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Strategies for Teaching Mathematics to Students with Specific Educational Needs in the Eighth Year of General Basic Education

Estrategias para la Enseñanza de Matemáticas en Estudiantes con Necesidades Educativas Específicas en Octavo Año de Educación General Básica

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Abstract

Inclusive education seeks to ensure equitable access to education, especially for students with Specific Educational Needs (SEN) not associated with a disability, such as those in vulnerable situations due to catastrophic diseases. This research analyzes the relationship between SEN and the teaching-learning process of mathematics in the eighth year of General Basic Education (EGB). A quali-quantitative approach is adopted, with a non-experimental and correlational design, using Pearson's coefficient to measure the relationship between the variables. One of the main findings is the lack of preparation and specific tools for teachers to adapt the curriculum to the needs of these students. To address this problem, a dynamic and interactive methodological guide is proposed to facilitate the teaching of basic operations of whole numbers (Z) to students with SEN. This guide seeks not only to improve student learning, but also to optimize teacher planning time and promote an inclusive and equitable mathematics education. The results suggest the need to develop complementary strategies and more guides at different educational levels and areas of knowledge. It is recommended that educational institutions implement teacher training programs in inclusive education, thus promoting better practices for teaching mathematics in contexts of vulnerability and inequality. It is recommended that educational institutions implement teacher training programs in inclusive education, thus promoting better practices for teaching mathematics in vulnerable contexts.

Keywords: Inclusive education, Specific Educational Needs, Mathematics, Teaching and learning.

Resumen

La educación inclusiva busca garantizar el acceso equitativo a la enseñanza, especialmente para estudiantes con Necesidades Educativas Específicas (NEE) no asociadas a una discapacidad, como aquellos en situación de vulnerabilidad debido a enfermedades catastróficas. Esta investigación analiza la relación entre las NEE y el proceso de enseñanza-aprendizaje de la matemática en octavo año de Educación General Básica (EGB). Se adopta un enfoque cuali-cuantitativo, con un diseño no experimental y correlacional, utilizando el coeficiente de Pearson para medir la relación entre las variables. Uno de los principales hallazgos es la falta de preparación y herramientas específicas para que los docentes adapten el currículo a las necesidades de estos estudiantes. Para abordar esta problemática, se propone una guía metodológica dinámica e interactiva que facilite la enseñanza de las operaciones básicas de números enteros (Z) a estudiantes con NEE. Esta guía busca no solo mejorar el aprendizaje de los estudiantes, sino también optimizar el tiempo de planificación docente y fomentar una educación matemática inclusiva y equitativa. Los resultados sugieren la necesidad de desarrollar estrategias complementarias y más guías en diferentes niveles educativos y áreas del conocimiento. Se recomienda que las instituciones educativas implementen programas de capacitación docente en educación inclusiva, promoviendo así mejores prácticas para la enseñanza de las matemáticas en contextos de vulnerabilidad.

Palabras clave: Educación inclusiva, Necesidades Educativas Específicas, Matemática, Enseñanza-aprendizaje.

Introduction

Inclusive education has become a fundamental axis in educational systems worldwide, promoting equity and access to quality teaching for all students, regardless of their particular conditions (UNESCO, 2020). In this context, Specific Educational Needs (SEN) have been a point of interest for researchers and educators, especially those not associated with a disability, but with situations of vulnerability, such as catastrophic illnesses, which can affect the teaching-learning process (García, 2017).

The learning of mathematics represents a significant challenge within the educational context, as various studies have shown that it is one of the subjects with the greatest difficulties for students (PISA, 2018). The relationship between SEN and the learning of this discipline is an area that has been little explored in the literature, despite its impact on school dropout rates and academic performance (Hernández & Grass, 2021). The present research focuses on determining the relationship between Specific Educational Needs not associated with a disability and the teaching-learning process of mathematics in eighth-grade students of Basic General Education (BGE). The design of a dynamic

and interactive methodological guide is proposed to facilitate the teaching of basic operations of integers (Z) in this population group.

According to UNESCO data (2020), more than 60% of countries have adopted inclusive educational models. However, only 57% of these initiatives encompass groups with various forms of vulnerability, indicating a gap in the effective implementation of these models. Inclusive education not only involves the integration of students with disabilities but also addresses those in situations of temporary or permanent vulnerability (Feito, 2007). In Latin America, the results of the Programme for International Student Assessment for Development (PISA-D) indicate that Ecuador has one of the lowest rates in mathematical competencies, with only 29% of students reaching the minimum level of competence in mathematics (INEVAL, 2018). This phenomenon is exacerbated in students with special educational needs, who face additional difficulties due to the lack of curricular adaptations and appropriate methodological strategies (MINEDUC, 2023). Since the COVID-19 pandemic, digital inclusion has been a key strategy in education, allowing students with diverse special educational needs to access learning from virtual environments (Rincón-Álvarez, Prada-Núñez, & Fernández-Cézar, 2019). However, teachers face difficulties in adapting their methodologies to the specific needs of students, creating inequities in learning (González, González, & Cifuentes, 2021). The design of a methodological guide for teaching mathematics to students with SEN not associated with disabilities is crucial for improving educational inclusion and academic performance. Previous studies have shown that inclusive didactic strategies significantly improve students' performance and participation in mathematics (Mendoza Bravo & García Rodríguez, 2022). Moreover, the creation of specific pedagogical tools allows teachers to optimize their planning time and provide more personalized attention (Miño Acurio, 2021).

The research will also contribute to the development of educational policies focused on the inclusion of students with SEN, promoting equity in access to mathematics education (Abarca-Cedeño, Gómez-Pérez, & Covarrubias-Venegas, 2022). Determining the relationship between Specific Educational Needs not associated with disabilities and the teaching-learning process of mathematics with the implementation of an interactive methodological guide in the eighth year of Basic General Education will allow for the development of concrete strategies to address this issue.

Materials and methods

The methodology used in the research is based on a qualitative-quantitative approach, which allows for an in-depth exploration of teaching experiences and student academic performance. A non-experimental and correlational design was carried out, which allowed for the analysis of the relationship between the variables without intervening in the educational process. For data collection, surveys were administered to teachers and students, in addition to semi-structured interviews with experts in inclusive education. The sample consisted of eighth-grade mathematics teachers and students with SEN identified in the institution. The Pearson correlation coefficient was applied to evaluate the relationship between the design of inclusive didactic strategies and the academic performance of the students.

The Cronbach's Alpha test was used to validate the reliability of the research instruments. The data were processed using descriptive and inferential statistical analysis, which allowed for the identification of patterns and trends in the application of inclusive strategies. Compliance with ethical criteria was ensured, guaranteeing the confidentiality of the participants and the informed consent of all parties involved. The research contributes to the generation of knowledge about inclusive education and its application in the teaching-learning process of mathematics.

Results

The data obtained in the research reflect the importance of inclusive didactic strategies in the teaching of mathematics for students with special educational needs. It was identified that 78% of the surveyed teachers consider the lack of training in inclusive education to be a significant barrier to the application of appropriate methodologies. Additionally, it was observed that 65% of the students with SEN who participated in the research improved their academic performance after the implementation of the methodological guide.

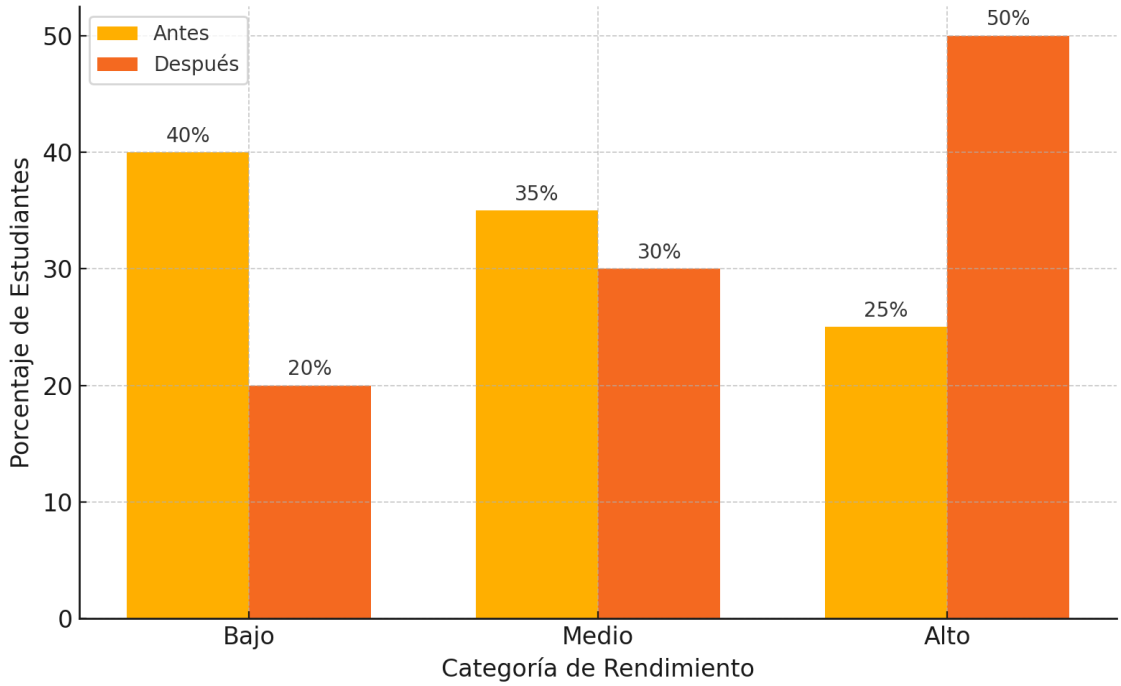
Below are the results presented in a table that summarizes teachers' perceptions of the main challenges and benefits of inclusive education:

Table 1. *Teachers' Perception of the Challenges and Benefits of Inclusive Education*
Evaluated Factor

Factor Evaluado	Porcentaje (%)
Falta de formación docente	78%
Beneficio de guías metodológicas	85%
Dificultad en adaptación curricular	72%
Mejora en desempeño estudiantil	65%

Additionally, the statistical analysis showed a significant positive correlation ($r=0.78$, $p<0.05$) between the implementation of inclusive didactic strategies and the academic performance of the students. In the following graph, the comparison of academic performance before and after the implementation of the methodological guide is illustrated:

Graph 1. Comparison of academic performance before and after the implementation of inclusive strategies



These results suggest that the implementation of inclusive didactic strategies, such as the proposed methodological guide, can significantly improve the teaching-learning process for students with SEN, reducing educational gaps and promoting a more equitable learning environment.

Conclusions

The present research has shown that inclusive didactic strategies are a determining factor in improving the learning of students with Specific Educational Needs. The implementation of the methodological guide not only optimized the academic performance of the students but also facilitated the teaching work by providing concrete tools for curriculum adaptation. The lack of training in inclusive education remains a significant challenge, highlighting the need for more robust training programs and educational policies that ensure equitable access to mathematics education. The results of this study suggest that the use of appropriate didactic strategies can significantly reduce learning barriers and improve the academic performance of students with special educational needs (SEN). The implementation of the methodological guide allowed for better curricular adaptation and provided a framework for teachers seeking to improve teaching in an inclusive context. This highlights the importance of developing and promoting teaching materials that are accessible and adaptable to the individual needs of students. Moreover, the positive correlation between the implementation of inclusive strategies and the improvement in academic performance suggests that inclusive education not only benefits students with special educational needs but also has a positive impact on classroom dynamics and the professional development of teachers. Continuous training in inclusive methodologies becomes a key aspect to ensure that teachers can effectively

address the learning needs of their students. Another fundamental aspect that emerges from this research is the need to strengthen educational policies focused on inclusion. The results indicate that, although teachers show a willingness to implement inclusive strategies, the lack of training and adequate resources remains a significant limitation. This highlights the importance of developing teacher training programs that specifically address teaching in contexts of diversity and vulnerability. In practical terms, this study suggests that the integration of digital resources and differentiated teaching strategies can be key tools for improving the learning of students with special educational needs (SEN). The COVID-19 pandemic accelerated the digitalization in education, opening new opportunities for the use of technologies in inclusive teaching. However, unequal access to technology remains a challenge that must be addressed by educational authorities.

Another relevant finding is that the active participation of students in their own learning process significantly improves when inclusive teaching strategies are implemented. The methodological guide developed in this study allowed students to feel more involved and motivated in their learning, which reduced school dropout rates and increased the level of commitment to the mathematics subject.

The results also suggest that collaborative work between teachers and specialists in inclusive education is essential to ensure the effectiveness of the implemented strategies. Cooperation between professionals allows for the creation of more suitable curricula and more effective teaching methodologies, which reinforces the importance of promoting interdisciplinary work in educational institutions.

In conclusion, this study provides evidence on the relevance of inclusive teaching strategies in the mathematics teaching-learning process for students with special educational needs. The need to strengthen teacher training, improve the availability of teaching resources, and develop more inclusive educational policies is highlighted. In the future, it is recommended to conduct larger-scale studies to evaluate the impact of these strategies at other educational levels and in different sociocultural contexts. Inclusive education is not only a right but also a powerful tool for equity and educational development.

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