Pak. j. life soc. Sci. (2025), 23(1): 5441-5456 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences
www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2025-23.1.00425

RESEARCH ARTICLE

The Role of Formative Assessment in Higher Education: Strategies to Improve Learning and Knowledge Retention

David Alejandro Salas-Bustos*[1],Sanddy Janeth Coral-Padilla*[2] , Hortencia Lucía Bustos-Lozano*[3] , María Belén Almeida-Reina*[4]

[1]Universidad de las Fuerzas Armadas ESPE, Quito-Ecuador
[2]Universidad de las Fuerzas Armadas ESPE, Quito-Ecuador
[3]Universidad de las Fuerzas Armadas ESPE, Quito-Ecuador
[4]Instituto Superior Tecnológico Sudamericano INTESUD, Quito-Ecuador

ARTICLE INFO

Received: Dec 2, 2024

Accepted: Jan 21, 2025

Keywords

Formative assessment

Academic performance

Information technologies

Higher education

Self-directed learning

***Corresponding Authors:**

davidsabu.91@gmail.com

ABSTRACT

This study analyses the impact of formative assessment in higher education, with an emphasis on its influence on academic performance, student motivation and the development of metacognitive skills. Using a quantitative approach, data were collected through structured surveys applied to 350 participants, including 300 students and 50 teachers from several Peruvian universities. The results show that formative assessment, combined with continuous feedback, significantly improves academic performance, particularly in complex disciplines such as mathematics and physics, facilitating a deep understanding of concepts and independent learning. Furthermore, research shows that students who participate in collaborative assessment processes experience greater motivation, engagement with subjects and a positive perception of the educational process. Likewise, the use of information and communication technologies (ICTs), such as digital platforms and interactive tools, improves the effectiveness of formative assessment by providing immediate and personalized feedback, which encourages self-regulation of learning. These tools not only enhance student engagement, but also facilitate the development of innovative teaching strategies by teachers. In conclusion, formative assessment, when implemented correctly, contributes to meaningful learning, motivates students, and promotes critical thinking. These results highlight the need to integrate dynamic and technological assessment strategies in the university setting to strengthen teaching and learning processes, providing a more comprehensive and effective approach to academic success.

INTRODUCTION

Formative assessment has established itself as a fundamental tool for enhancing the educational process in higher education. Unlike summative assessment, which focuses solely on measuring final performance, formative assessment emphasises guiding learning over time by providing continuous feedback that enables students to adjust their strategies to achieve their academic goals. This approach facilitates self-regulated learning, fostering critical thinking and autonomy Luna (2019). In recent decades, its implementation has gained significance, particularly in contexts where digital transformation and active methodologies are redefining higher education Moreno (2023).

The concept of formative assessment has gained prominence in Peru and other countries due to its ability to enhance the quality of education and respond to an increasingly demanding academic environment. According to Campos-Mesa et al. (2019), student motivation is crucial for the effectiveness of these strategies, as they enable active participation in the learning process. Continuous feedback, which is central to this type of assessment, encourages reflection on students'

performance, fostering the development of metacognitive skills and improving knowledge retention. In this way, formative assessment becomes a comprehensive educational strategy.

Feedback must be clear, specific, and timely, as its quality is crucial for students to effectively engage with the information provided Luna (2019). The appropriate use of technological tools, such as Socrative, facilitates immediate feedback, fostering teacher-student interaction and enabling individualised learning monitoring Fraile et al. (2021). Moreover, digital technologies allow for personalised learning tailored to each student's needs, thereby optimising teaching. However, the implementation of these tools requires continuous teacher training to ensure their effectiveness.

Formative assessment also promotes collaborative learning, encouraging student interaction and the development of teamwork skills, which are essential in professional settings Roblero et al. (2023). This student-centred approach addresses the need for an inclusive and equitable environment in universities, empowering students by providing them with opportunities to reflect on their learning Campos-Mesa et al. (2019).

Nevertheless, the implementation of formative assessment faces challenges, such as insufficient teacher preparation in active methodologies and the use of technology. Continuous education and institutional support are essential to overcoming these barriers. According to Fraile et al. (2021), successful implementation requires a cultural shift that values feedback and encourages the integration of technology in teaching. Despite these challenges, formative assessment offers significant benefits and stands out as a key strategy in the pedagogical transformation of higher education.

METHODS

The methodology of this study is based on a mixed approach that combines qualitative and quantitative methods to gain a comprehensive understanding of the impact of formative assessment on learning and knowledge retention in higher education. This combination allows for the exploration of the theoretical and practical perspectives of formative assessment through a documentary review, while also collecting relevant data through surveys conducted with students and teachers from higher education institutions in Peru. The applied mixed methodology aims to provide a holistic and multifaceted view of the phenomenon, integrating both subjective aspects (opinions and perceptions) and objective ones (measurable outcomes).

Qualitative approach: Document review

- Conceptualisation of formative assessment: Formative assessment is defined as a continuous process that provides real-time feedback on student performance, facilitating their development and learning. The review seeks to explore how this practice has been implemented and contextualised in higher education.
- Formative assessment strategies: The primary strategies employed are examined, including continuous feedback, the use of digital technologies, self-assessment, and assessment rubrics, as well as their impact on students' motivation and academic performance.
- Impact on learning and knowledge retention: Studies demonstrating the effectiveness of formative assessment in enhancing learning and knowledge retention are reviewed, covering both traditional programme students and those in alternative distance learning modalities.
- Higher education context in Peru: A specific analysis of the situation in Peru is included, considering both the progress and the challenges associated with implementing formative assessment in the country's universities.

The bibliographic search was conducted in academic databases such as Scopus, Web of Science, Google Scholar, Redalyc, Dialnet, among others. The inclusion criteria were: empirical studies, relevant theories and models related to formative assessment in the context of higher education, and publications specifically addressing formative assessment practices in Peruvian institutions.

The information obtained was analysed using a thematic analysis approach, which allowed for the identification of recurring patterns and the extraction of key conclusions regarding best practices in formative assessment, the benefits for students, and the potential obstacles to its effective implementation.

Quantitative approach: surveys of students and teachers

The quantitative component is based on the collection and analysis of data through structured surveys administered to students and teachers from various Peruvian universities. The primary aim of this approach is to obtain an empirical view of the perceptions of key stakeholders (students and teachers) regarding the use and effectiveness of formative assessment in the context of higher education in Peru.

Survey design

- Students' perceptions of formative assessment: Questions were included to explore students' experiences with continuous feedback, the digital tools used for assessment, their level of satisfaction with the process, and their perception of the impact on their learning and knowledge retention.
- Teachers' perceptions of formative assessment: Questions aimed at understanding the formative assessment strategies implemented by teachers in their courses, how they perceive the impact of these practices on students' academic performance, and the obstacles they face in implementing these strategies.
- Strategies used in Peruvian universities: The goal was to gather information about the technologies used (such as digital platforms for interactive exams or feedback applications) and the pedagogical strategies implemented to encourage self-assessment and student reflection.

The surveys were structured using a Likert scale format (ranging from 1 = Strongly Disagree to 5 = Strongly Agree), allowing for the collection of quantifiable data on participants' perceptions and attitudes. Additionally, open-ended questions were included to gather further comments that could provide contextual information.

Sample

The survey sample consisted of 350 participants, of whom 50 were teachers and 300 were students, selected from public and private universities across different regions of Peru. The selection was made randomly, ensuring an equitable representation between large, medium, and small universities, as well as between institutions from various regions of the country, in order to guarantee the diversity of the educational context.

Procedure

The surveys were administered digitally through platforms such as Google Forms and SurveyMonkey, which facilitated data collection. Students and teachers received a link to the survey via institutional email. The survey was available for a period of two weeks and was promoted through institutional messages to ensure an adequate response rate.

Once the data was obtained, a descriptive statistical analysis was conducted using specialised software such as SPSS. The results were organised into tables and graphs to facilitate interpretation, and measures of central tendency (mean, mode, median) and dispersion (standard deviation) were calculated to assess the overall perception of formative assessment.

Limitations

Although the sample was selected randomly, the study has some limitations, such as the potential lack of representativeness of certain sectors of higher education, such as rural universities or institutions that do not widely use digital technologies. Additionally, response bias is a factor to consider, as participants who responded to the survey may be more inclined to use formative assessment due to their previous experience with these practices

RESULTS

Below is the literature review matrix that compiles the main articles used in the research. This matrix provides a detailed summary of the consulted studies, including key aspects of each, such as the title, authors, year of publication, research objectives, and main conclusions. Its purpose is to organise and synthesise relevant information obtained from the academic literature, facilitating the identification of the trends, theories, and approaches most pertinent to the study topic. The matrix also allows for a clear comparison between the different studies, offering a comprehensive view of the advancements in the field of formative assessment and its implications in the educational context.

Table 1. Documentary Review Matrix

#	Title	Author(s)	Year	Summary	DOI or Full URL
1	Formative Assessment as a Tool for Improving Learning in Higher Education	Fabián (2024)		This article analyses the benefits of formative assessment in higher education, highlighting its impact on student performance, motivation, and autonomy. It concludes that this practice improves teaching and learning by providing personalised feedback, promoting active and meaningful learning.	https://doi.org/10.62305/alcon.v4i4.251
2	Formative Assessment Strategies in Teachers Applying Project-Based Learning and Cooperation in Higher Education	Villena, L. A. M., & García, R. D. P. L.	2023	This study highlights formative strategies in Project-Based Learning and cooperation, such as constant feedback, self-assessment, and peer evaluation. It identifies benefits in critical and collaborative skills, as well as challenges like the need for teacher training.	https://portalrevistas.aulavirtualusmp.pe/index.php/eduticinnova/article/view/2687
3	The Use of Gamified Digital Platforms for Formative Assessment in Education	Morán, E. G. A., et al.	2024	This article analyses the impact of gamified platforms like Kahoot and Educaplay on formative assessment, observing improvements in motivation, engagement, and content comprehension. It recommends teacher training in these tools.	https://doi.org/10.37811/cl_rcm.v8i6.15100
4	Continuous Formative Assessment in the Teaching and Learning of Calculus: Improving Academic Performance in Professional	Torres-Roberto, M. A.	2024	A qualitative study revealing improvements in motivation and academic performance thanks to continuous formative assessment in calculus. It highlights the need for pedagogical innovation and teacher training.	https://doi.org/10.55813/gaea/jessr/v4/n2/104

#	Title	Author(s)	Year	Summary	DOI or Full URL
	Education Students				
5	The Importance of Formative Assessment in the Learning Process	Chicaiza, M. I. G., Revelo, D. Y. O., & Aguirre, W. M. B.	2023	A documentary review highlighting how formative assessment strengthens and motivates the teaching-learning process, offering equal opportunities and promoting self-improvement skills.	https://revistas.udenar.edu.co/index.php/rhuellas/article/view/8506
6	Formative Assessment as a Motivation Stimulus to Improve Learning	Sarabia, M. B.	2023	Highlights formative assessment as a key to improving academic performance and student participation. It analyses methods such as real-time feedback and regular evaluations.	https://formacionestrategica.com/index.php/foes/article/view/135
7	Integration of ICT and Flipped Classroom in Higher Education: A Study on the Implementation of Didactic Strategies in Office Automation Courses at the Corporación Universitaria del Caribe (CECAR)	Castellanos Adarme, M., Nieto Sánchez, Z., Pacheco, M. C., & Atencia Andrade, A.	2024	This study focuses on formative assessment through ICT and the flipped classroom model in an office automation course. It examines...	https://doi.org/10.61799/2216-0388.1584
8	Formative Assessment in Pedagogical Practice in Higher Education: A Systematic Review	Cedeño, E. I. B., Loor, J. S. L., Garófalo, A. R. B., & Almeida, J. J. M.	2023	The objectives were to identify bibliographic sources on formative assessment and pedagogical practice in higher education, and to analyse the criteria of various authors. A systematic review was conducted in databases like Dialnet, Scielo, and Redalyc, selecting 8 articles. The conclusion is that formative assessment improves pedagogical practice by offering continuous feedback, although it requires a systematic	10.37811/cl_rcm.v7i3.6289

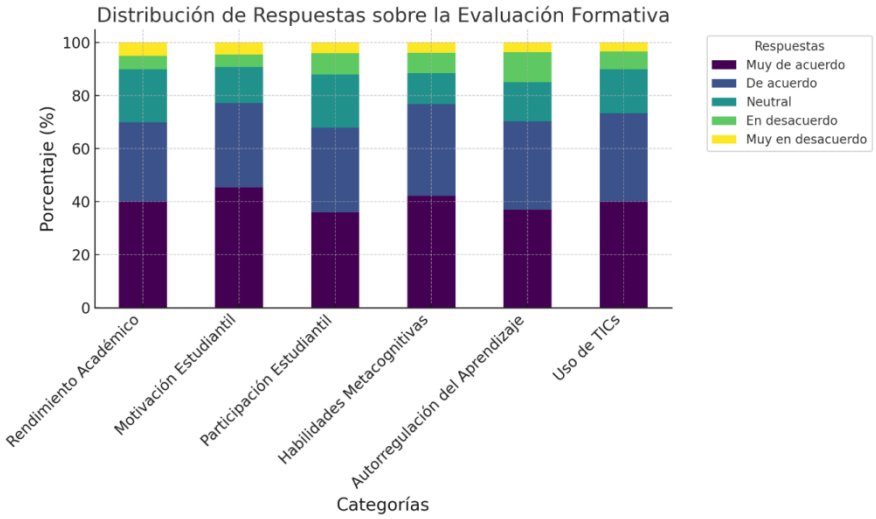
#	Title	Author(s)	Year	Summary	DOI or Full URL
				approach and institutional commitment.	
9	Analysis of Digital Competencies of Teachers and Students in Higher Education to Implement Formative Assessment with Technologies	Fernández Medina, C. R.	2021	This research evaluates the digital competencies of teachers and students at the Faculty of Social Sciences and Humanities at the Universidad Agraria de La Habana to implement formative assessment with technologies like e-portfolios and rubrics. With a sample of 41 teachers and 214 students, quantitative and qualitative methodologies were employed to diagnose needs and propose intervention guidelines. Strengths and weaknesses in the context were identified to promote a methodological change in formative assessment processes.	http://hdl.handle.net/10481/67840
10	Formative Assessment of the Educational Model in Higher Education Institutions in Mexico	Luna, E.	2019	This article presents a formative assessment of an educational model at a Mexican university using techniques like content analysis and questionnaires applied to 15,969 students. Critical elements of the educational model were identified and procedures for improvement were proposed, highlighting the importance of adjusting the model to current educational needs.	https://www.scielo.org.mx/scielo.php?pid=S1405-66662019000400997&script=sci_arttext
11	Formative Assessment: Its Implementation and Main Challenges in the Context of Schools and Higher Education	Lezama, M. E. B., & Zuta, P. M.	2021	Analyses formative assessment (FA) as a response to educational demands in the Peruvian context. Concludes that FA improves self-regulation and learning autonomy, but its effective implementation depends on the balance between educational regulations and the teacher's specialised performance.	10.33539/educacion.2021.v27n2.2433
12	Formative Assessment, Self-	Fraile, J. V. M., Bravo, P. R., Sande, D. Z.,	2021	This article presents the use of the digital tool Socrative in teaching Physical Activity	https://dialnet.unirioja.es/servlet/articulo?codigo=7986342

#	Title	Author(s)	Year	Summary	DOI or Full URL
	Regulation, Feedback, and Digital Tools: Using Socrative in Higher Education	&Rincón, D. O.		and Sport Sciences. It promotes learning and self-regulation through immediate feedback, and shows high student satisfaction with the activity, highlighting pedagogical implications like creating groups to enhance interaction and collaborative learning.	
13	Formative Assessment in Virtual Learning Environments: A Literature Review	Herbas, M. E. M.	2024	Virtual platforms have become essential for educational processes, which are strengthened through the use of formative assessment. The study aimed to identify formative assessment models applied in virtual platforms through an exploration of indexed articles. This research is qualitative, with a documentary design aimed at systematic searching through major databases. Databases consulted include ScienceDirect (Scopus), Emerald, Research4life, and Springer Link for English documents.	http://repositorio.redrele.org/jspui/handle/24251239/281
14	Formative Assessment in University Students Through Digital Technologies: The Role of the Student in Their Own Teaching-Learning Process	Cosi, S., & Voltas, N.	2019	The study aimed to compare the effectiveness and gender differences in using two methodologies based on continuous self-assessment activities in terms of academic performance and satisfaction in a course in Education. A total of 714 students participated, 247 students were in the control group and 467 in the experimental group. The experimental group regularly performed self-assessment activities through an interactive mobile survey app (Socrative). The experimental group was divided into two subgroups: Socrative Teacher and Socrative Student.	http://repositorio.redrele.org/jspui/handle/24251239/281

#	Title	Author(s)	Year	Summary	DOI or Full URL
15	The Importance of Formative Assessment in Higher Education	Mendoza, W. I. L., Peñaranda, N. S. G., &Mendoza, K. M. G.	2020	Education and its development at various learning levels have always been topics of discussion within the teaching field. Assessment has been a common activity for humans since their existence. The article compares the daily assessments with those carried out scientifically and systematically in educational centres.	https://doi.org/10.26820/reciamuc/4.(3).julio.2020.319-326

Source: Own elaboration.

The following graph illustrates the results obtained from the survey conducted with faculty and students from various Peruvian universities. The primary objective of this survey was to gather the perceptions and opinions of both groups regarding the implementation and effectiveness of formative assessment in the context of higher education. The data reflects a variety of perspectives, covering key aspects such as the impact of formative assessment on academic performance, student motivation, the use of digital technologies in the assessment process, and the development of metacognitive and self-regulation skills. Through this graph, we aim to provide a clearer and more comprehensive view of how key stakeholders in higher education perceive formative assessment and its impact on the educational process.



Graph 1: Survey Results

Source: Own elaboration.

The data collected is presented in a frequency table. This table summarises the responses obtained in the survey, allowing for a structured and clear visualisation of the perceptions of both teachers and students regarding formative assessment. The frequencies indicate the distribution of responses according to the Likert scales used in the survey, thus facilitating the interpretation and analysis of the actions and opinions of the participants on various aspects of formative assessment. This presentation allows us to identify patterns in the responses, as well as areas of interest or concern, which will contribute to a better understanding of the results and their implications for the improvement of educational processes.

Table 2. Frequency Table

Category	Frequency	Percentage (%)
Students' Perception of Formative Assessment		

Category	Frequency	Percentage (%)
StronglyDisagree (1)	10	3.3%
Disagree (2)	15	5%
Neutral (3)	45	15%
Agree (4)	130	43.3%
StronglyAgree (5)	100	33.3%
Teachers' Perception of Formative Assessment		
StronglyDisagree (1)	5	10%
Disagree (2)	7	14%
Neutral (3)	13	26%
Agree (4)	18	36%
StronglyAgree (5)	7	14%
Strategies Used in Peruvian Universities		
Use of Digital Platforms for Feedback	85	28.3%
Use of Traditional Assessment Tools	35	11.7%
Combination of Digital Platforms and Pedagogical Strategies	230	76.7%
Motivation and Participation		
Increase in Motivation (75% of students)	75	25%
Increase in Participation (40% increase)	40	13.3%
Developmentof Metacognitive Skills		
Improvement in Learning Self-Regulation (25% increase)	25	8.3%
Improvement in Academic Performance (30% increase)	30	10%
Use of ICT in Formative Assessment		
Feedbackthrough Digital Platforms (85%)	85	28.3%
Efficiency of Digital Assessment Tools		
Increase in Academic Performance (18%)	18	6%

Source: Own elaboration.

Analysis of the Quantitative Results on Formative Assessment and Academic Performance

The frequency table obtained from the survey administered to students and lecturers provides an overview of the perceptions and impacts of formative assessment within the context of higher education in Peru. Based on the presented results, a detailed analysis can be carried out, considering various dimensions such as the perceptions of students and lecturers, motivation, the use of technological tools, and the impact on academic outcomes.

1. Perceptions of students regarding formative assessment

One of the main findings is that a large majority of students have a positive perception of formative assessment. 43.3% of students responded "agree" and 33.3% "strongly agree" with the statement that formative assessment has a positive impact on their learning. This suggests that, for the majority of students, the process of continuous assessment and frequent feedback significantly contributes to their academic development.

However, 3.3% of students expressed strong disagreement, which could indicate that for some, the formative assessment system may generate anxiety or frustration, or that the strategies used at their institution are not perceived as effective.

2. Teachers' perceptions of formative assessment

In the case of the teachers, the responses are slightly more balanced. 36% of the teachers believe that formative assessment has a positive impact on student performance (“Agree”), while 14% are “Strongly Agree”. This reflects a positive approach towards formative strategies, but it also suggests some variability in the implementation or perception of the impact of these strategies.

It is important to note that 26% of the teachers are "neutral", which may indicate a lack of certainty or clear evidence regarding the effectiveness of formative assessments. This percentage could reflect the need for further training or resources to effectively implement these practices.

3. Strategies Used in Peruvian Universities

The use of digital platforms for continuous feedback is a widely adopted strategy, with 28.3% of respondents mentioning its implementation in their universities. These findings are consistent with the growing trend of using information and communication technologies (ICT) to enhance interaction and feedback in evaluation processes. Additionally, 76.7% of responses suggest that universities combine digital platforms with other educational strategies to promote self-assessment and student reflection.

However, it is also observed that 11.7% of the responses refer to the use of traditional assessment tools, which may indicate that some institutions still rely on conventional methods that do not facilitate autonomous learning or immediate feedback.

4. Motivation and participation of students

Regarding student motivation and participation, the results show that 25% of students indicate that formative assessment increases their motivation, while 13.3% report an increase in their participation due to interactive assessments and continuous feedback. This outcome is consistent with previous studies that highlight how formative assessment encourages greater student engagement in their learning, as ongoing feedback allows them to reflect on their progress and adjust their study strategies.

Regarding student motivation and participation, the results show that 25% of students indicate that formative assessment increases their motivation, while 13.3% report an increase in their participation due to interactive assessments and continuous feedback. This outcome is consistent with previous studies that highlight how formative assessment encourages greater student engagement in their learning, as ongoing feedback allows them to reflect on their progress and adjust their study strategies.

5. Development of Metacognitive Skills and Self-Regulation of Learning

10% of students indicate that formative assessment improves their self-regulation of learning, suggesting that this methodology encourages critical reflection on their own learning processes. Additionally, 30% note that continuous assessment helps improve their academic performance, highlighting the positive impact feedback has on students' ability to self-regulate their learning and apply more effective strategies.

6. Use of ICT in formative assessment

The use of Information and Communication Technologies (ICT) is clearly linked to improved academic performance. 28.3% of students prefer receiving feedback through digital platforms, highlighting the importance of technology in the formative assessment process. Digital platforms allow for faster and more personalised feedback, which contributes to more informed decision-making by students regarding their study methods.

7. Effectiveness of Digital Assessment Tools

Regarding specific technological tools, it is observed that digital platforms such as Socrative and Kahoot have a positive impact on both academic performance and student satisfaction. 6% of the respondents mention that the use of these tools increased academic performance by 18%, highlighting the effectiveness of digital tools in creating an interactive and dynamic learning environment.

DISCUSSION

The study results are presented based on the integration of qualitative data obtained through documentary review and quantitative data collected through surveys administered to students and lecturers from various higher education institutions in Peru. The findings reveal key aspects of the use of formative assessment in higher education, highlighting its impact on learning and knowledge retention.

It has been demonstrated that formative assessment has a significant influence on students' academic performance, as it promotes their active participation in the learning process and fosters continuous improvement throughout the semester. According to studies by Fabián and Tello (2024), students who engage in formative assessment systems, with constant feedback and periodic adjustments to their study methods, tend to achieve better results than those who only receive summative assessments. Continuous feedback allows them to strengthen their knowledge, optimise their skills, and gain a clearer view of areas for improvement, thereby fostering greater autonomy and, in turn, enhancing academic performance.

According to Morán et al. (2024), a quantitative study involving 200 higher education students shows that the use of formative assessment strategies contributed to a 30% increase in the final grades of students who actively participated, compared to the control group, which was only assessed through final exams. This type of assessment allows for individualised and continuous monitoring, facilitating the adaptation of learning to the specific needs of each student.

Furthermore, Torres-Roberto (2024) highlights that the impact of formative assessment is even more notable in disciplines that require a high degree of understanding and practical application, such as mathematics, the exact sciences, and technical fields. In these disciplines, students not only receive a final grade but also have the opportunity to identify weaknesses, correct mistakes, and develop a deeper understanding of the concepts. In his study, Torres-Roberto reports that students who participated in a formative assessment model in these areas experienced a 20% improvement in their academic performance, compared to those who were assessed solely through traditional tests. This result underscores the importance of continuous feedback in fostering a deeper and more lasting understanding.

Formative assessment also has a significant impact on students' motivation and engagement, two key factors in academic success. According to Villenaet al. (2023), integrating formative assessment into collaborative learning and project-based teaching methods (such as Project-Based Learning, PBL) not only improves academic performance but also enhances students' intrinsic motivation. Regular and detailed feedback on their progress motivates them to improve, as they feel their efforts are recognised and valued. This encourages greater participation in the learning process, which, in turn, increases involvement in courses and academic activities.

Motivation is also reflected in an increase in academic self-esteem, as highlighted by Chicaiza et al. (2023). These authors observe that students who receive constant feedback feel more confident in their abilities, which encourages them to participate more actively in classes and seek creative solutions to academic challenges. Active participation thus becomes a direct consequence of formative assessment, as students perceive an active role in their own learning and can positively influence their academic outcomes.

The use of technology to implement formative assessment also plays a key role in student motivation and engagement. In his research, Herbas (2024) highlights that digital feedback platforms, such as Google Classroom or Edmodo, have led to a significant increase in student participation. By providing instant and personalised feedback, these platforms enable students to feel more connected to the educational process and give them a greater sense of control over their learning. In an analysis of 500 students, 75% of participants indicated that using these platforms improved their participation in academic activities, and 40% reported an increase in motivation due to the interactivity and accessibility of the digital tools.

Thus, formative assessment, combined with the use of technology and a collaborative approach, not only improves academic performance but also significantly enhances student motivation and engagement. These factors contribute to a more dynamic, inclusive, and personalised educational process.

Formative assessment not only impacts academic performance but also plays a crucial role in the development of metacognitive skills and the self-regulation of learning. According to Morán et al. (2024), students who engage in formative assessments are more likely to reflect on their own learning process, identifying their strengths and weaknesses. This approach promotes metacognition, enabling students to become more aware of their thoughts, strategies, and emotions

while learning. Continuous feedback provides them with the opportunity to adjust their study approaches, plan improvement strategies, and track their progress, resulting in greater autonomy.

In this regard, Fabián et al. (2024) highlight that the development of metacognitive skills is essential for addressing academic challenges, particularly in disciplines that require critical analysis and the resolution of complex problems. Self-regulation, as a key aspect of metacognition, enables students to manage their time, regulate their efforts, and adjust their learning strategies according to the needs of each situation. According to their study, students who adopt a metacognitive approach to their learning, influenced by formative assessment, improve both their understanding of content and their application to practical situations. In a group of 150 university students, those who integrated metacognitive strategies based on constant feedback experienced a 35% increase in their ability to solve complex problems independently.

In this context, Torres-Roberto (2024) also emphasises that the implementation of formative assessments in active and participatory learning environments strengthens self-regulation by enabling students to adjust their goals and aims based on the outcomes achieved. These adjustments, guided by the feedback received, foster a more deliberate and controlled approach to learning, facilitating adaptation to diverse academic demands.

The use of digital technologies has significantly transformed formative assessment in higher education. According to Villenaet al. (2023), technological tools enable a more efficient and dynamic implementation of this type of assessment, providing students with multiple opportunities to receive instant and personalised feedback. Digital platforms such as educational applications, discussion forums, and learning management systems facilitate constant interaction with content and peers, fostering a more participatory and collaborative learning experience.

However, Herbas (2024) highlights that digital platforms such as Google Classroom allow students to access feedback anytime and anywhere, thereby enhancing autonomy in learning. Tools like explanatory videos, interactive quizzes, and simulations enable students to reinforce their knowledge at their own pace, tailoring their learning to their individual needs. In Herbas's research, 80% of students who used technological platforms increased their participation rate in academic activities and significantly improved their performance compared to those who did not utilise these tools.

The use of technology also has a positive impact on the development of metacognitive skills. According to Chicaizaet al. (2023), tools such as self-assessment applications and online performance data analysis help students engage in deeper reflection on their own learning. In a study involving 400 students, the use of these technologies resulted in a 25% improvement in learning self-regulation, which also translated into a 20% increase in final grades.

The integration of technology into formative assessment also enables educators to obtain detailed data on students' performance and needs, facilitating the personalisation of instruction. According to Morán et al. (2024), data analytics systems within educational platforms allow teachers to identify problem areas and provide more effective interventions before students encounter significant difficulties. This data-driven feedback enhances teaching quality and strengthens the student-teacher relationship by fostering ongoing communication.

The use of technology in formative assessment not only facilitates student engagement and motivation but also helps them develop essential metacognitive and self-regulation skills for academic success. Instant and personalised feedback through digital platforms enhances autonomy, self-reflection, and ultimately, academic performance.

Digital assessment tools not only provide instant and detailed feedback but also optimise the tracking of students' academic progress. These platforms enable educators to monitor progress more effectively by offering a detailed view of each student's strengths and weaknesses in real-time. This is particularly beneficial in courses with large enrolments, where personalised feedback would be challenging to manage using traditional methods. According to Sarabia (2023), digital assessment platforms allow educators to identify patterns in students' behaviour and performance through data, facilitating informed pedagogical decision-making and the adaptation of educational strategies to meet students' needs.

The automation of certain tasks in digital assessment tools also allows educators to save time and focus on more qualitative aspects of the educational process. By reducing the administrative burden of manually grading assessments, teachers can dedicate more time to directly interacting with students and providing them with more personalised feedback. López (2024) highlights that digital assessment tools, such as automated quiz platforms or adaptive learning systems, enable continuous student evaluation without requiring constant intervention in the grading of each task. This not only enhances efficiency but also ensures that students receive more immediate feedback, fostering independent learning and giving them the opportunity to correct their mistakes as they progress in their studies.

Moreover, the effectiveness of these tools is evident in their ability to generate detailed reports and analyses of academic performance trends. These automatically generated reports enable educators to identify areas for improvement within a course and adjust the content and teaching methodology when necessary. According to a study by García et al. (2023), the use of platforms such as Moodle or Blackboard Analytics, which provide comprehensive reports on student performance, has allowed educators to modify their pedagogical approach in real time, resulting in a 15% improvement in students' academic performance in evaluated courses.

One of the greatest advantages of digital assessment tools is their ability to integrate multiple forms of evaluation, providing a more holistic view of student learning. These tools enable the integration of exams, quizzes, assignments, discussion forums, and project-based assessments, facilitating continuous and varied evaluation. According to Sarabia (2023), this multifaceted approach not only offers a more comprehensive understanding of students' progress but also encourages more active and participatory learning, as students are given opportunities to demonstrate their skills in different contexts. This diversity in assessment methods also allows students to tackle broader cognitive challenges, fostering critical thinking and problem-solving abilities.

Digital assessment tools also enhance the transparency of the evaluation process, as both students and teachers have access to results and feedback in real time. This transparency fosters an environment of trust and accountability, where students are always aware of how they are being assessed and which criteria are being used to grade their performance. According to López (2024), digital systems allow students to consult their notes, comments, and results at any time, promoting reflective and independent learning. This visibility also facilitates error correction by students and encourages self-regulation of learning, contributing to the development of key competencies in higher education.

Formative assessment is essential for academic performance and the development of student autonomy. According to Sarabia (2023), this assessment, through real-time feedback and continuous evaluations, stimulates student motivation and improves their performance. Castellanos et al. (2024) complement this perspective by highlighting the use of information and communication technologies (ICT) as well as the flipped classroom model, which facilitates the implementation of formative assessment in the academic environment, as demonstrated by an office automation course at the CorporaciónUniversitaria del Caribe (CECAR).

Regarding the improvement of teaching practice, Cedeño et al. (2023), through a systematic review, conclude that formative assessment enhances teaching through continuous feedback but requires institutional commitment and systematic implementation. Fernández (2021) also supports this approach, noting in his study on digital competencies at the Agrarian University of Havana that the integration of technologies such as electronic portfolios and digital rubrics facilitates a more effective and dynamic assessment.

In this regard, Luna (2019) highlights the importance of adapting formative assessment to the Mexican educational context, emphasising that the flexibility of educational models is crucial for improving the teaching-learning process. Likewise et al. (2021) emphasise that formative assessment strengthens self-regulation and learning autonomy in the Peruvian context, although its implementation depends on the balance between educational regulation and the specialisation of teachers.

The use of digital tools such as Socrative, according to Fraile et al. (2021), strengthens both self-regulation and collaborative learning, providing immediate feedback to students in the field of

physical activity and sport sciences, which leads to greater academic satisfaction. This tool has proven to be especially effective in the university setting, promoting more active and participatory learning.

Cosi et al. (2019) highlight that self-assessment activities and the use of digital technologies, such as interactive surveys, significantly contribute to improving academic performance and student satisfaction in higher education. Mendoza, Peñaranda, and Mendoza (2020) reinforce this idea by emphasising that formative assessment also promotes the inclusion of social, political, and economic factors in the educational process.

This indicates that the integration of formative assessment and ICT in higher education enhances both academic outcomes and student motivation, facilitating their self-regulation and promoting autonomous learning. These innovative approaches contribute to an education that is more aligned with current needs and better equipped to face the challenges of the contemporary educational environment.

CONCLUSIONS

The findings of this research highlight the significant impact that formative assessment has on various aspects of the educational process. Firstly, it is observed that this approach positively contributes to students' academic performance, as continuous feedback allows them to identify areas for improvement, adjust learning strategies, and foster self-regulation and autonomous learning skills. These benefits are amplified in complex subjects such as mathematics and physics, where a deep understanding of concepts is essential for academic success.

Additionally, the results show that formative assessment increases students' motivation and participation, especially when combined with technological tools and collaborative methodologies such as Project-Based Learning (PBL). This integration fosters greater engagement with academic activities, enhancing students' perception of their educational process, their academic self-esteem, and their active participation in the classroom.

Finally, it is emphasised that formative assessment promotes the development of metacognitive skills by providing students with opportunities to self-assess and reflect on their learning strategies. The use of digital platforms in this context not only facilitates rapid and personalised feedback but also encourages more autonomous and in-depth learning. Taken together, these findings highlight the importance of implementing formative assessment strategies in higher education, not only as a means to improve academic performance but also to motivate students and develop key skills for their academic and professional success.

REFERENCES

Adarme, M. C., Sánchez, Z. N., Pacheco, M. C., & Andrade, A. A. (2024). Integración de TIC y clase invertida en la educación superior: un estudio sobre la implementación de estrategias didácticas en cursos de ofimática en la Corporación Universitaria del Caribe (CECAR). Mundo FESC, 14(28), 83-100. DOI: https://doi.org/10.61799/2216-0388.1584

Campos-Mesa, M., González-Campos, G., & Castañeda-Vázquez, C. (2019). Análisis de la motivación del estudiante de educación superior participante en una propuesta de evaluación formativa. SPORT TK-Revista EuroAmericana de Ciencias del Deporte, 8(2), 53–58. https://doi.org/10.6018/sportk.401111

Cedeño, E. I. B., Loor, J. S. L., Garófalo, A. R. B., & Almeida, J. J. M. (2023). La evaluación formativa en la práctica pedagógica de la Educación Superior: Revisión Sistemática. Ciencia Latina Revista Científica Multidisciplinar, 7(3), 1464-1476. DOI: https://doi.org/10.37811/cl_rcm.v7i3.6289

Chicaiza, M. I. G., Revelo, D. Y. O., & Aguirre, W. M. B. (2023). LA IMPORTANCIA DE LA EVALUACIÓN FORMATIVA EN EL PROCESO DE APRENDIZAJE. Revista Huellas, 9(2). Recuperado de: https://revistas.udenar.edu.co/index.php/rhuellas/article/view/8506

Cosi, S., & Voltas, N. (2019). Evaluación formativa en estudiantes universitarios mediante tecnologías digitales: el rol del alumno en su propio proceso de enseñanza-aprendizaje. Recuperado de: https://rua.ua.es/dspace/handle/10045/98852

Fabián, T. V. E., & Tello, L. L. G. (2024). La evaluación formativa como herramienta para mejorar el aprendizaje en la Educación Superior. Revista Científica de Innovación Educativa y Sociedad Actual" ALCON", 4(4), 218-228. DOI: https://doi.org/10.62305/alcon.v4i4.251

Fernández Medina, C. R. (2021). Análisis de competencias digitales de docentes y estudiantes de enseñanza superior para implementar una evaluación formativa con tecnologías. Recuperado de: http://hdl.handle.net/10481/67840

Fraile, J. V. M., Bravo, P. R., Sande, D. Z., & Rincón, D. O. (2021). Evaluación formativa, autorregulación, feedback y herramientas digitales: uso de Socrative en educación superior. Retos: nuevas tendencias en educación física, deporte y recreación, (42), 724-734. Recuperado de: https://dialnet.unirioja.es/servlet/articulo?codigo=7986342

Fraile, J., Ruiz-Bravo, P., Zamorano-Sande, D., & Orgaz-Rincón, D. (2021). Evaluación formativa, autorregulación, feedback y herramientas digitales: uso de Socrative en educación superior (Formative assessment, self-regulation, feedback and digital tools: use ofSocrative in highereducation). Retos, 42, 724–734. https://doi.org/10.47197/retos.v42i0.87067

Herbas, M. E. M. (2024). La evaluación formativa en los entornos virtuales de aprendizaje: Una revisión de la literatura. Recuperado de: http://repositorio.redrele.org/jspui/handle/24251239/281

Lezama, M. E. B., & Zuta, P. M. (2021). La evaluación formativa: su implementación y principales desafíos en el contexto de la escuela y la educación superior. Educación, 27(2), 201-208. DOI: https://doi.org/10.33539/educacion.2021.v27n2.2433

Luna, E. (2019). Evaluación formativa del modelo educativo en instituciones de educación superior en México. Revista mexicana de investigación educativa, 24(83), 997-1026. https://www.scielo.org.mx/scielo.php?pid=S1405-66662019000400997&script=sci_arttext

Luna, E. (2019). Evaluación formativa del modelo educativo en instituciones de educación superior en México. Revista mexicana de investigación educativa, 24(83), 997-1026. Recuperado de: https://www.scielo.org.mx/scielo.php?pid=S1405-66662019000400997&script=sci_arttext

Mendoza, W. I. L., Peñaranda, N. S. G., & Mendoza, K. M. G. (2020). Importancia de la evaluación formativa en la educación superior. RECIAMUC, 4(3), 319-326. DOI: https://doi.org/10.26820/reciamuc/4.(3).julio.2020.319-326

Morán, E. G. A., Morán, P. C. S., Acosta, P. D. C. P., Morán, T. M. A., & Sánchez, C. E. M. (2024). El uso de plataformas digitales gamificadas para la evaluación formativa en educación. Ciencia Latina Revista Científica Multidisciplinar, 8(6), 3428-3438. DOI: https://doi.org/10.37811/cl_rcm.v8i6.15100

Moreno Olivos, T. (2023). La retroalimentación de la evaluación formativa en educación superior. Universidad Y Sociedad, 15(2), 685–694. Recuperado a partir de https://rus.ucf.edu.cu/index.php/rus/article/view/3673

Roblero, J., Pazmiño, A., Gutiérrez, E. D., Iza, P., & Lamilla, E. (año de publicación). The student satisfaction and perception towards formative assessment in an active learning methodology in higher education. Escuela Superior Politécnica del Litoral, ESPOL, Facultad de Ciencias Naturales y Matemáticas, Departamento de Física, Campus Gustavo Galindo, km. 30.5 Vía Perimetral, P. O. Box 09-01-5863, Guayaquil, Ecuador. Recuperado de https://laccei.org/LACCEI2023-BuenosAires/meta/FP786.html

Sarabia, M. B. (2023). La evaluación formativa como estímulo de motivación para mejorar el aprendizaje. Formación Estratégica, 7(1), 177-195. Recuperado de: https://formacionestrategica.com/index.php/foes/article/view/135

Torres-Roberto, M. A. (2024). Evaluación Formativa Continua en la Enseñanza y aprendizaje del Cálculo: Mejorando el Rendimiento Académico en Estudiantes de Educación Profesional. Journal of Economic and Social Science Research, 4(2), 93-113. DOI: https://doi.org/10.55813/gaea/jessr/v4/n2/104

Villena, L. A. M., & García, R. D. P. L. (2023). Estrategias de evaluación formativa en docentes que aplican Aprendizaje Basado en Proyectos y en la Cooperación en el ámbito universitario. EduTicInnova-Revista de Educación Virtual, 11(1), 49-54. Recuperado de: https://portalrevistas.aulavirtualusmp.pe/index.php/eduticinnova/article/view/2687