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Article

Effect of Peer Tutoring and Brainstorming Strategies on the Academic Performance of Students with Hearing Impairment in Economics in Oyo State, Nigeria

Yekinni Opeyemi Muitu[1*], Alaka Abiodun Sadia[2], Oyesiji Aminat Oluwabunmi[3], Akinlolu Abosede Motunrayo[4], Oteniola Israel Ayobami[5]

1,2,3 Directorate of Sign Language Interpreting, Federal College of Education (Special), Oyo, Oyo State, Nigeria
4. Department of Economics, Lagos State University, Ojo, Lagos State, Nigeria
5. Olusegun Agagu University of Science and Technology, Okitipupa, Ondo State, Nigeria.
* Correspondence: olamewealth@gmail.com

Abstract: This study examines the effectiveness of peer tutoring and brainstorming strategies on the academic performance of students with hearing impairments in Economics, addressing a gap in instructional methods tailored to this population. Using a mixed-methods approach, 60 students with hearing impairments were assigned to one of three groups: peer tutoring, brainstorming, or a control group with traditional instruction. Pre-test and post-test assessments were conducted, and ANCOVA analysis showed significant improvement in the peer tutoring (M = 68.7, SD = 5.2) and brainstorming groups (M = 71.2, SD = 5.0) compared to the control group (M = 55.4, SD = 6.1). Qualitative data from interviews and observations highlighted that peer tutoring increased students' confidence and understanding, while brainstorming enhanced engagement and creativity. The findings suggest that these strategies positively impact learning outcomes for students with hearing impairments, recommending structured peer tutoring, brainstorming activities, and educator training to foster inclusive learning. Further research should investigate the long-term and broader application of these methods.

Keywords: Peer tutoring, Brainstorming strategies, Hearing impairments, Academic performance, Inclusive education

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1. Introduction

Education is a cornerstone of personal and societal development, offering individuals the tools they need to succeed and contribute meaningfully to their communities. However, students with hearing impairments face unique challenges in traditional educational settings, where the reliance on auditory information can create significant barriers to learning. These challenges are especially evident in subjects like Economics, which demand a deep understanding of abstract concepts, analytical thinking, and the ability to engage with complex data and theoretical frameworks. For students with hearing impairments, the lack of accessible instructional methods can lead to misunderstandings, decreased motivation, and lower academic performance [1].

Traditional teaching methods often rely heavily on lectures and verbal explanations, which may not effectively reach students who cannot fully access auditory information. As a result, students with hearing impairments may struggle to keep pace with their peers, leading to feelings of isolation and frustration. To bridge this gap, educators are increasingly seeking alternative strategies that can foster an inclusive learning environment.

Among the strategies gaining attention are peer tutoring and brainstorming, both of which offer dynamic, interactive ways to engage students with diverse learning needs [2].

Peer tutoring is an instructional approach where students work collaboratively in pairs or small groups to support each other's learning. This method leverages the power of social interaction to enhance understanding and retention of academic content. Through peer tutoring, students with hearing impairments can benefit from personalized support, improved communication skills, and increased confidence in their abilities. Recent studies, such as those by Carter and McCleary (2020), have shown that peer tutoring not only improves academic outcomes but also promotes social integration and reduces feelings of isolation among students with disabilities [3].

Brainstorming, a creative problem-solving technique, involves generating ideas and solutions collectively in a group setting. This approach encourages active participation, critical thinking, and the sharing of diverse perspectives, making it particularly effective for students who may struggle with traditional, lecture-based instruction. Brainstorming allows students with hearing impairments to express their ideas visually and interactively, facilitating a deeper understanding of economic concepts. Research by Paulus and Kenworthy (2019) indicates that brainstorming enhances creativity and problem-solving skills, offering a supportive environment for students to explore and refine their ideas.

This study aims to investigate the effects of peer tutoring and brainstorming on the academic performance of students with hearing impairments in Economics. By examining how these strategies can be integrated into the classroom, the study seeks to provide insights into effective educational practices that promote inclusivity and empower students with disabilities to achieve their full potential. Through this research, we hope to highlight the importance of adopting innovative teaching methods that cater to the diverse needs of all learners, ensuring equal access to education for students with hearing impairments [4].

Background to the Study

Students with hearing impairments face unique challenges in educational settings due to their limited access to auditory information, which significantly impacts their ability to engage with classroom activities, understand complex subjects, and participate in discussions. Economics, in particular, involves abstract concepts, data analysis, and theoretical frameworks that can be challenging for these students if not taught using inclusive strategies. Hearing impairment, which can range from mild to profound, affects the ability to perceive and process auditory information. This sensory limitation can hinder classroom communication and interaction, leading to feelings of isolation and frustration. According to Knoors and Marschark (2022), students with hearing impairments benefit from visual aids, interactive learning experiences, and instructional methods that emphasize visual and kinesthetic engagement rather than relying solely on auditory input [5].

Peer tutoring is an educational approach where students work together in pairs or small groups to help each other learn and understand academic content. This method leverages the social dynamics of peer interactions to facilitate learning. Carter and McCleary (2020) highlight that peer tutoring can enhance both academic performance and social skills among students with disabilities. The collaborative nature of peer tutoring encourages students to communicate effectively, ask questions, and explain concepts to each other, reinforcing their understanding of the material. This approach also provides opportunities for students with hearing impairments to interact with their peers in a supportive environment, reducing feelings of isolation and increasing engagement [6].

Brainstorming is another effective strategy that involves generating ideas and solutions in a group setting, promoting active participation, critical thinking, and the exchange of diverse perspectives. Paulus and Kenworthy (2019) note that brainstorming fosters a sense of inclusion and collaboration, which is particularly beneficial for students with hearing impairments who may struggle with traditional lecture-based instruction. By partici-

pating in brainstorming sessions, these students can express their ideas visually and interactively, leading to a deeper understanding of economic concepts. Brainstorming helps develop creative thinking skills and enhances the ability to approach complex problems from multiple angles.

Recent research underscores the potential benefits of these strategies for students with hearing impairments. Knight et al. (2021) conducted a meta-analysis showing that peer tutoring significantly improves academic achievement and social interaction among students with disabilities. Similarly, Palladino et al. (2023) found that brainstorming enhances creative problem-solving skills, making it an effective strategy for engaging students in subjects that require analytical thinking, such as Economics. These findings emphasize the importance of adopting innovative teaching methods that cater to the diverse learning needs of students with hearing impairments. By implementing peer tutoring and brainstorming strategies, educators can create inclusive classrooms that promote active learning and improve academic outcomes for all students [7].

Literature Review

The academic challenges faced by students with hearing impairments have been a focus of educational research for many years. These students encounter difficulties in accessing auditory information, leading to significant barriers in traditional educational settings. The reliance on verbal instruction and auditory communication in conventional teaching methods often fails to meet the learning needs of students with hearing impairments, impacting their academic performance and engagement. To address these challenges, educators and researchers have explored various strategies to enhance learning outcomes for these students, with peer tutoring and brainstorming emerging as effective approaches [8].

Peer Tutoring

Peer tutoring has gained recognition as a beneficial instructional strategy for students with disabilities. This approach involves pairing students together, allowing them to teach and learn from each other in a supportive and interactive environment. According to a meta-analysis by Knight et al. (2021), peer tutoring significantly improves academic performance and social skills among students with disabilities, including those with hearing impairments. The study highlights that the collaborative nature of peer tutoring encourages active engagement and facilitates the reinforcement of academic content. Students with hearing impairments, in particular, benefit from the personalized support and increased interaction that peer tutoring provides. It creates an inclusive environment where students can communicate and learn at their own pace, reducing feelings of isolation and promoting confidence [9].

Further research by Carter and McCleary (2020) underscores the social benefits of peer tutoring. They found that this approach not only enhances academic achievement but also fosters social integration and friendship development among students with disabilities. By participating in peer tutoring, students with hearing impairments can build meaningful relationships with their peers, improving their overall educational experience. The study also emphasizes that peer tutoring helps students develop essential communication skills, which are crucial for their academic and social success. Additionally, peer tutoring provides students with opportunities to develop leadership skills, as they take on the role of both learner and teacher, fostering a sense of responsibility and mutual respect among peers (Fuchs & Fuchs, 2020) [10].

Brainstorming

Brainstorming is another instructional strategy that has shown promise in supporting students with hearing impairments. This creative problem-solving technique involves generating ideas and solutions collectively, encouraging participation and critical thinking.

Research by Paulus and Kenworthy (2019) indicates that brainstorming enhances creativity and problem-solving abilities, making it an effective tool for engaging students in subjects like Economics. For students with hearing impairments, brainstorming provides an opportunity to express their ideas visually and interactively, allowing them to contribute meaningfully to group discussions [11].

Palladino et al. (2023) explored the impact of brainstorming on students' cognitive development and found that it encourages divergent thinking and the exploration of multiple perspectives. This is particularly beneficial for students with hearing impairments, who may face challenges in accessing and processing auditory information. By participating in brainstorming sessions, these students can engage with the material in a more dynamic and inclusive manner, leading to a deeper understanding of complex concepts. The study also highlights that brainstorming promotes a sense of belonging and collaboration, which can enhance students' motivation and interest in learning. Moreover, brainstorming sessions can be structured to incorporate visual aids and technology, such as interactive whiteboards and digital mind-mapping tools, further enhancing the accessibility and engagement for students with hearing impairments (Alkhalaf & Aljabri, 2022) [12].

Combination of Strategies

The combination of peer tutoring and brainstorming strategies offers a comprehensive approach to addressing the learning needs of students with hearing impairments. A study by Adigun et al. (2020) examined the effects of integrating both strategies in teaching Mathematics to students with hearing impairments and found significant improvements in their academic performance and engagement. The study concluded that combining peer tutoring and brainstorming creates a supportive learning environment that encourages active participation, critical thinking, and social interaction [13].

These findings underscore the importance of adopting innovative teaching methods that cater to the diverse needs of students with hearing impairments. By implementing peer tutoring and brainstorming strategies, educators can create inclusive classrooms that promote active learning and improve academic outcomes. The literature suggests that these strategies not only enhance students' academic skills but also foster social integration and personal development, contributing to a more equitable and empowering educational experience for students with hearing impairments. Furthermore, the integration of technology in these strategies, such as using online platforms for peer tutoring and digital tools for brainstorming, can further enhance accessibility and engagement, providing students with hearing impairments with the resources they need to succeed [14].

Overall, the literature supports the implementation of peer tutoring and brainstorming as effective strategies for improving the academic performance and engagement of students with hearing impairments. These approaches provide a framework for educators to develop inclusive practices that address the unique challenges faced by these students, ensuring that they have equal opportunities to succeed in their educational pursuits.

2. Materials and Methods

This study investigates the effects of peer tutoring and brainstorming strategies on the academic performance of students with hearing impairments in Economics. The research follows a quasi-experimental design with pre-test and post-test assessments to evaluate the impact of these instructional strategies on students' learning outcomes.

The study involved 60 students with hearing impairments enrolled in a secondary school for the Deaf in Oyo State, Nigeria. The participants were in their second year of secondary education, aged between 15 and 28 years. The students were randomly assigned to three groups: a peer tutoring group, a brainstorming group, and a control group, with

20 students in each group. The selection criteria included students who had been diagnosed with hearing impairments and had basic proficiency in reading and writing in English [15].

The primary instrument used in this study was an Economics achievement test developed specifically for this research. The test consisted of 30 multiple-choice questions covering key topics in the Economics curriculum, such as supply and demand, market structures, and economic policies. The test was validated by a panel of experts in Economics education and special education to ensure content validity and appropriateness for students with hearing impairments. In addition, a questionnaire was administered to assess students' attitudes towards Economics and their perceived challenges in learning the subject.

The study was conducted over eight weeks, with each group receiving different instructional interventions. The peer tutoring group participated in sessions twice a week, where they worked in pairs to review and discuss Economics topics. The pairs were rotated regularly to ensure exposure to different peer tutors. Each session lasted 60 minutes and included activities such as problem-solving, summarizing key concepts, and discussing real-life applications of economic principles. Tutors received training on effective communication strategies and how to provide constructive feedback to their peers. The brainstorming group participated in weekly sessions where they engaged in group activities to generate ideas and solve problems related to Economics. Each session lasted 60 minutes and involved interactive discussions, visual aids, and collaborative projects. Students were encouraged to share their thoughts and explore multiple solutions to economic issues, fostering a creative and inclusive learning environment. Meanwhile, the control group continued with the traditional lecture-based instruction commonly used in the school, which involved teacher-led explanations, textbook reading, and individual assignments without any additional instructional strategies [16].

Data were collected using the pre-test and post-test scores from the Economics achievement test and responses from the attitude questionnaire. Descriptive statistics were used to summarize the demographic information and pre-test scores of the participants. Analysis of Covariance (ANCOVA) was employed to determine the effects of the instructional strategies on students' post-test scores, controlling for any differences in pre-test scores. The level of significance was set at ($p < 0.05$\) for all statistical tests. Additionally, qualitative data from student interviews and observations during the intervention sessions were collected to gain insights into students' experiences and perceptions of the instructional strategies. Thematic analysis was conducted to identify common themes and patterns related to students' engagement, motivation, and challenges encountered during the study.

The study adhered to ethical guidelines for research involving human participants. Informed consent was obtained from all participants and their parents or guardians before the study commenced. Participants were assured of the confidentiality and anonymity of their responses, and they had the right to withdraw from the study at any time without any consequences. The study was approved by the school's ethics committee and complied with all relevant regulations for conducting research with students with disabilities [17].

3. Results

The results of this study are presented in terms of the impact of peer tutoring and brainstorming strategies on the academic performance of students with hearing impairments in Economics. The analysis includes both quantitative data from the Economics achievement test and qualitative data from student interviews and observations [18].

Quantitative Results

The pre-test and post-test scores of the participants were analyzed to determine the effectiveness of the instructional strategies. The descriptive statistics for the pre-test scores indicated no significant difference among the three groups, confirming the initial equivalence of the groups. Table 1 presents the mean and standard deviation of the pre-test scores for each group.

Table 1. Descriptive Statistics for Pre-Test Scores

Group	Mean Pre-Test Score	Standard Deviation
Peer Tutoring	45.8	4.6
Brainstorming	46.3	4.8
Control	45.5	4.7

Analysis of Covariance (ANCOVA) was used to analyze the post-test scores, controlling for pre-test scores as a covariate. The results revealed significant differences in the post-test scores among the three groups, $F(2, 56) = 18.92$, $p < 0.001$. Post-hoc comparisons using the Bonferroni test indicated that both the peer tutoring group and the brainstorming group performed significantly better than the control group. Table 2 provides the mean and standard deviation of the post-test scores for each group.

Table 2. Descriptive Statistics for Post-Test Scores

Group	Mean Post-Test Score	Standard Deviation
Peer Tutoring	68.7	5.2
Brainstorming	71.2	5.0
Control	55.4	6.1

The ANCOVA results in Table 3 show the significant effects of the instructional strategies on students' post-test performance.

Table 3. ANCOVA Results for Post-Test Scores

Source	SS	Df	MS	F	p
Between Groups	1523.2	2	761.6	18.92	<0.001
Within Groups	2254.1	56	40.25		
Total	3777.3	58			

Qualitative Results

The qualitative data from student interviews and observations provided additional insights into the students' experiences and perceptions of the instructional strategies. Students in the peer tutoring group reported increased confidence and understanding of Economics concepts. They appreciated the opportunity to learn from their peers and valued the personalized support they received during the sessions. Many students expressed that the peer interactions helped clarify difficult concepts and fostered a supportive learning environment.

Similarly, students in the brainstorming group reported enhanced engagement and enjoyment in learning Economics. They highlighted that the interactive nature of brainstorming sessions allowed them to explore different ideas and collaborate with their peers. Students noted that visual aids and group discussions made complex economic concepts more accessible and easier to understand. The brainstorming sessions were described as a creative and inclusive learning experience that encouraged active participation.

The control group, which received traditional instruction, reported fewer positive experiences. Students in this group expressed difficulties in keeping up with the material and a lack of motivation to engage with the content. The traditional lecture-based approach was perceived as less interactive and supportive compared to the other instructional strategies [19].

Overall Findings

The findings of this study indicate that both peer tutoring and brainstorming strategies significantly improve the academic performance of students with hearing impairments in Economics compared to traditional instruction. The peer tutoring group showed notable improvements in understanding and applying economic concepts, while the brainstorming group demonstrated enhanced engagement and creativity in problem-solving. These results suggest that implementing innovative instructional strategies can effectively support students with hearing impairments, providing them with equal opportunities to succeed in their academic pursuits.

4. Discussion

The results of this study provide compelling evidence that both peer tutoring and brainstorming strategies significantly enhance the academic performance of students with hearing impairments in Economics. These findings align with previous research, which has highlighted the effectiveness of innovative instructional methods in improving educational outcomes for students with disabilities (Knight et al., 2021; Carter & McCleary, 2020).

The peer tutoring approach proved to be an effective strategy for students with hearing impairments, as evidenced by the significant improvement in their post-test scores compared to the control group. The interactive nature of peer tutoring facilitates active learning, allowing students to engage with the material more deeply. This is consistent with the work of Fuchs and Fuchs (2020), who noted that peer tutoring not only reinforces academic concepts but also enhances communication and social skills among students with disabilities.

The qualitative data further supports these findings, as students in the peer tutoring group reported increased confidence and comprehension of Economics concepts. The opportunity to learn from peers provided a supportive environment where students felt comfortable asking questions and seeking clarification. This aligns with the findings of Knight et al. (2021), who emphasized the social and academic benefits of peer interactions in educational settings.

Brainstorming was also shown to be a highly effective strategy for engaging students with hearing impairments. The brainstorming group outperformed both the peer tutoring and control groups, indicating that this method may be particularly beneficial for fostering creativity and critical thinking in Economics. This supports the findings of Paulus and Kenworthy (2019), who highlighted the positive impact of brainstorming on students' cognitive development and problem-solving abilities. The interactive and inclusive nature of brainstorming sessions allowed students to explore diverse ideas and collaborate with their peers. This approach facilitated a deeper understanding of economic concepts by encouraging students to think critically and consider multiple perspectives. Palladino et al. (2023) emphasized that brainstorming promotes divergent thinking, which is essential for complex subjects like Economics.

The findings of this study have significant implications for educators working with students with hearing impairments. The success of peer tutoring and brainstorming strategies suggests that traditional lecture-based instruction may not be the most effective approach for these students. By incorporating innovative instructional methods, educators can create more inclusive and supportive learning environments that cater to the diverse needs of students with hearing impairments. Implementing peer tutoring and brainstorming strategies requires careful planning and consideration of students' unique needs. Educators should provide training for peer tutors to ensure effective communication and support during sessions. Additionally, brainstorming activities should be designed to accommodate different learning styles and incorporate visual aids and technology to enhance accessibility.

While this study provides valuable insights into the benefits of peer tutoring and brainstorming for students with hearing impairments, it is not without limitations. The study was conducted in a single school with a relatively small sample size, which may limit the generalizability of the findings. Future research should consider larger and more diverse samples to validate these results. Additionally, this study focused solely on Economics as the subject area. Future research could explore the effectiveness of these instructional strategies across different subjects to determine their broader applicability. Longitudinal studies would also be beneficial to assess the long-term impact of peer tutoring and brainstorming on students' academic performance and personal development [20].

5. Conclusion

In conclusion, this study demonstrates the positive impact of peer tutoring and brainstorming strategies on the academic performance of students with hearing impairments in Economics. These instructional methods promote active learning, critical thinking, and social interaction, providing students with the tools they need to succeed academically. By adopting these innovative strategies, educators can create more inclusive and effective learning environments for students with hearing impairments, ultimately enhancing their educational experiences and outcomes.

Recommendations

Based on the findings of this study, several recommendations can be made to enhance the academic performance of students with hearing impairments through the use of peer tutoring and brainstorming strategies in Economics and potentially other subjects. To effectively implement peer tutoring programs, schools should provide structured training and support to both tutors and tutees. This training should include effective communication techniques, the use of visual aids, and strategies for providing constructive feedback. Teachers should consider strategic pairing or grouping of students, taking into account their strengths, weaknesses, and interpersonal dynamics to maximize the benefits of peer tutoring. Continuous monitoring and evaluation of peer tutoring sessions should be conducted to ensure the program's effectiveness and to make necessary adjustments. Feedback from both students and teachers should be regularly collected to improve the tutoring experience.

Incorporating brainstorming techniques in the classroom can significantly enhance student engagement and learning. Educators should design brainstorming sessions that involve interactive and collaborative activities, using visual aids, real-world problem-solving tasks, and technology to make them more engaging and accessible for students with hearing impairments. Teachers should encourage all students to participate actively in brainstorming sessions, fostering an inclusive environment where diverse ideas are valued. Providing clear guidelines and structured activities can help ensure that all students are engaged and contributing. The content of brainstorming sessions should be adapted to suit the interests and learning levels of the students, enhancing motivation and engagement by making the content relevant and relatable.

Professional development for educators is crucial to the successful implementation of these instructional strategies. Schools should offer workshops and training sessions to equip teachers with the skills and knowledge needed to implement peer tutoring and brainstorming effectively. Encouraging collaboration and sharing of best practices among educators can facilitate the exchange of ideas and promote the adoption of successful strategies. Creating a community of practice among teachers can further support the implementation of innovative teaching methods.

Educational policymakers should develop and promote policies that support the inclusion of innovative teaching strategies for students with hearing impairments. This includes providing necessary resources and support to schools to implement these strategies

effectively. Additionally, the curriculum should be adapted to incorporate instructional strategies that cater to diverse learning needs. By embedding peer tutoring and brainstorming into the curriculum, schools can ensure that these approaches are an integral part of the learning process.

Further research is needed to explore the effectiveness of peer tutoring and brainstorming strategies across different subjects and educational levels to assess their broader applicability. Future studies should consider the long-term impact of these strategies on students' academic and personal development. Research should adopt inclusive designs that involve students with various types of disabilities to better understand the effectiveness and adaptability of these strategies across diverse learning contexts. In summary, adopting peer tutoring and brainstorming strategies can significantly improve the educational outcomes for students with hearing impairments. By implementing these recommendations, educators and policymakers can create more inclusive and effective learning environments that empower students to achieve their full potential.

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