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Research article

Formative assessment and its contribution to the improvement of reading comprehension in a public school in Lima

Evaluación formativa y su contribución a la mejora de la comprensión lectora en una escuela pública de Lima

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Abstract
Introduction: Formative assessment is an important factor in the prediction and promotion of reading comprehension in the school environment. This would be a consequence of the fact that it increases motivation and commitment to reading, facilitates the adjustment of teaching to the peculiarities of the student and the development of self-regulation skills in reading. **Methodology:** It is a quantitative, causal correlational methodological design with very high reliability instruments: 0,885 and 0,909, for formative assessment and reading comprehension, respectively. **Results:** It was found that formative assessment has a significant impact on reading comprehension. **Discussions:** Contrasting studies have shown that collaboration, motivation and curricular adaptation are favored. Nevertheless, several of them were indirect antecedents. **Conclusions:** This evaluative strategy fosters self-regulation and autonomy so that students can adjust their learning as a process tailored to their abilities and pace of progress. It provides teachers with didactic tools to adapt their teaching according to the particular needs of the students. It also offers identification of areas of strengths and limitations, timely feedback and collaborative dialogue between educators and learners.

Keywords: regression analysis; causal analysis; active learning; comprehension; skill development; primary education; formative assessment; statistical inference.

Resumen
Introducción: La evaluación formativa es un factor destacado para la predicción y el fomento de la comprensión lectora en el ámbito escolar. Esto sería consecuencia de que, aumenta la motivación y el compromiso con la lectura, facilita el ajuste de la enseñanza a las peculiaridades del estudiante y al desarrollo de habilidades de autorregulación en la lectura. **Metodología:** Se trata de un diseño metodológico cuantitativo, correlacional causal y con instrumentos de confiabilidad muy fuerte: 0,885 y 0,909, para evaluación formativa y comprensión lectora, respectivamente. **Resultados:** Se obtuvo que, la evaluación formativa incide de manera significativa en la comprensión lectora. **Discusión:** El contraste con los estudios ha comprobado que, se ven favorecidos la colaboración, la motivación y la adaptación curricular. No obstante, varios de ellos fueron antecedentes indirectos. **Conclusiones:** Esta estrategia evaluativa fomenta la autorregulación y la autonomía para que los estudiantes ajusten su aprendizaje como un proceso a la medida de sus capacidades y ritmos de progreso. A los docentes les brinde herramientas didácticas para que adapten su enseñanza, de acuerdo a las necesidades particulares del estudiantado. Ofrece también identificar áreas de fortalezas y limitaciones, retroalimentación oportuna y el diálogo colaborativo entre educadores y educandos.

Palabras clave: análisis de regresión; análisis causal; aprendizaje activo; comprensión; desarrollo de las habilidades; enseñanza primaria; evaluación formativa; inferencia estadística.

Before proceeding, we will present in the following table a list of operational definitions, intended as a vade mecum to facilitate a clearer understanding of the concepts developed throughout the article.

Table 1.

Operational Definitions of Formative Assessment and Reading Comprehension

Variables	Operational Definition	Dimensions
Formative Assessment	Continuous and interactive process of gathering evidence on students' learning, aimed at providing timely feedback to both teachers and students, thereby enabling instructional adjustments and promoting self-regulation.	- Associated with the qualification - Proactive - Interactive - Metacognitive - Retroactive - Adjusted
Reading Comprehension	The ability to construct meaning from a text through cognitive processes such as identifying ideas, making inferences, and engaging in critical reflection, based on prior knowledge and contextual factors.	- Literal comprehension - Reorganization - Inferential comprehension - Critical understanding

Source: Own elaboration.

1. Introduction

1.1 Context and importance of the study

At the global level, several multilateral organizations warn of a silent learning crisis. One of the most active institutions in this regard is the World Bank (WB), which after promoting the Progress in International Reading Literacy Study (PIRLS), has reported a decrease in average achievement scores in 69% of the 45 countries or territories for which evidence is available. In four of them, this has reached more than 30 points in Latvia (-30), Azerbaijan (-32), Kazakhstan (-32) and South Africa (-32). In practical terms, an average student in those latitudes could have taken the lagging status for more than a year in reading progress (WB, 2023).

PIRLS delineated a study area of 45 countries and territories where 62% of children have below minimum reading comprehension level in 2021 compared to 2016. There has been an increase in the proportion of children who did not reach minimum proficiency levels: 14% in Azerbaijan, 5% in Latvia, 7% in Kazakhstan and 3% in South Africa (WB, 2023). It should be noted that the above problematic situation, together with variations in structural inequalities after the pandemic, affect the percentage of students below the minimum proficiency level and variations in structural inequality.

In Latin America and the Caribbean, according to the United Nations Educational, Scientific and Cultural Organization (Unesco), four out of five students in the sixth grade of primary school did not achieve the minimum level of reading comprehension (Unesco, 2022). Now, before the outbreak of the pandemic, the region was in a learning crisis, so the data shows that there is a considerable worsening.

In Peru, according to the Ministry of Education (Minedu), PISA classifies students on a scale of seven or eight levels, depending on the competency assessed. Level 2 is considered the minimum threshold necessary to perform successfully in modern society. According to PISA 2022 results, 50% of Peruvian students reached level 2 or higher in Reading, 47% in Science and 34% in Mathematics (Minedu, 2023).

In the face of this adverse panorama, formative assessment has become an effective and valuable strategy for the development of reading comprehension. Many teachers report that one of the first positive reactions among students is greater motivation. Students perceive that now teachers seem to trust in their possibilities, communicate their limitations assertively and provide them with strategic support so that they can jointly plan activities aimed at counteracting academic failure. In many cases, as a result of poor reading comprehension, there are effects such as the poor use of process evaluations, as well as feedback that is neither prompt nor assertive, and much less directed towards the student's formation. Reading is, essentially, inferential, since it requires not only decoding, discernment and comprehension of texts, but also implies that, in the analysis, the environment, the text and the reader must be associated.

Similarly, formative assessment strategies can improve academic performance and reading comprehension. Emotional difficulties and lack of technological adaptation can hinder learning and text comprehension, especially that which is driven from the government under the distance modality (Alazemi, 2024; Ceballos and Sevilla, 2020; Chen *et al*., 2019; Sevilla and Marón, 2020; Yan and Chiu, 2023).

1.2. Theoretical framework

1.2.1. Previous research

In this regard, in the last five years it is possible to note that formative assessment and feedback are important factors for improving reading comprehension. In this regard, Lozano (2022) found that reading comprehension depends on 56.7% of formative assessment in elementary school students (Nagelkerke's R2 = 0.567). It is true that correlation does not equal causation, but correlations could be a first step in exploring a causal relationship. In this sense, Marcos (2024), Añorga (2023), Huamán (2022), Quintana (2022) and Arotoma (2021) found statistically significant relationships between formative feedback and reading comprehension in basic education students (rho = 0.333; rho = 0.735; rho = 0.747; rho = 0.643; rho = 0.869, respectively).

Digital tools and curricular adaptation are necessary in an educational context marked by the intensive use of technology (Alazemi, 2024; Chen *et al*., 2019; Yan & Chiu, 2023). Other aspects that cannot be omitted from pedagogical work either are emotional regulation and the connection between cognitive and emotional processes (Ceballos and Sevilla, 2020; Sevilla and Marón, 2020). These variables have also appeared related to reading comprehension during the review of the available literature.

Thus, previous studies in the last five years show, for the moment, the predominance of correlations and indirect antecedents for samples made up of school students. This evidence reinforces the need for causal research that, relying on logistic regression, helps to elucidate much more certain relationships regarding the impact of formative assessment on the improvement of reading comprehension. In addition, logistic regression provides a predictive model of variability in reading comprehension if formative assessment is systematically incorporated into the planning of learning sessions. This also quantifies the effect of formative assessment on reading comprehension and the probability of success in terms of text comprehension in heterogeneous didactic scenarios.

1.2.2. Literature review

Sanmartí's (2020) model, together with Van den Broek and Espin's (2012) model of reading comprehension, focus on cognitive processes. They have highlighted how the reader activates their already acquired knowledge, formulates inferences and constructs a mental representation of the text while reading. For his part, Sanmartí (2020) points to the monitoring of what the learner gradually learns.

Another principle shared by both models is reader-text interaction. According to Sanmartí (2020), formative assessment fosters an active relationship with learning understood as a process. In Van den Broek and Espin's model (2012), reading comprehension is stated as an active process where one connects what one knows with what one has recently known, which is consistent with the purpose of formative assessment to foster comprehensive and reflective reading.

From a constructivist point of view, also taking into account the contributions of Sanmartí (2020), when the student understands, he/she is capable of weighing the different possibilities offered by the text, shares experiences with his/her peers and rarely will do it just to know if his/her answers are correct or not, taking into account only that the teacher explained. Thus, reading implies the potential, for the student, to become a point of confluence, as well as the opportunity to expose what he thinks and argue it in the midst of a dialectical contest (Errázuriz *et al*., 2025; Peng *et al*., 2024; Zhang *et al*., 2024).

One of the most relevant educational assessments worldwide is the PISA tests. A low performance in their competencies implies that, in the future, these students will be less likely to complete their higher education or get profitable jobs (Günaydin and Başaran, 2022). On the other hand, the relationship between formative assessment and reading comprehension in elementary school students involves certain challenges and opportunities. Implementing formative assessment promotes self-regulation and constructive feedback during learning (Alazemi, 2024; Castro *et al*., 2024; Pérez *et al*., 2024). However, the manner in which this assessment is implemented, as well as its effectiveness, depends on several factors. These include the quality of the feedback, the teacher's resources to recognize limitations in the process, and the individual peculiarities of the students (Chajin *et al*., 2024; Moreno *et al*., 2025; Yan & Chiu, 2023).

When alluding above to the learner's own traits, this refers to the learner's previous level of reading skills, intrinsic motivation, and attitude toward learning. Thus, while some learners may derive enormous benefit from formative assessment, others may not necessarily perceive it as useful or relevant to their improvement process, leading to a gap in results (Montaña *et al*., 2025; Romero, 2024; Xuan *et al*., 2022).

1.3. Problem and objective

Therefore, the question to be answered is: What is the influence of formative assessment on the reading comprehension of primary school students, Lima 2025? In turn, the objective will be: To determine the influence of formative assessment on the reading comprehension of primary education students, Lima 2025.

2. Methodology

In this quantitative research, the hypothetical deductive method has been used. The design was non-experimental, without intervening in the evolution of the variables, and of causal correlational and cross-sectional scope.

2.1. Participants

Since the researchers had access to the entire population, it was decided to work with all its elements. For this reason, it is a census-type population. Since we worked with such a population, it was not necessary to work with any particular sampling.

After excluding a few students because their parents did not authorize them to be part of the survey, the population consisted of 216 students in the sixth grade of elementary school in Lima, Peru. Ages ranged from 11 to 13 years old. The data on the distribution of the population are shown in Table 1. It is possible to appreciate that girls had the highest percentage of presence. The most represented age was 12 years old.

Table 2.

Population distribution by sex and age

	11 years		12 years		13 years		Total	
	f	%	f	%	f	%	f	%
Girls	30	13,9	66	30,6	24	11,1	120	55,6
Children	24	11,1	54	25,0	18	8,3	96	44,4
Total	54	25,0	120	55,6	42	19,4	216	100,0

Source: IBM SPSS Statistics 26.0

2.2. Procedure

Initially, the co-authors held induction meetings with the parents of the sixth-grade students. In these activities, the objective and importance of the research was concisely explained to them, also expressing the commitment to exclusively academic use of the responses to be collected. Once the parents agreed to collaborate, an informed consent form was signed, authorizing their children to answer the questionnaires. When the time came to apply the instruments to the population, the co-authors distributed in five classrooms were present to explain the test instructions, help resolve any queries that might arise, and inform and ratify the voluntariness and anonymity of the questionnaires. The instrument administration sessions lasted approximately 20 minutes.

2.3. Measuring instruments

Teaching performance associated with formative evaluative practices (Cerón et al., 2020).

This information record is constituted by 21 items and must be answered based on a five-point Likert scale of response (1 = Never; 2 = Rarely; 3 = Occasionally; 4 = Frequently; 5 = Very frequently). The item to be answered is equivalent to the number of occasions in which they have had this impression or perception of the formative evaluation. Thus, of the total number of items in this questionnaire, three items are related to grading, three items to proactivity, four items to interactivity, four items to metacognition, four items to retroactivity and three items to curricular adjustment or adaptation.

The instrument was developed by Cerón *et al*. (2020). Finally, the internal consistency of the test was quantified by Cronbach's Alpha index equal to 0.885.

ACL 6 Reading Comprehension Test (Catalá *et al*., 2001).

This is one of the most widely applied assessments in the educational system for this purpose. This is because it provides results that allow the adaptation of pedagogical strategies, as well as the design of interventions for the improvement of reading performance. It is a standardized test useful for teachers and researchers, and is composed of 28 dichotomous items derived from a certain typology of texts (narrative, expository, poetic, interpretation of images and data). All textual fragments are used to measure four skills: literal comprehension, reorganization of information, inferential comprehension and critical comprehension. Finally, the reliability of the instrument was calculated with the KR-20 statistic, which yielded a value equal to 0.909.

2.4. Data analysis

This was done with the intention of establishing the influence of formative assessment. The SPSS 26 statistical package was used to meet the requirements concerning the necessary analysis, so as to respond to the objective of this research.

Initially, the descriptive analysis of the variables and their separate dimensions was based on frequencies and percentages. The scales were organized into low, medium and high levels, which made it possible to methodically observe the scores in each of the dimensions provided. This analysis revealed that the majority of the 216 respondents were at a medium level in both the independent variable (formative assessment) and the dependent variable (reading comprehension).

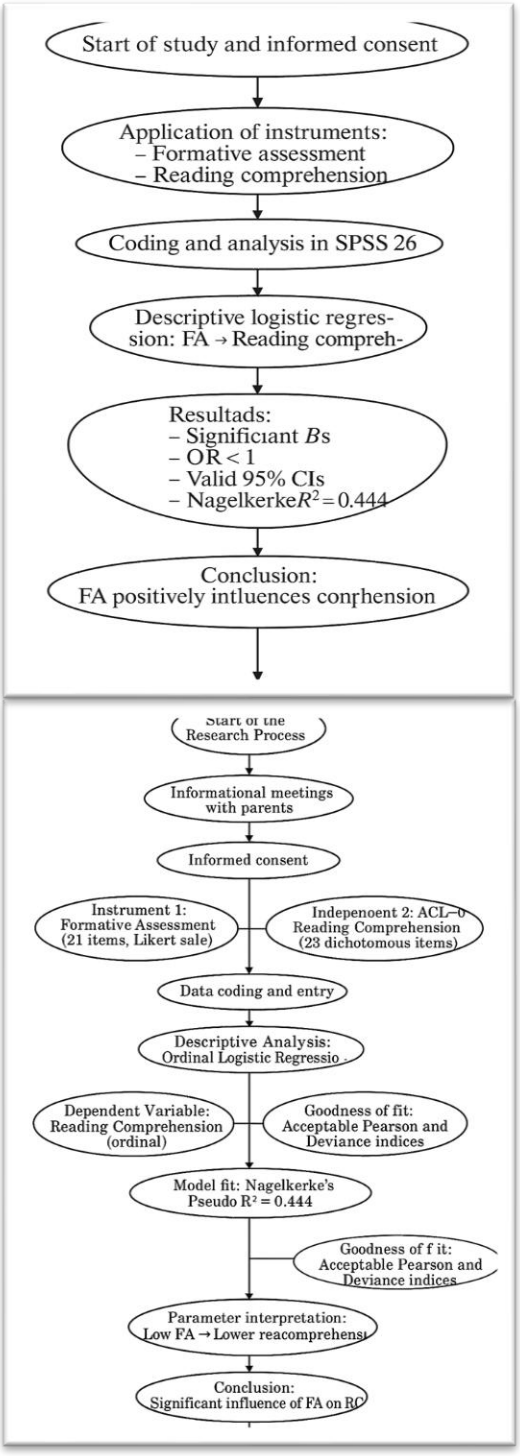
Then, to analyze whether the variables have a statistically relevant relationship, an ordinal logistic regression model was used. Thanks to that, the probability that a higher implementation of formative assessment is able to predict improvements in reading comprehension was estimated. An adequate model fit was obtained, with a pseudo Nagelkerke's R2 of 0.444, which is equivalent to a moderate explained variance. Likewise, the chi-square (106.001; $p < 0.001$) showed that the final model produces a considerable improvement in prediction in contrast to the intersection. The goodness of fit was verified by Pearson's test ($X2 = 2.813$; $p = 0.384$) and the variance test ($X2 = 4.908$; $p = 0.128$), whose values suggest that the model has an adequate fit to the data under observation. Finally, the parameter estimates have confirmed that formative assessment has a positive association with better reading comprehension, thus reinforcing the validity of the predictive model.

In addition to the model's B coefficients, 95% confidence intervals (95% CI) and odds ratios (OR) were calculated to interpret the effect of the different levels of formative assessment. It was observed that a low level of formative assessment (Category 1) yielded a B coefficient of -21.680 (SE = 0.392; $p < 0.001$), with an odds ratio of $2.91 \times 10^{(-10)}$ and a 95% CI ranging from $1.80 \times 10^{(-10)}$ to $7.54 \times 10^{(-10)}$. Similarly, Category 2 reported B = -20.135, also with a statistically significant effect and OR < 1. This indicates that low levels of formative assessment drastically reduce the likelihood of achieving high levels of reading comprehension.

These estimates reinforce the validity of the predictive model, demonstrating that greater implementation of formative assessment strategies is positively correlated with improved reading comprehension levels.

Figure 3.

Data collection process flowchart



Source: Own elaboration.

3. Results

3.1 Descriptive analysis

Table 3 presents the frequencies and percentages for each level and dimension, with a notable concentration at a medium level across the analyzed dimensions. This underscores the need to implement educational strategies aimed at strengthening these characteristics, particularly in aspects related to formative assessment. More specifically, in the grading dimension, 60.6% of respondents perceive it at an intermediate level, suggesting that it is viewed as a procedure applied after evaluations to accurately determine achievements and difficulties.

For the proactive dimension, 69.0% indicate that most students recognize that, before and during the learning session, they are aware of the teacher's instructions and clearly understand what is expected of them and how they will be assessed in terms of skill development.
Regarding the interactive dimension, 55.6% consider the support provided by the teacher when the work team needs to correct a response and move on to a new learning challenge to be of medium or regular level.

In the metacognitive dimension, a considerable percentage of students appear to struggle with fully developing metacognitive skills related to assessment (52.8%). For the retroactive dimension, 75.9% at a medium level suggest that feedback is generally provided adequately for most students, although there are still goals to be achieved. Finally, in the adjusted dimension, when combining the percentages corresponding to the medium level (67.6%) and the high level (26.4%), this dimension emerges as one of the most positively perceived by students.

Table 3.

Frequencies and dimensions of formative evaluation

Levels	Formative evaluation		Associated with the qualification		Proactive		Interactive		Metacognitive		Retroactive		Adjusted	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Bajo	33	15,3%	35	16,2%	26	12,0%	51	23,6%	48	22,2%	21	9,7%	13	6,0%
Medio	150	69,4%	131	60,6%	149	69,0%	120	55,6%	114	52,8%	164	75,9%	146	67,6%
Alto	33	15,3%	50	23,1%	41	19,0%	45	20,8%	54	25,0%	31	14,4%	57	26,4%
Total	216	100%	216	100%	216	100%	216	100%	216	100%	216	100%	216	100%

Source: IBM SPSS Statistics 26.0

In Table 4, 63.9% of students are classified as "in progress," indicating a considerable number of students who have not yet achieved competency mastery. A similar situation is observed in the reorganization dimension, where the predominant level is also "in progress" (66.2%). While some students continue to make progress, they still require more opportunities to reach the expected level and enhance their learning outcomes.

On the other hand, inferential comprehension, with 55.6% of students in progress, reveals significant limitations in their ability to formulate deeper meanings. This remains a challenge that needs to be addressed.

Regarding critical comprehension, the percentage of students at the achieved level (45.4%) suggests that, compared to inferential comprehension, students encounter fewer difficulties in analyzing and evaluating textual content.

Table 4.

Frequencies and dimensions of comprehension

Levels	Reading comprehension		Literal comprehension		Reorganization		Inferential comprehension		Critical understanding	
	f	%	f	%	f	%	f	%	f	%
Home	42	19,4%	42	19,4%	39	18,1%	38	17,6%	49	22,7%
In process	105	48,6%	138	63,9%	143	66,2%	120	55,6%	69	31,9%
Achieved	69	31,9%	36	16,7%	34	15,7%	58	26,9%	98	45,4%
Total	216	100%	216	100%	216	100%	216	100%	216	100%

Source: IBM SPSS Statistics 26.0

3.2. Inferential Analysis Through Hypothesis Testing

3.2.1. Model Fit and Pseudo R2 (Table 5)

Log-likelihold. The log-likelihood value for the «intercept-only» model is 124,886, indicating that the baseline model, which only considers the constant, has a good initial fit. When comparing the final model with the baseline model, the final log-likelihood is 106,001. The difference between these values suggests that the model's fit improves when formative assessment is included.

Chi square**.** The significance of the Chi-square test (106,001)**,** with 2 degrees of freedom **(df)** and a p-value lower than 0.001, indicates that the final model is significantly better than the baseline model. This reinforces the idea that formative assessment has a meaningful impact on reading comprehension**.**

Pseudo R^2:

- **Cox y Snell:** The 0,388 value suggests that the model explains approximately 38,8% of the variability in reading comprehension, which is a reasonable proportion. However, it is not sufficient evidence to claim that all relevant factors were considered.

- **McFadden:** The 0,237 value also indicates a reasonable fit, although lower than the previous indices. This suggests that while the model is useful, its predictive power could improve by including additional explanatory variables.

- **Nagelkerke:** The Nagelkerke Pseudo R^2 value of 0,444 implies that approximately 44% of the dependent variable's variability is explained by the model. This represents an improvement over Cox & Snell and reflects a moderate model fit**.**

Thus, formative assessment emerges as a significant predictor of students' reading comprehension, with an adequate model fit, as evidenced by the Pseudo R^2 values. However, the explained variability percentage is not particularly high, suggesting that additional factors not included in the model also influence reading comprehension.

This finding is particularly relevant in the educational field, as while formative assessment is undeniably crucial, other strategies or student attributes—such as motivation, prior knowledge, or learning environment—may play an equally important role.

Table 5.

Model fit and Pseudo R² explaining the influence of formative assessment on reading comprehension

Model	Logarithm of likehood	Chi-square	gl	Sig.	Pseudo R square	
Intersection only	124,886				Cox and Snell	,388
Final	18,885	106,001	2	<0,001	Nagelkerke	,444
					McFadden	,237

Source: IBM SPSS Statistics 26.0. Link function: Logit.

3.2.2. Goodness-of-Fit Analysis (Table 6)

Pearson's Chi-square Test. Given that p = 0,384 > 0,05, it can be stated that there are no significant differences between the observed values and those predicted by the model. This indicates that the model exhibits a good fit in relation to the data.

Deviance Test. Similarly, since p = 0,128 > 0,05, the model does not show signs of misspecification. This provides statistical support to affirm that there is no evidence questioning the adequacy of the model.

Consequently, the logistic regression model fits the data well, as confirmed by the goodness-of-fit analysis. This finding reinforces the relationship between formative assessment and reading comprehension, ensuring that the interpretation of the model's results is reliable, as no indications of misspecification are present.

From an educational perspective, this result strengthens the argument that formative assessment plays a crucial role in improving students' reading comprehension. A well-fitted model facilitates more precise inferences about how formative assessment methods positively impact the development of reading skills in sixth-grade primary school students.

While the model demonstrates adequate fit, its explanatory power must be considered alongside other parameters, such as the regression coefficient and the Pseudo R² values (as presented in Table 3), to attain a more comprehensive understanding of the positive impact of formative assessment on reading comprehension. Additionally, it is essential to explore other potential influencing factors, such as teaching methodologies, students' socioeconomic conditions, and access to reading materials, which could also shape reading comprehension outcomes.

Table 6.

Goodness of fift of the influence of formative assessment on reading comprehension (Table 5)

	Chi square	gl	sig.
Pearson	2,813	2	0,384
Deviation	4,908	2	0,128

Source: IBM SPSS Statistics 26.0. Link function: Logit

3.2.3. Analysis of Model Parameters (Table 7)

The estimates for the reading comprehension categories are predominantly negative, indicating that the probability of improved reading comprehension decreases when formative assessment values are lower. Moreover, when formative assessment scores are 1 or 2 (representing a low level of assessment), highly negative estimates are observed (-21.680 and -20.135, respectively), with a p-value lower than 0.001. In other words, a low level of formative assessment is significantly associated with a lower probability of achieving higher reading comprehension levels.

From a pedagogical perspective, these findings reinforce the importance of continuous assessment strategies and effective feedback in enhancing reading skills. The differences in coefficients across assessment levels suggest that the greater the use of formative evaluation strategies, the more pronounced the development in reading comprehension. This insight is crucial for designing educational policies and implementing increasingly effective and diversified teaching methodologies.

Table 7.

Parameter estimates of parameters formative assessment in reading comprehension

Parameter estimates		Estimate	Stand. Error	Wald	gl	Sig.	95% confidence interval Lower limit	Upper limit
Threshold	[Reading_comprehension = 1]	-21,732	,213	10425,428	1	<,001	-22,149	-21,315
	[Reading_comprehension = 2]	-18,922	,191	9813,343	1	<,001	-19,297	-18,548
Location	[Formative_evaluation =1]	-21,680	,392	3059,000	1	<,001	-22,449	-20,912
	[Formative_evaluation =2]	-20,135	,000	.	1	.	-20,135	-20,135
	[Formative_evaluation =3]	0[a]	.	.	0	.	.	.

Función de enlace: Logit. This parameter is set to zero because it is redundant.

Source: IBM SPSS Statistics 26.0

4. Discussion

The findings of this study demonstrate a significant impact of formative assessment on reading comprehension in primary education, further reflecting a causal relationship between these variables. It was found that formative assessment explains 44.4% of the variability in reading comprehension, emphasizing its critical value in formal education. The existing literature provides evidence supporting the assertion that effective implementation of formative assessment enhances student performance, which in turn positively affects learning outcomes (Alazemi, 2024; Yan & Chiu, 2023; Xuan *et al*., 2022). Consequently, many educational institutions have adopted this approach to improve their achievements in this area, as well as in other fundamental aspects of learning.

Formative assessment is also embedded within a sociocultural perspective, where the classroom is seen as a constructive environment that relies on collaboration between teachers and students. The connection between individual cognition and the environment stems from the idea that thought processes are shaped by contextual factors. Conversely, the interactions students establish with their surroundings influence the way they direct their cognitive processes. In this regard, learning is inherently a collaborative activity. Another key aspect of formative assessment is its role in fostering self-regulation. This highlights the necessity of providing students with the appropriate conditions to gradually become active agents in their own learning processes.

These findings align with those of Alazemi (2024), Chen *et al*. (2019), and Yan & Chiu (2023), who demonstrated that formative assessment strategies supporting reading comprehension require intensive use of digital technologies and curricular adaptations that reflect the real and specific learning conditions of certain students. Similarly, Ceballos & Sevilla (2020) and Sevilla & Marón (2020) emphasized the importance of integrating both cognitive and emotional processes into the implementation of formative assessment.

Likewise, Chacaguasay & Larreal (2023) found that strengthening metacognition enhances assessment practices and the development of reading comprehension skills. Furthermore, Fuentes & Salcines (2018) analyzed how formative assessment contributes to learning quality, as well as student engagement in formal educational settings. Guillén *et al*. (2019) also highlighted the importance of formative assessment in improving reading comprehension qualitatively. Additionally, Dieste *et al*. (2017) examined students' positive perception of the coherence and effectiveness of formative assessment in their learning process. Meanwhile, Barrientos *et al*. (2018) explored the significant impact of formative assessment on student motivation and participation in their own learning process.

The cited authors also align with Schunk & Zimmerman's (2009) theory of self-regulated learning, which posits that well-structured and differentiated prior knowledge enables learners to actively and efficiently retrieve information from memory before completing a task. Additionally, students understand the need to acquire and apply cognitive strategies that facilitate the integration of prior knowledge with new learning material. They also recognize how the proper management of cognitive processes enhances goal achievement through metacognition (Schunk & Zimmerman, 2009). Furthermore, they develop the ability to plan and regulate the time and effort invested in learning activities, creating optimal learning environments for their academic success (Zimmerman, 2002).

As part of the practical implications, the implementation of concrete classroom strategies received appropriate support. One viable approach is the use of formative feedback scripts, which guide students toward deeper reading comprehension (e.g., «What did the author mean by this expression?» «What evidence supports your interpretation?»). Additionally, the organization of short reading self-regulation workshops is also feasible, aimed at identifying comprehension barriers and designing compensatory strategies (such as strategic highlighting and self-assessment tools). When these approaches are applied, the principles of formative assessment are operationalized through concrete and routine classroom practices, thereby strengthening both self-regulated and collaborative learning.

5. Conclusions

The results have demonstrated that the relationship between the independent variable (formative assessment) and the dependent variable (reading comprehension) is both positive and causal. Therefore, this assessment strategy should be integrated into the planning of learning sessions. Its significance lies in its ability to establish the classroom as a space for fostering self-regulation and autonomous learning within a sociocultural framework.

Formative assessment has also been effective in promoting essential skills such as metacognition and collaboration within work teams. Functional strategies such as feedback and self-assessment have enabled students to take responsibility for directing their own learning, aligning with Zimmerman's (2002) self-regulated learning model.

Finally, these findings open new research avenues, such as the potential influence of formative assessment on mathematical and socio-emotional competencies, as well as the role of digital technologies and curricular adaptation in culturally diverse settings to enhance inclusion and competency-based learning.

Future studies could adopt a longitudinal design for data collection to assess the long-term effects of formative assessment on reading comprehension. Additionally, it would be feasible to design and implement pilot interventions enhanced by adaptive technological feedback, as well as evidence-based curricular adjustment models. Finally, the statistical model employed in this study could be applied to other educational contexts or academic levels, both to validate its assumptions and to explore new associations involving mediating variables such as academic motivation or perceived self-efficacy.

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