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Formative research in teachers: a systematic review

Investigación formativa en docentes: una revisión sistemática

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Abstract

Formative research has emerged as a crucial component in the field of education, especially in educational institutions dedicated to teacher training. This type of research not only seeks to generate new knowledge, but also to develop research skills among teachers. The integration of formative research into educational practice has become a key strategy for addressing the current challenges of the education system and promoting quality education. This systematic review article aims to determine the foundations of formative research in teachers through searches in databases such as Scopus, SciELO, and Web of Science, highlighting the epistemological theories of constructivism and Vygotsky's social learning. This research highlights the need to support and promote formative research in educational institutions as a means of improving teaching skills and, ultimately, educational quality. In addition, the implications of these findings for pedagogical innovation and teacher professional development are discussed, emphasizing the relevance of a holistic approach that considers multiple dimensions of the educational process.

Keywords: formative research, problem-based learning, experiential learning

Resumen

La investigación formativa ha emergido como un componente crucial en el ámbito educativo, especialmente en instituciones educativas dedicadas a la formación de docentes. Esta modalidad de investigación no solo busca la generación de nuevo conocimiento, sino también el desarrollo de competencias investigativas entre los docentes. La integración de la investigación formativa en el quehacer educativo se ha convertido en una estrategia clave para enfrentar los desafíos actuales del sistema educativo y para fomentar una educación de calidad. Este artículo de revisión sistemática tiene como objetivo determinar los fundamentos de la investigación formativa en los docentes, a través búsquedas en bases de datos como Scopus, SciELO y Web of Science, destacando las teorías epistemológicas del constructivismo y aprendizaje social de Vygotsky. Esta investigación resalta la necesidad de apoyar y fomentar la investigación formativa en las instituciones educativas como un medio para mejorar las competencias docentes y, en última instancia, la calidad educativa. Además, se discuten las implicaciones de estos hallazgos para la innovación pedagógica y el desarrollo profesional de los docentes, enfatizando la relevancia de un enfoque holístico que contemple múltiples dimensiones del proceso educativo.

Palabras clave: investigación formativa, aprendizaje basado en problemas, aprendizaje experiencial

Introduction

Formative research is a powerful tool for enhancing the educational process, providing data and feedback that allow for continuous adjustments and improvements in teaching and learning. However, many educators do not actively engage in research, which limits educational opportunities and the development of student skills, adversely affecting the promotion of research practices and highlighting a lack of teacher participation. Multiple

reasons could explain this phenomenon, such as a lack of training in research methodology, workload overload, and the perception that research is not relevant to their teaching duties, which can negatively impact their problem-solving abilities (Flores Limo et al., 2023).

According to A. López et al. (2022), formative research is essential for educators, as it provides the opportunity to analyze the data and findings derived from their own practices. Nevertheless, many educational programs do not include it as an integral part of their curriculum, potentially limiting students' ability to develop research competencies. This results in the formation of professionals who are unprepared to solve complex problems or adapt to a constantly evolving work environment.

Dipas et al. (2022) state that in Colombia, formative research is considered a fundamental pillar of deep learning. However, its implementation faces various barriers, such as a lack of training in research methods, workload overload, and the perception that it is not a relevant activity for teaching functions. Additionally, its proper application requires resources and institutional support that are not always available.

Cabrera Claudia et al. (2023) argue that the ineffective implementation of formative research in higher education can lead to low-quality teaching and students' failure to develop critical and technical skills. This situation negatively impacts their ability to face complex challenges and adapt to changing work environments. These issues can be addressed through strategies that promote the continuous professional development of educators, the integration of formative research into curricula, and the strengthening of institutional support.

In their study, Cabrera et al. (2022) analyze how the use of outdated pedagogical knowledge leads to low-quality education, preventing students from developing critical and technical skills. This deficiency affects their ability to solve problems in the classroom and adapt to dynamic work contexts.

At the Latinoamericana University, it has been identified that, according to Corona Meza (2023a), there is a gap between teachers' competencies and the knowledge demands of the 21st century. The following issues are observed: a lack of continuous training, which prevents educators from adapting to a constantly changing world; a lack of resources to implement innovative methodologies and foster active learning; and adverse working conditions. These issues negatively affect the quality of education, hindering teaching performance.

A local analysis was conducted in two educational institutions in the district of 8 Pascuales, Guayas province. This study revealed that the absence of pedagogical innovation can lead to static training with limited adaptability to the changing needs of students. This negatively impacts both the quality of instruction and students' ability to develop critical and technological skills. In response to these limitations, a formative research program for educators was implemented. The overarching problem was formulated through the following question: What is the foundation of formative research in educators? The primary purpose of this study is to determine the foundations of formative research in educators.

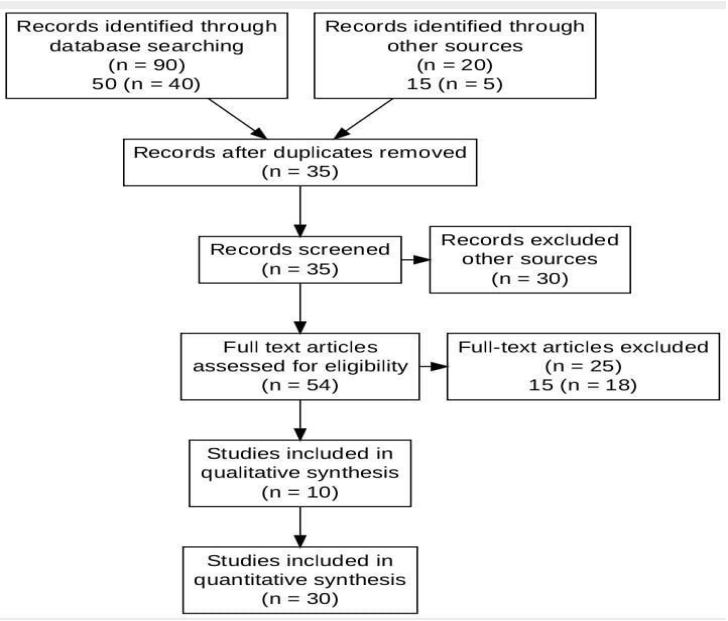
Methodology

This study was based on an analytical, critical, and reflective methodology. The topic emerged from an identified issue. A thorough review of articles related to the subject was conducted from 2022 to the present. For this research, databases of scientific journals such as Scopus, SciELO, Web of Science, and Google Scholar were analyzed. Keywords such as "Formative Research," "Problem-Based Learning," "Experiential Learning," "Social Constructivism," and "Mixed Methods" were used for the analysis and search of the topic. Of all the information found, 56 articles were selected, of which 30 were utilized for the structure of the literature review, while the remaining 26 were excluded as they were not relevant to the study.

A methodological guide centered on the theme of teaching practices was followed. Guiding questions were generated to address the issue. Subsequently, theoretical foundations were sought in the selected articles. A critical and reflective analysis of the information was conducted. Finally, the results were discussed, and conclusions were drawn (Ascona & Ireneo, 2023). To analyze important or relevant ideas related to the study topic, readings and summaries of different viewpoints according to authors were carried out. Mendeley was then used to categorize the documents utilized for citations and bibliographic references.

Figure 1

Systematic review diagram



Results and discussion

The content of the scientific articles was reviewed following a thorough search and selection process in various academic databases. According to the analysis by Morales-Santillán and Peralta-Herrera (2023), the focus is on how these studies (research seedbeds) represent important strategies for academic training and become innovative educational tools that promote active and constructivist learning. These spaces encourage the participation of students and university faculty in a dynamic educational process that values freedom, creativity, and innovation. Their aim is to develop new ways of thinking and learning to promote formative research.

The studies reviewed by Álvarez Gómez et al. (2022) emphasize that formative research provides educators with the opportunity to explore topics of personal interest, thereby deepening their understanding and commitment to learning. By actively participating to gather valuable information, it is essential to formulate well-structured questions and present findings; students not only acquire substantive knowledge, but the experience also allows them to develop transferable skills such as solving complex problems, adapting to different environments, and effective communication.

The article by Morocho Quezada and Camacho Condo (2023) highlights the urgent need to establish a more precise definition of formative research in the Colombian context. It also underscores the importance of reviewing and improving the teaching methods and resources used to promote it among university students.

In the work of Álvarez Contreras et al. (2023), the primary objective was to observe the academic factors influencing formative research in state educational institutions in the region. Additionally, a documentary study was conducted focused on identifying and analyzing relevant academic factors.

Meanwhile, in Quispe-Mamani et al. (2024a) in Peru, the main objective was to conduct a reflective analysis of formative research and the teaching skills applied in university classrooms. The conclusions obtained highlight the importance and quality of formative research as an integral part of the training of future professionals in the Peruvian context. This approach not only strengthens the research skills of university students but also significantly contributes to the development of critical competencies and analytical approaches needed to navigate challenging labor and professional environments.

For Ospino Peñas (2023), the primary aim of formative research is to promote the transmission of knowledge and the advancement of research capabilities. Ecuadorian universities encourage a research approach that goes beyond the mere transmission of theoretical knowledge, focusing on the development of practical skills and competencies for autonomous and critical research, thereby training researchers capable of generating new and relevant knowledge. However, a significant challenge identified by the authors is the perception among some educators, who see formative research as something external to their usual pedagogical practices. This disconnect may be due to several factors, including a lack of training in research methods, workload overload, and an institutional culture that does not always value research as an integral part of teaching.

According to Gonzaga-Figueroa et al. (2024), formative research faces the challenge of a lack of specific guidance, despite the existence of general guidelines. This absence of detailed guidance on the modalities and strategies necessary for effective implementation may limit its impact on students' academic development. An important distinction highlighted in the article is the difference between formative research and scientific research. While the pedagogical objective of formative research is essential for the comprehensive development of students, as it allows them not only to acquire knowledge but also to develop skills for independent and autonomous learning, scientific research is primarily oriented towards the production of new, systematized knowledge.

In Peru, Palacios (2023) focused on analyzing the impact of formative research on the formative evaluation of secondary education teachers in three public schools within the UGEL Canchis, Cusco, during the year 2022. This study is particularly relevant, as it provides a quantitative perspective on how teaching practices influence formative evaluation.

This article thoroughly reviews formative research in higher education institutions in Lima during the COVID-19 pandemic in 2022 (Tantaleán Terrones & Aguirre Morales, 2024). The pandemic exacerbated the challenges for effective teaching practice, exposing pre-existing weaknesses and limiting access to essential tools for teaching performance.

According to Solís-Murillo et al. (2024), formative research plays a crucial role in fostering growth and improving teaching and learning processes. This article emphasizes that formative evaluation, far from being a punitive approach, is essential for contextualized, high-quality education. This evaluation allows educators to reflect on their pedagogical strategies, identify strengths and weaknesses, and make necessary adjustments to enhance teaching effectiveness.

The results of the study by Caicedo and Pérez Lemus (2024) highlight the importance of teacher adaptation in the face of new educational challenges. To support teachers in this adaptation, it is essential to promote continuous training based on research, the use of educational technologies, and the implementation of collaborative strategies. These measures not only improve the quality of teaching but also strengthen the development of critical skills in students and their ability to tackle academic and labor challenges.

According to García and Ruano Ibarra (2023), the valuation of formative research by educators is crucial for optimizing educational quality, and the opinions of students are fundamental for refining the evaluation of knowledge. The study focuses on comparing university students' perceptions of teaching effectiveness in theoretical and applied subjects, recognizing that there is no consensus on which skills, competencies, or values should be evaluated, underscoring the importance of addressing this issue from a specific context.

Formative research is supported by various epistemological theories that influence its approach and methodology, among which the following stand out:

Constructivist Theory: Based on the work of Jean Piaget and Lev Vygotsky, this theory posits that knowledge is actively constructed through interaction with the environment. Its application in formative research enables educators to develop instructional skills that promote the active construction of knowledge. Collaborative learning and reflection on educational practice are emphasized (Vizcaíno Zúñiga et al., 2023).

Vygotsky's Social Learning Theory emphasizes the importance of social context and interaction with others in cognitive development. In formative research, this theory promotes collaborative learning and participation in communities of practice, where educators can share experiences and develop new pedagogical strategies (Haro, 2022).

Formative research is an educational approach aimed at enhancing the quality of teaching and learning. According to Giovanni and Daza (2020), it involves a continuous process of analysis, reflection, and action, where educators investigate their pedagogical practices and seek effective ways to foster the development of student competencies. This study is grounded in observation, data collection, and constant feedback to adapt and optimize educational strategies, providing more effective and student-centered teaching.

Encouraging formative research in the classroom allows students to develop essential 21st-century skills, such as critical thinking, creative problem-solving, and effective communication (Corona Meza, 2023b). Additionally, formative research is a valuable tool that contributes to the development of critical thinking, problem-solving, and communication skills. However, its implementation requires teacher willingness and commitment, as well as institutional resources and support (Salguero and Pérez, 2023a).

On the other hand, formative research is based on the principle that learning occurs through inquiry and problem-solving. Students engage in investigative activities that allow them to explore a topic of interest, formulate questions, gather information, analyze it, and draw conclusions (Vicuña et al., 2023). As a form of empowerment, formative research also helps students develop a sense of autonomy and control over their own learning, enabling them to make decisions and take responsibility for their educational process (Epiquién et al., 2023). The following are five key dimensions of formative research:

Problem-Based Learning (PBL): According to Carbajal Leandro (2024), this methodology allows educators to guide students in identifying and solving real problems, fostering skills such as critical thinking, collaboration, and autonomy.

Participatory Action Research: This involves both educators and students in a collaborative process of identifying and solving classroom problems. It emphasizes reflection and action to improve pedagogical practices (López and Masullo, 2023).

Experiential Learning: This approach proposes that formative research should be based on practical experience and reflection, allowing educators to learn through action and problem-solving in real contexts (Martínez, 2024).

Social Constructivism: This perspective highlights the role of social and cultural context in knowledge construction. From this viewpoint, educators should promote collaboration and dialogue among students to enhance learning and research (Sánchez et al., 2024).

Virtual Formative Research: According to Quispe-Mamani et al. (2024b), this is configured as a key strategy for training novice university researchers, emphasizing collaboration, personalization, and humanization in pedagogical support and overcoming digital divides. Cachay Chonlon and Gonzales Soto (2024) also highlight the importance of this approach, emphasizing its contribution to the development of analytical, deductive, and expository competencies.

Formative research, as outlined by Vélez Castañeda et al. (2024), when applied to the training of sports professionals, focuses on developing research skills while promoting active learning and its connection to everyday life. Loor Halder et al. (2024) also support this perspective, emphasizing the integration of teaching, research, and social engagement in higher education, especially in real contexts like cocoa marketing.

Caicedo and Pérez Lemus (2024) highlight a humanistic, contextualized, and collaborative theoretical-methodological conception that articulates theory and practice in the Public Accounting program, while Portela Rolando and Loaiza Kelly (2024) underscore the practical influence of the research component on the teaching performance of Basic Education graduates in Ecuador. Both studies agree that formative research strengthens research and pedagogical competencies, evidencing a close relationship between formative processes and professional practice, and contributes to the continuous improvement of teaching through a participatory and applied approach, although Caicedo emphasizes conceptual and curricular design.

Morocho Quezada and Camacho Condo (2023), along with Martínez-García and Ardila Castro (2023), also highlight the importance of formative research in strengthening competencies and knowledge in higher education. Morocho emphasizes the need for clear standards and rigorous evaluations in distance education, while Martínez-García and Ardila Castro stress a constructivist perspective focused on student perception as a pathway to improve training.

Corona Meza (2023a) identifies four essential dimensions: epistemology, development of students' research skills, teaching practice, and institutional strategies. Rodríguez Lucio et al. (2023) highlight the use of formative research to consolidate skills in English proficiency, emphasizing motivation and language skills as key outcomes.

Salguero and Pérez (2023b) emphasize the transmission of knowledge, the development of research competencies, and pedagogical innovation, noting difficulties in management due to a lack of clear guidance on strategies and methods. Vicuña et al. (2023) stress that formative research is key to fostering independent thinking and meaningful learning in secondary education. Both agree on its essential role in training and the need to strengthen its pedagogical implementation.

Olave Astorga and Orrego Martínez (2025), along with Bernal et al. (2024), concur that formative research is fundamental for competency development, though with differing approaches. Olave Astorga and Orrego Martínez emphasize formative assessment strategies in primary and secondary education, highlighting feedback, self-assessment, and peer assessment as mechanisms to improve pedagogical decision-making, while cautioning about limitations in long-term sustainability. In contrast, Bernal et al. propose a model aimed at strengthening university research competencies, based on sessions and research seedbeds.

Tantalean Lizley and Aguirre Marivel (2024) highlight students' positive evaluation of the virtual course structure and the teacher's role, emphasizing competencies such as creativity, leadership, and theory-practice articulation during the pandemic. Cabrera Borges et al. (2023) emphasize interaction and reflection in professional learning communities that, through digital technologies, enhance the development of research and professional competencies. Both agree that formative research favors collaborative and adaptive processes in changing environments, showcasing complementary approaches centered on student and community experience.

Conclusions

First, Problem-Based Learning (PBL) within the framework of formative research for educators stands out as a powerful methodology that drives continuous improvement in the educational process. By focusing learning on solving real problems, PBL not only strengthens critical thinking and collaboration skills among students but also allows educators to evaluate and adjust their pedagogical approaches based on active interaction with authentic issues. This methodology fosters a more dynamic and student-centered teaching environment, providing educators with tools to adapt their strategies and respond effectively to the changing needs of the classroom.

Participatory Action Research (PAR) is highlighted in formative research for educators due to its collaborative and reflective approach. By involving educators and students in a continuous cycle of identifying, reflecting, and acting on classroom issues, PAR promotes constant improvement in pedagogical practices. This methodology not only facilitates a deep understanding of educational challenges but also empowers participants to make informed decisions and implement real-time adjustments. PAR fosters a culture of continuous improvement and adaptation, crucial for the professional development of educators and the effectiveness of learning in the classroom.

Experiential Learning offers a fundamental approach to formative research by emphasizing the value of practical experience and reflection in the professional development of educators. By allowing educators to learn through action and problem-solving in real contexts, this methodology promotes deeper and more contextualized learning. The integration of practical experience with continuous reflection enables educators to identify areas for improvement in their practices and effectively adapt their pedagogical strategies. Thus, Experiential Learning becomes a key tool for professional growth and the optimization of educational practices.

Social Constructivism provides a crucial perspective in formative research for educators by underscoring the importance of social and cultural context in the learning process. This theory suggests that educators should facilitate a collaborative and dialogic environment among students to construct knowledge meaningfully and contextually. In formative research, Social Constructivism emphasizes that learning is enriched when students actively participate in the co-creation of knowledge within a shared social framework. This perspective aids educators in creating more inclusive and collaborative learning environments, promoting a deeper and more relevant understanding of educational material.

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