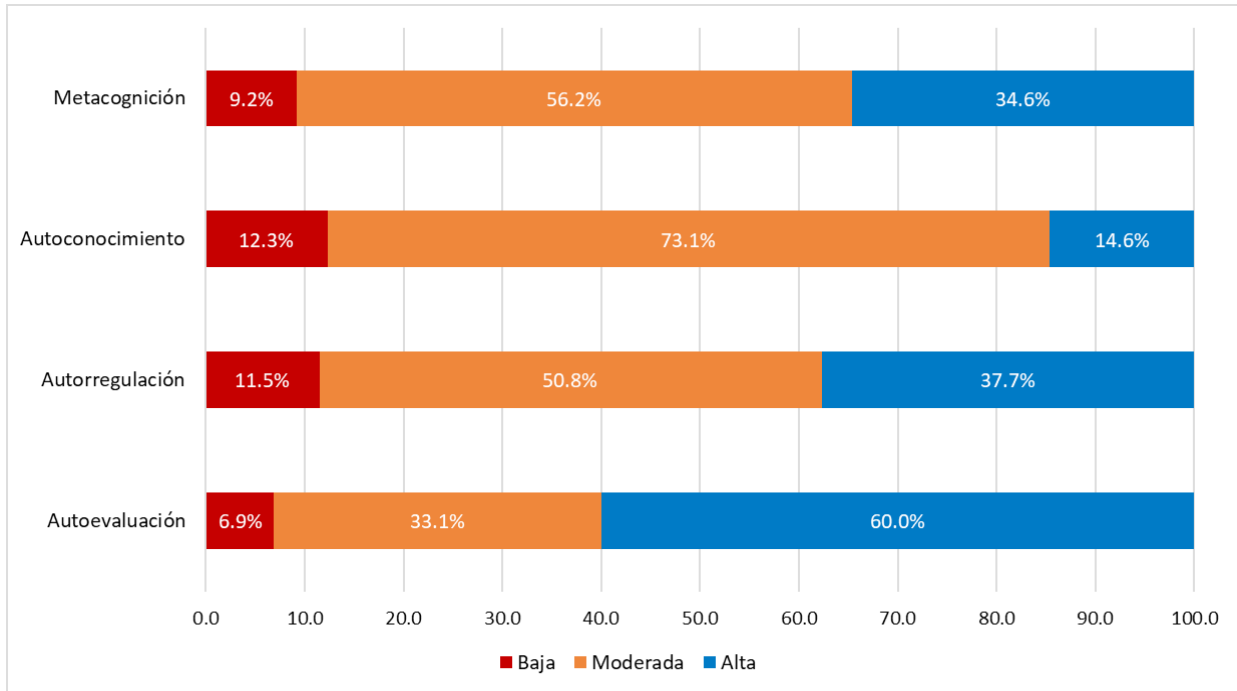
Figure 1. Percentage distribution of the metacognition variables and their dimensions
Source: Surveys.

Figure 2 shows that the level of motivation of 63,8 % of students was high, 30 % was moderate, and 6,2 % was low. Regarding the intrinsic motivation dimension, the predominant level was high, with 72,3 %, followed by moderate, with 25,4 %, and low, with 2,3 %. Finally, the level of extrinsic motivation was found to be moderate at 50 %, high at 40 %, and low at 10 %. These data suggest that most of the students surveyed show positive motivation, both intrinsic and extrinsic, which could be an indicator of their commitment and active participation in the learning process.
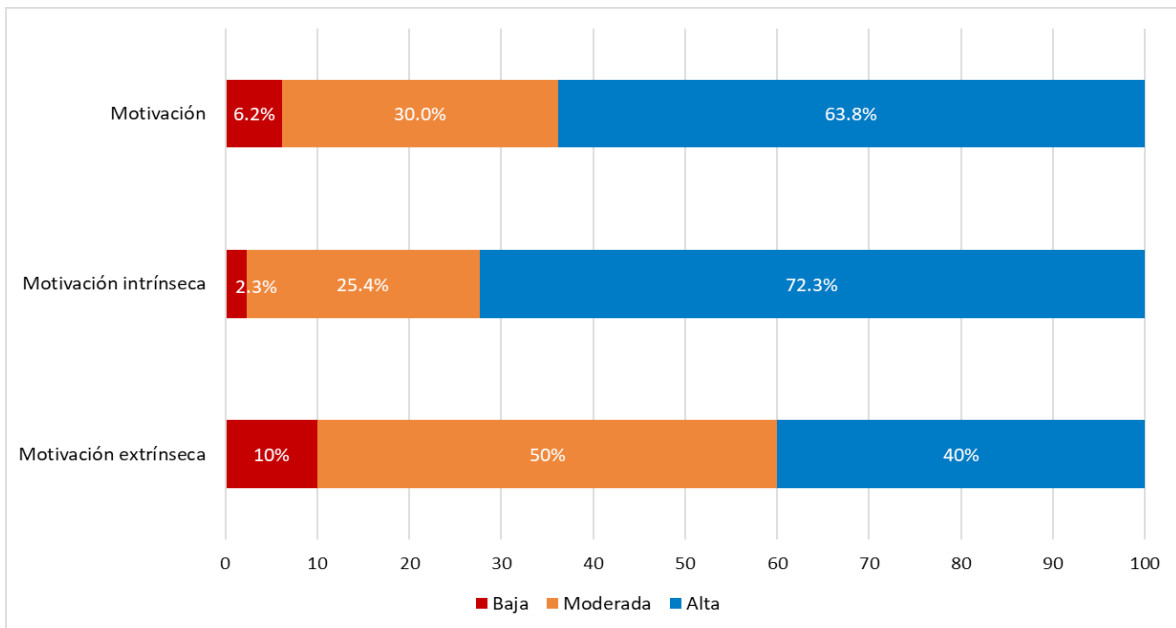

Figure 2. Percentage distribution of the motivation variables and their dimensions
Source: Surveys.

According to table 1, Spearman's rho correlation coefficient between the variables metacognition and

motivation was 0,501, and the p-value was below the significance level (p<0,05). Since the coefficient is positive and in the range of 0 to 1, it indicates a direct and moderate relationship between the variables. This finding suggests that as the level of metacognition increases, so does student motivation.

Table 1. Correlation between metacognition and motivation			Metacognition	Motivation
Kendall's Tau-b	Metacognition	Correlation coefficient	1,000	0,501**
		Sig. (bilateral)	.	0,000
		N	130	130
	Motivation	Correlation coefficient	0,501**	1,000
		Sig. (bilateral)	0,000	.
		N	130	130
**. The correlation is significant at the 0,01 level (2-tailed).				
Source: Surveys.				

According to table 2, Spearman's rho correlation coefficient between the self-knowledge dimension and the motivation variable was 0,267, and the p-value was below the significance level (p<0,05). Since the coefficient is positive and close to 0, it indicates a direct and weak relationship between the dimension and the variable analyzed. This finding suggests that as the level of self-knowledge increases, so does student motivation.

Table 2. Correlation between self-knowledge and motivation			Self-knowledge	Motivation
Kendall's Tau-b	Self-knowledge	Correlation coefficient	1,000	0,267**
		Sig. (bilateral)	.	0,000
		N	130	130
	Motivation	Correlation coefficient	0,267**	1,000
		Sig. (bilateral)	0,000	.
		N	130	130
**. The correlation is significant at the 0,01 level (2-tailed).				
Source: Surveys.				

Table 3 shows that Spearman's rho correlation coefficient between the self-regulation dimension and the motivation variable was 0,522, and the p-value was below the significance level (p<0,05). Since the coefficient is positive and in the range of 0 to 1, it indicates a direct and moderate relationship between the dimension and variable analyzed. This finding suggests that as the level of self-regulation increases, so does student motivation.

Table 3. Correlation between self-regulation and motivation			Self-regulation	Motivation
Kendall's Tau-b	Self-regulation	Correlation coefficient	1,000	0,522**
		Sig. (bilateral)	.	0,000
		N	130	130
	Motivation	Correlation coefficient	0,522**	1,000
		Sig. (bilateral)	0,000	.
		N	130	130
**. The correlation is significant at the 0,01 level (2-tailed).				
Source: Surveys.				

Table 4 shows that Spearman's rho correlation coefficient between the self-evaluation dimension and the motivation variable was 0,519, and the p-value was less than the significance level (p<0,05). As the coefficient is positive and in the range of 0 to 1, it indicates a direct and moderate relationship between the dimension and variable analyzed. This finding suggests that as the level of self-evaluation increases, so does student motivation.

Table 4. Correlation between self-evaluation and motivation			Self-evaluation	Motivation
Kendall's Tau-b	Self-evaluation	Correlation coefficient	1,000	0,519**
		Sig. (bilateral)	.	0,000
		N	130	130
	Motivation	Correlation coefficient	0,519**	1,000
		Sig. (bilateral)	0,000	.
		N	130	130
**. The correlation is significant at the 0,01 level (2-tailed).				
Source: Surveys.				

DISCUSSION

Currently, metacognition has gained significant attention in the educational field due to its fundamental role in the learning process.[23] It is increasingly recognized that students not only need to acquire knowledge and skills but also develop a reflective understanding of how they learn and how they can improve their academic performance.[24] Accordingly, the present research focused on determining whether there is a relationship between metacognition and motivation in Peruvian elementary school students.

An emerging finding is that most students have partially developed their awareness of cognitive processes and self-regulation skills. However, they show a positive perception regarding their abilities to evaluate and discern their learning process. This suggests that, although they are still in the process of fully developing their metacognitive skills, students are confident in their ability to reflect and improve their way of learning. Similar results were obtained in research conducted in Ecuador,[25] where they found that students perceived highly adequate the metacognitive skills expressed through planning, verification, and evaluation, suggesting that they were aware of the importance of these processes in their learning.

Another preliminary finding shows that most of the students surveyed show positive motivation, both intrinsic and extrinsic, which could be an indicator of their engagement and active participation in the learning process. Moreover, this positive motivation may have a significant impact on their academic performance and their willingness to face challenges with determination and perseverance. This finding is consistent with research conducted in Peru,[26] where it was identified that the predominant level of motivation in fifth-year high school students (37,4 %) was high, suggesting a strong commitment and enthusiasm toward the learning process.

A revealing result shows that motivation is directly and significantly related to the variable metacognition (Tau-b= 0,501; p<0,05) and the dimensions self-knowledge (Tau-b= 0,267; p<0,05), self-regulation (Tau-b= 0,522; p<0,05) and self-evaluation (Tau-b= 0,519; p<0,05). These results suggest that as students develop an increased ability to understand and regulate their own thinking and learning processes, they experience an increase in their motivation to engage and commit to academic activities. This implies that knowledge and control over how they learn, plan, and evaluate their progress not only provides them with a sense of empowerment but also drives them to be more motivated and dedicated to achieving their educational goals. Some research corroborates the results described above.[27,28,29]

The self-determination theory supports the described finding.[12] This theory postulates that people's motivation can be intrinsic (driven by personal interests and internal satisfaction) or extrinsic (driven by external rewards or punishment avoidance). However, when students develop metacognitive skills, such as self-regulation and reflection on their learning, they can primarily increase their intrinsic motivation by feeling a greater sense of autonomy, competence, and connection to their learning goals. Thus, self-determination theory provides a solid conceptual framework for understanding how metacognition can influence students' motivation.

The existence of a direct and significant relationship between metacognition and motivation in a sample of students invites deep reflection on the learning process and academic development in specific educational contexts. This relationship suggests that not only knowledge and self-regulation of cognitive processes influence the way students learn, but also affect their disposition and commitment to the learning process itself. In a context such as Peru, where socioeconomic and cultural realities can affect motivation and access to learning, understanding this relationship may be essential for designing more effective educational interventions tailored to the particular needs of students.

It is essential to recognize that this research presents certain limitations that may influence the interpretation of the results obtained. First, the sample used in the study needed to be more prominent in size. It came from a specific geographic location, which could limit the generalization of the findings to other populations of primary education students in different contexts. In addition, the use of self-administered questionnaires may have introduced response biases, as participants may have provided responses that they considered socially desirable rather than reflecting their actual experiences. Therefore, for future research, studies with more

extensive and more diversified samples are suggested, which would allow for greater representativeness and generalization of the results. It would also be beneficial to complement quantitative data with qualitative methods, such as interviews or focus groups, to obtain a deeper and more contextualized understanding of the phenomena studied.

CONCLUSIONS

In education, metacognition has been highlighted as a crucial element to enhance students' meaningful learning. The ability of students to understand and regulate their mental processes is considered fundamental in the development of effective study strategies, complex problem-solving, and informed decision-making.

The results suggested that there is a direct and significant relationship between metacognition and motivation in Peruvian primary education students. This suggests that students who possess greater awareness and control over their thinking processes are more motivated and committed to their academic tasks. Therefore, promoting the development of metacognitive skills in the classroom could be an effective strategy to increase students' motivation and improve their learning achievement levels. This relationship also highlights the importance of considering both cognitive and motivational aspects in the design of educational interventions aimed at improving students' learning process.

Therefore, it is recommended that teachers implement pedagogical strategies that foster the development of metacognitive skills from an early age, integrating reflection on the learning process itself into curricular planning. It is crucial to promote a culture of support and recognition, highlighting students' metacognitive efforts and linking the development of these skills with intrinsic motivation towards learning. In addition, providing additional support and targeted resources may be beneficial for those students who require an extra level of help. These actions will help cultivate an educational environment that promotes the holistic development of students, boosting both their metacognition and motivation toward learning.

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CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

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