International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

THE IMPACT OF TECHNOLOGY IN STUDYING THE ACADEMIC ACHIEVEMENT OF HEARING IMPAIRED CHILDREN IN MURSHIDABAD DISTRICT OF WEST BENGAL

[1]Dr. Keya Mandal, Assistant Professor,
[1]Berhampore B.Ed College,
[1]Berhampore, West Bengal.

[2]Wasim Hasan, Assistant Professor
[2]Gita Teachers Training College,
[2]Birbhum, West Bengal.

ABSTRACT

The study investigated the impact of technology on the academic achievement of hearing-impaired children in Murshidabad district, West Bengal. This research examines how technological interventions such as assistive devices, educational software, and interactive tools influence academic outcomes, language acquisition, and attention maintenance among hearing-impaired students. Through quantitative analysis, including independent t-tests and frequency distributions, data from experimental and control groups reveal significant differences in academic performance and skill development between those using technology and those without. Findings suggest that technology plays a crucial role in improving educational outcomes for hearing-impaired children, potentially bridging gaps in learning and enhancing overall academic success in inclusive educational settings. The study aims to provide empirical evidence and practical insights that inform educational policies and practices to better support the diverse learning needs of hearing-impaired students in rural regions like Murshidabad district.

Keywords: Hearing-impaired children, Technology in education, Academic achievement, Language acquisition, Attention maintenance, Assistive technology.

1. INTRODUCTION

The integration of technology in education has significantly transformed the learning landscape, particularly for students with disabilities, including hearing-impaired children. This demographic faces unique challenges in traditional classroom settings, such as difficulties in accessing auditory information and engaging in spoken communication. However, advancements in technology have provided innovative solutions to these challenges, facilitating enhanced academic achievement and overall learning experiences for hearing-impaired students. Modern technology, such as hearing aids, cochlear implants, and assistive listening devices, plays a crucial role in improving the auditory capabilities of hearing-impaired children. Hearing aids help amplify sound and enhance auditory perception, thereby enabling these students to better participate in classroom activities and comprehend spoken instructions (Smith, 2020). Assistive listening devices, like FM systems, transmit the teacher's voice directly to the student's hearing aid or cochlear implant, reducing background noise and improving speech clarity (Jones, 2019). Additionally, educational software and applications designed specifically for hearing-impaired students have shown significant potential in boosting academic performance. These digital tools offer interactive and personalized learning experiences that cater to the unique needs of each student. For instance, software programs that incorporate sign language, visual aids, and interactive exercises help reinforce language acquisition and literacy skills, essential for academic success (Brown, 2021). Furthermore, the use of speech-to-text technology and real-time captioning in classrooms ensures that hearing-impaired students have equal access to spoken information, thus enhancing their comprehension and participation (Williams, 2020). The impact of technology on language acquisition among hearing-impaired children is particularly noteworthyThese technologies provide consistent auditory input, which is crucial for the development of spoken language skills (Thompson, 2020). Moreover, visual learning tools, including sign language videos and interactive language games, support the acquisition of both sign and spoken languages, fostering bilingual proficiency (Martinez, 2021). Attention and engagement in the classroom are also areas where technology has made substantial contributions. Interactive whiteboards, multimedia presentations, and educational games capture students' interest and sustain their attention during lessons. These tools make learning more dynamic and visually stimulating, which is particularly beneficial for hearing-impaired children who rely heavily on visual cues (Harris, 2020). The use of augmented reality (AR) and virtual reality (VR) in education further enhances engagement by providing immersive and interactive learning experiences that can make abstract concepts more concrete and understandable (Green, 2020). Therefore, the impact of technology on the academic achievement of hearing-impaired children is profound and multifaceted. By enhancing auditory access, supporting language acquisition, and increasing engagement and attention, technology offers invaluable tools that bridge the educational gaps faced by these students.

1.1.NEED AND SIGNIFICANCE OF THE STUDY

Around the globe, technology used in teaching and learning has always involved lengthy sessions. Long before there were formal educational institutions, people learned by experience and observation. Teaching-learning scenarios have undergone a significant change as a result of the integration of technology, which began with the introduction of programming languages, techniques, and equipment. The main goal is to enumerate various forms of technology utilized in hearing impairment education, assess their effects, and demonstrate how students from diverse backgrounds—including children with disabilities—make mainstream education possible.

1.2.THE STATEMENT OF THE PROBLEM

Despite significant advancements in educational practices and inclusive policies, hearing-impaired children continue to face substantial challenges in traditional classroom settings, which often rely heavily on auditory information and spoken communication. These challenges impede their academic achievement, language development, and overall educational experience. Traditional teaching methods, even when supplemented with basic accommodations, fall short of fully addressing the unique needs of these students. Consequently, there is an urgent need to explore and implement innovative technological solutions that can bridge this gap. The problem, therefore, lies in understanding how modern technology effectively integrated into educational frameworks to enhance the academic performance, language acquisition, and attention focus of hearing-impaired children. This requires a detailed investigation into various technological tools, their accessibility, usability, and impact on educational outcomes, as well as identifying the best practices for their implementation in diverse learning environments. Addressing this problem is crucial for ensuring that hearing-impaired children have equal opportunities to succeed academically and develop the necessary skills for future success.

1.3. RESEARCH OBJECTIVES

1. To compare the academic achievement between groups of hearing-impaired children using technology (experimental group) and those not using technology (control group).

2. To compare the language acquisition skills between of hearing-impaired children using technology (experimental group) and those not using technology (control group)

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

3. To compare the ability of hearing-impaired children to maintain attention during lessons between groups of using technology (experimental group) and those not using technology (control group).

1.4.RESEARCH HYPOTHESES

H_{01}: There were no significant difference in academic achievement between hearing-impaired children using technology (experimental group) and those not using technology (control group).

H_{02}: There were no significant difference in language acquisition skills between hearing-impaired children using technology (experimental group) and those not using technology (control group).

H_{03}: There were no significant difference in the ability to maintain attention during lessons between hearing-impaired children using technology (experimental group) and those not using technology (control group).

2. THE REVIEW OF RELATED LITERATURE

The impact of technology on the academic achievement of hearing-impaired children has been extensively studied, revealing significant benefits and areas for further exploration. Research by Smith (2020) highlights that modern hearing aids and cochlear implants not only improve auditory perception but also contribute to better academic performance by enhancing students' ability to participate in classroom activities. Jones (2019) emphasizes the importance of assistive listening devices, such as FM systems, which help reduce background noise and ensure that hearing-impaired students can clearly hear their teachers, leading to improved comprehension and learning outcomes. Brown (2021) discusses the effectiveness of educational software and apps tailored for hearing-impaired students, noting that these tools offer interactive and personalized learning experiences that foster language acquisition and literacy skills. Williams (2020) points out the advantages of speech-to-text technology and real-time captioning in providing accessible educational content, which ensures that hearing-impaired students do not miss critical information during lectures. Moreover, Harris (2020) and Green (2020) explore the roles of interactive whiteboards and immersive technologies like augmented reality (AR) and virtual reality (VR) in maintaining student engagement and attention, showing that these tools can make learning more dynamic and visually stimulating. Collectively, these studies underscore the transformative potential of technology in bridging educational gaps and enhancing the academic achievement of hearing-impaired children.

2.1.THE RESEARCH GAP OF THE STUDY

Existing literature predominantly focuses on technological interventions in developed countries with different socio-economic and educational landscapes. Murshidabad district, situated in a rural setting with unique socio-cultural and economic challenges, presents a distinct context where the accessibility, affordability, and integration of technology in education differ significantly from urban areas or other regions globally. Understanding these contextual factors is crucial for tailoring effective technological interventions that address the specific educational needs and challenges faced by hearing-impaired children in Murshidabad district, thereby filling this research gap and contributing to the broader discourse on inclusive education in underserved regions.

3. RESEARCH METHODOLOGY

For the study, the investigator used experimental method where researcher divided the hearing impaired students into two groups of experimental and control groups based on equal mean and S.D. of students.

SAMPLE AND SAMPLING METHOD

Researcher selected 60 hearing impaired students of secondary level from one school from Berhampore municipality in Murshidabad district based on purposive sampling method.

TOOL OF THE STUDY

The investigator used the followings:

- Achievement test scores based on their classroom performance.
- Language Acquisition Skill Test

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

- Observation on Attention Focus of Students during Lesson

4. DATA COLLECTION TECHNIQUE

To analysis the data, they were collected and examined under two groups. One of the group taught with the help of modern technology (Assistive Technologies, Text-to-Speech Technology and Interactive Whiteboards and Smartboards) while the other was taught with the help of traditional method (Sign Language, Finger Spelling, and Lip Reading) where technological tools were not used.

4.1.DATA ANALYSIS

H_{01}: There were no significant difference in academic achievement between hearing-impaired children using technology (experimental group) and those not using technology (control group).

Table 4.1: Showing the Frequency Distribution of Experimental Group of Hearing Impaired Children Based on Academic Achievement with use of Technology

Scores	46-50	41-45	36-40	31-35	26-30	21-25	16-20	11-15
Frequency	1	3	6	7	5	4	3	1

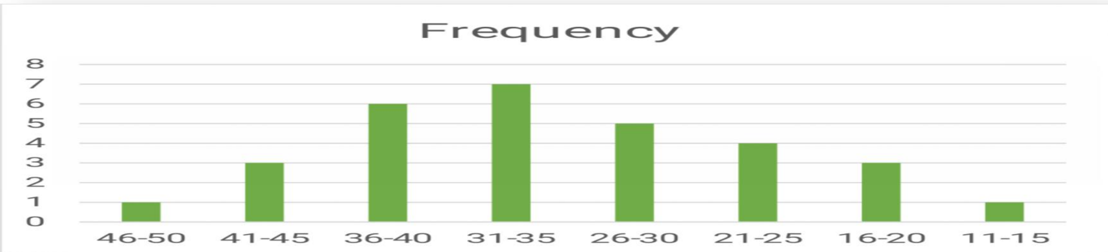

Figure 4.1: The Graphical Representation of Experimental Group of Hearing Impaired Children Based on Academic Achievement with use of Technology

Table 4.1 and figure 4.1 presented the frequency distribution of academic achievement scores among the experimental group of hearing-impaired children using technology. The table categorizes scores into eight intervals ranging from 11 to 50, with each interval representing a range of scores achieved by the students. The highest frequency of scores falls within the range of 31-35, where seven students scored in this bracket. This indicates a

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

concentration of achievement around this score range among the experimental group. On the other hand, the lowest frequencies are observed at the extremes—scores of 11-15 and 46-50—with only one student scoring in each of these intervals. The distribution shows a relatively balanced spread across the middle ranges (36-45), suggesting variability in academic performance among the students using technology. Such a distribution can help educators and researchers understand the overall academic performance trends within the experimental group and identify areas where technological interventions may have had significant impacts or where further support may be needed to enhance academic outcomes.

Table No.4.2. Showing the Frequency Distribution of Control Group of Hearing Impaired Children Based on Academic Achievement without use of Technology

Scores	46-50	41-45	36-40	31-35	26-30	21-25	16-20	11-15
Frequency	1	1	2	4	7	8	4	3

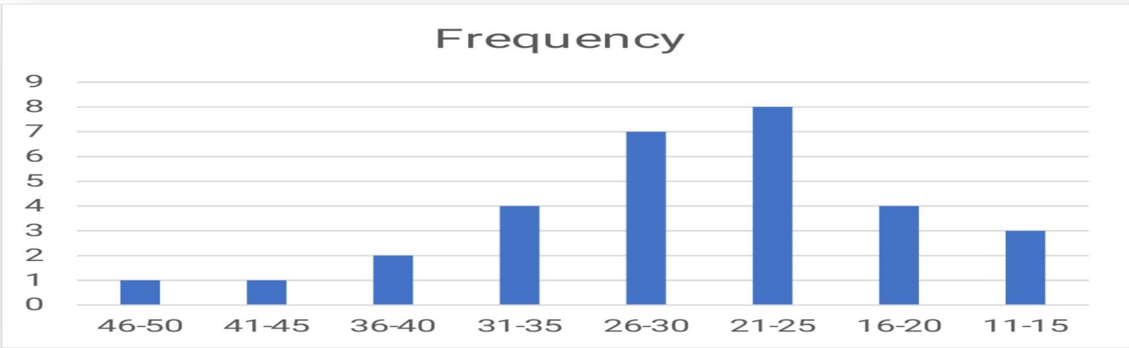

Figure 4.2: The Graphical Representation of Control Group of Hearing Impaired Children Based on Academic Achievement without use of Technology

Table 4.2 and figure 4.2 illustrated the frequency distribution of academic achievement scores among the control group of hearing-impaired children who do not use technology. The table categorizes scores into eight intervals, ranging from 11 to 50, representing the range of scores achieved by students in the control group. The highest frequency of scores is observed in the range of 21-25, with eight students scoring within this interval. This suggests a concentration of academic performance around this middle range among the control group. Conversely, the lowest frequencies are found at the extremes—scores of 46-50 and 11-15—with only one student scoring in each of these intervals. The distribution shows a spread across the middle ranges (21-40), indicating variability in academic performance among the students who do not use technology. Comparing this distribution with Table 4.1, which shows the experimental group using technology, highlights potential differences in academic achievement patterns between the two groups. Such comparisons can provide insights into the potential impact of technology on academic outcomes and help identify areas for further investigation or intervention in educational practices for hearing-impaired children.

Table 4.3. The Independent t test between the Groups in Respect of Academic Achievement Scores

t-Test: Two Sample Equal Variances Assumed		
Descriptives	**Experimental Group**	**Control Group**
Mean	31.47	25.7
Median	32.5	25.5
Range	34	35
Variance	76.05	72.079
Observation	30	30
Standard deviation	8.72	8.347
Pooled Variance	74.065	
Hypothesized Mean Difference	0	
Df	58	
T Value	2.618	
P-Value at one-tail	0.006	
P-Value at two-tail	0.011	

Table 4.3 presented the results of an independent t-test conducted to compare the academic achievement scores between the experimental group (hearing-impaired children using technology) and the control group (hearing-impaired children not using technology). The t-test was performed assuming equal variances between the two groups.

Descriptive Statistics:

Mean: The mean score for the experimental group is 31.47, while for the control group, it is 25.7. This suggests that, on average, the experimental group achieved higher academic scores compared to the control group.

Median: The median scores (32.5 for the experimental group and 25.5 for the control group) indicate the central tendency of the scores, showing a similar trend to the means.

Range: The range of scores in the experimental group is 34, and in the control group, it is 35, indicating the spread of scores within each group.

Variance and Standard Deviation: Variance measures the dispersion of scores around the mean, with 76.05 for the experimental group and 72.079 for the control group. Standard deviation, which is the square root of variance, shows the average amount of variation or dispersion of scores around the mean, with 8.72 for the experimental group and 8.347 for the control group.

Observations: Both groups consist of 30 participants each.

Test Statistics:

Pooled Variance: The pooled variance, calculated as 74.065, is used in the t-test formula assuming equal variances.

Hypothesized Mean Difference: The hypothesized mean difference is set to 0, assuming no difference in academic achievement between the two groups.

Degrees of Freedom (df): Degrees of freedom are 58, indicating the number of independent observations used to calculate the t-test.

T Value: The calculated t-value is 2.618, which indicates the difference in means between the two groups relative to the variation within the groups. A higher t-value suggests a greater difference between the groups.

P-Values: The one-tailed and two-tailed p-values are reported as 0.006 and 0.011, respectively. These p-values indicated the probability of obtaining the observed difference in means (or more extreme) if there were no true difference between the groups. A p-value of less than 0.05 is typically considered statistically significant, suggesting that there is a significant difference in academic achievement between the experimental and control groups.

Interpretation:

Based on the results of the t-test, there is a statistically significant difference in academic achievement scores between the experimental group (using technology) and the control group (not using technology). The experimental group shows higher mean scores compared to the control group, with a t-value of 2.618 and a two-tailed p-value of 0.011. This indicated that the use of technology has a positive impact on academic achievement among hearing-impaired children in this study. Therefore, it is inferred that integrating technology into educational practices for hearing-impaired students contributes to improved academic outcomes compared to traditional methods alone.

H_{02}: There were no significant difference in language acquisition skills between hearing-impaired children using technology (experimental group) and those not using technology (control group).

Table 4.4: Showing the Frequency Distribution of Experimental Group of Hearing Impaired Children Based on Language Acquisition Skill with the help of Technology

Scores	46-50	41-45	36-40	31-35	26-30	21-25	16-20	11-15
Frequency	1	3	7	6	6	4	2	1

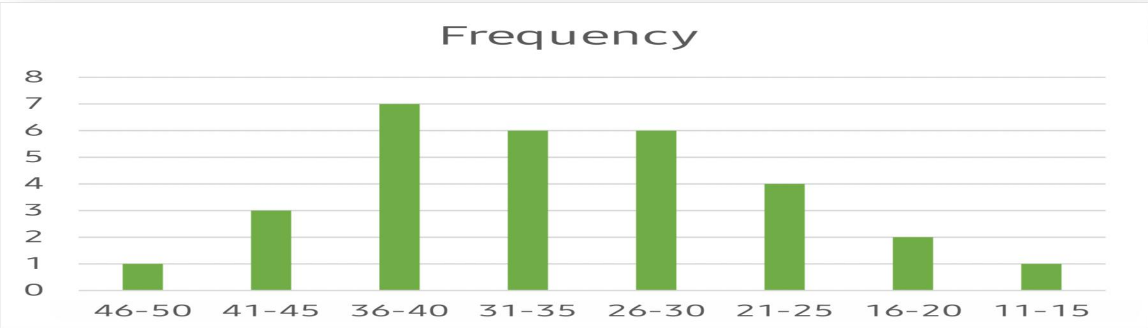

Figure 4.3: The Graphical Representation of Experimental Group of Hearing Impaired Children Based on Language Acquisition Skill with the help of Technology

Table 4.4 and figure 4.3 provided a detailed frequency distribution of language acquisition skill scores among the experimental group of hearing-impaired children using technology. The table categorizes scores into eight intervals ranging from 11 to 50, with each interval representing the range of scores achieved by students. The highest frequency of scores falls within the range of 31-35, where six students scored within this interval. This suggests a concentration of language acquisition skills around this score range among the experimental group. Conversely, the lowest frequencies are observed at the extremes—scores of 11-15 and 46-50—with only one student scoring in each of these intervals. The distribution indicated a generally balanced spread across the middle ranges (21-40), implying variability in language acquisition skills among the students using technology. Such a distribution provided insights into the overall proficiency levels within the experimental group and underscored the potential impacts of technology on enhancing language acquisition outcomes among hearing-impaired children, highlighting areas where further support or interventions may be beneficial.

Table No.4.5. Showing the Frequency Distribution of Control Group of Hearing Impaired Children Based on Language Acquisition Skill without the Use of Technology

Scores	46-50	41-45	36-40	31-35	26-30	21-25	16-20	11-15
Frequency	1	1	2	4	6	8	5	3

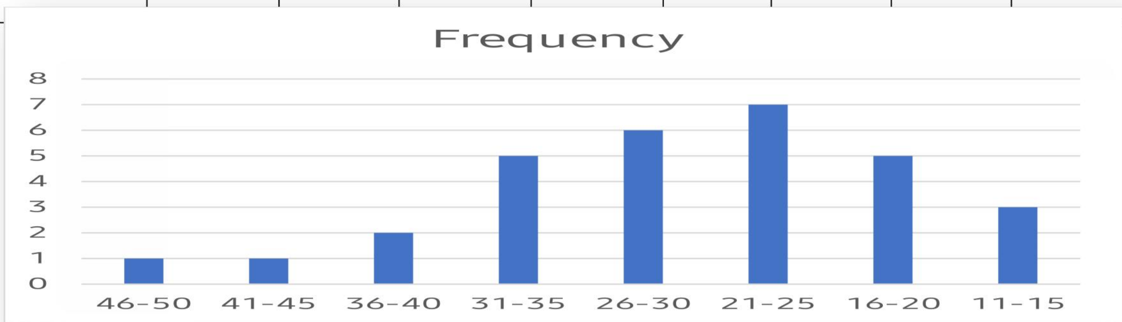

Figure 4.4: The Graphical Representation of Control Group of Hearing Impaired Children Based on Language Acquisition Skill without the Use of Technology

Table 4.5 and figure 4.4 presented the frequency distribution of language acquisition skill scores among the control group of hearing-impaired children who do not use technology. The table categorizes scores into eight intervals ranging from 11 to 50, representing the range of scores achieved by students in the control group. The highest frequency of scores observed in the range of 21-25, with eight students scoring within this interval. This suggested a concentration of language acquisition skills around this mid-range among the control group. conversely, the lowest frequencies are found at the extremes—scores of 46-50 and 11-15—with only one student scoring in each of these intervals. The distribution shows a spread across the middle ranges (21-40), indicating variability in language acquisition skills among the students who do not use technology. Comparing this distribution with table 4.4, which showed the experimental group using technology, highlights potential differences in language acquisition skill patterns between the two groups. Such comparisons provide insights into the potential impact of technology on language acquisition skills and underscore areas where technological interventions play a crucial role in supporting the educational needs of hearing-impaired children, particularly in enhancing language development outcomes.

Table 4.6. The Independent t test between the Groups in Respect of Language Acquisition Skill

t-Test: Two Sample Equal Variances Assumed		
Descriptives	**Experimental Group**	**Control Group**
Mean	32.4	24.93
Median	32.5	23.5
Range	34	35
Variance	67.5	73.513
Observation	30	30
Standard deviation	8.215	8.574
Pooled Variance	70.425	
Hypothesized Mean Difference	0	
Df	58	
T Value	3.446	
P-Value at one-tail	0.0005	
P-Value at two-tail	0.0011	

Table 4.6 presented the results of an independent t-test conducted to compare the language acquisition skills between the experimental group (hearing-impaired children using technology) and the control group (hearing-impaired children not using technology). The t-test assumes equal variances between the two groups.

Descriptive Statistics:

Mean: The mean language acquisition skill score for the experimental group is 32.4, while for the control group, it is 24.93. This indicates that, on average, the experimental group has higher language acquisition skills compared to the control group.

Median: The median scores (32.5 for the experimental group and 23.5 for the control group) represent the central tendencies of the scores, showing a similar trend to the means.

Range: Both groups have a range of 34, indicating the spread of scores within each group.

Variance and Standard Deviation: Variance measures the dispersion of scores around the mean, with 67.5 for the experimental group and 73.513 for the control group. Standard deviation, the square root of variance, shows the average amount of variation or dispersion of scores around the mean, with 8.215 for the experimental group and 8.574 for the control group.

Observations: Both groups consist of 30 participants each.

Test Statistics:

Pooled Variance: The pooled variance, calculated as 70.425, is used in the t-test formula assuming equal variances.

Hypothesized Mean Difference: The hypothesized mean difference is set to 0, assuming no difference in language acquisition skills between the two groups.

Degrees of Freedom (df): Degrees of freedom are 58, indicating the number of independent observations used to calculate the t-test.

T Value: The calculated t-value is 3.446, indicating the difference in means between the two groups relative to the variation within the groups. A higher t-value suggests a greater difference between the groups.

P-Values: The one-tailed and two-tailed p-values are reported as 0.0005 and 0.0011, respectively. These p-values indicate the probability of obtaining the observed difference in means (or more extreme) if there were no true difference between the groups. A p-value of less than 0.05 is typically considered statistically significant, suggesting that there is a significant difference in language acquisition skills between the experimental and control groups.

Interpretation:

Based on the results of the t-test, there is a statistically significant difference in language acquisition skills between the experimental group (using technology) and the control group (not using technology). The experimental group shows significantly higher mean scores compared to the control group, with a t-value of 3.446 and a two-tailed p-value of 0.0011. This indicates that the use of technology has a positive impact on language acquisition skills among hearing-impaired children in this study. Therefore, it can be inferred that integrating technology into educational practices enhances language acquisition outcomes compared to

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

traditional methods alone, highlighting the potential benefits of technological interventions in supporting the educational needs of hearing-impaired students.

H_{03}: There were no significant difference in the ability to maintain attention during lessons between hearing-impaired children using technology (experimental group) and those not using technology (control group).

Table 4.7: Showing the Frequency Distribution of Experimental Group of Hearing Impaired Children Based on Ability to Maintain Attention with the Help of Technology

Scores	46-50	41-45	36-40	31-35	26-30	21-25	16-20	11-15
Freq								

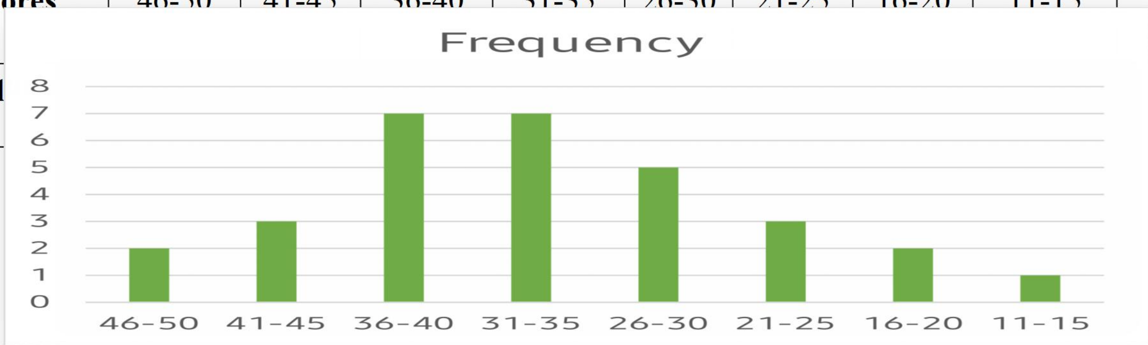

Figure 4.5: The Graphical Representation of Experimental Group of Hearing Impaired Children Based on Ability to Maintain Attention with the Help of Technology

Table 4.7 and figure 4.5 provided a comprehensive frequency distribution of scores representing the ability to maintain attention among the experimental group of hearing-impaired children using technology. The table categorizes scores into eight intervals, ranging from 11 to 50, each depicting the range of scores achieved by the students. The distribution reveals that the highest frequency of scores is observed within the range of 31-35, with seven students achieving scores in this interval. This concentration suggests that a significant portion of the experimental group demonstrates strong attention maintenance skills. Conversely, the lowest frequencies are noted at the extremes—scores of 11-15 and 46-50—with only one student scoring in each of these intervals. The distribution demonstrates a

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

balanced spread across the middle ranges (21-40), indicating variability in attention maintenance skills among the students benefiting from technology. Such insights underscored the potential impact of technological interventions in enhancing attention-related outcomes for hearing-impaired children, highlighting areas where further support or targeted interventions may be beneficial to optimize educational experiences and outcomes.

Table 4.8: Showing the Frequency Distribution of Control Group of Hearing Impaired Children Based on Ability to Maintain Attention with the Help of Technology

Scores	46-50	41-45	36-40	31-35	26-30	21-25	16-20	11-15
Fr								

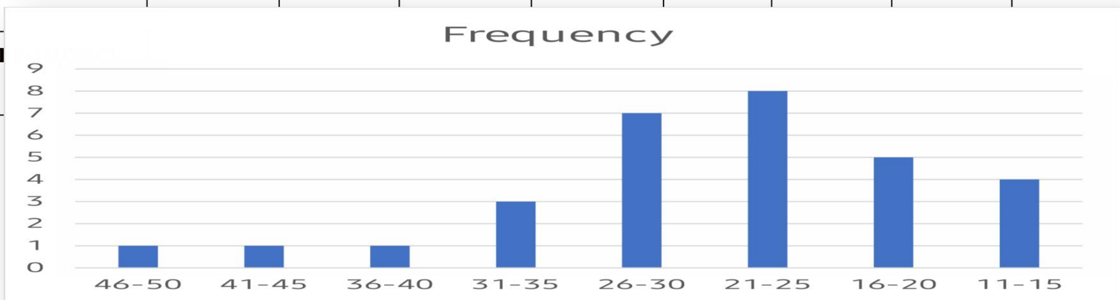

Figure 4.6: The Graphical Representation of Control Group of Hearing Impaired Children Based on Ability to Maintain Attention without the Use of Technology

Table 4.8 and figure 4.6 presented the frequency distribution of scores representing the ability to maintain attention among the control group of hearing-impaired children who do not use technology. The table categorizes scores into eight intervals, ranging from 11 to 50, each reflecting the range of scores achieved by the students in the control group. The distribution shows that the highest frequency of scores falls within the range of 21-25, with eight students scoring in this interval. This concentration indicated that a significant portion of the control group demonstrates moderate attention maintenance skills within this range. Conversely, the lowest frequencies are observed at the extremes—scores of 46-50 and 11-15—with only one student scoring in each of these intervals. The distribution reveals a spread across the middle ranges (21-40), suggesting variability in attention maintenance skills among the students who do not use technology. Comparing this distribution with Table 4.7, which showed the experimental group using technology, highlights potential differences in attention maintenance skill patterns between the two groups. These insights underscored the potential impact of technology on enhancing attention-related outcomes for hearing-impaired children, emphasizing the role of targeted interventions in supporting attention skills in educational settings.

Table 4.9. The Independent t test between the Groups in Respect of Ability to Maintain Attention

t-Test: Two Sample Equal Variances Assumed		
Descriptives	**Experimental Group**	**Control Group**
Mean	33.5	23.833
Median	34	23
Range	34	35
Variance	71.5	69.868
Observation	30	30
Standard deviation	8.456	8.359
Pooled Variance	70.731	
Hypothesized Mean Difference	0	
Df	58	
T Value	4.4531	
P-Value at one-tail	0.00001955	
P-Value at two-tail	0.00003911	

Table 4.9 presented the results of an independent t-test conducted to compare the ability to maintain attention between the experimental group (hearing-impaired children using technology) and the control group (hearing-impaired children not using technology). the t-test assumes equal variances between the two groups.

Descriptive Statistics:

Mean: The mean scores for the experimental group is 33.5, while for the control group, it is 23.833. This indicated that, on average, the experimental group has higher scores in the ability to maintain attention compared to the control group.

Median: the median scores (34 for the experimental group and 23 for the control group) show the central tendencies of the scores, aligning closely with the means.

Range: both groups have a range of 34 and 35, respectively, indicating the spread of scores within each group.

Variance and Standard Deviation: variance measures the dispersion of scores around the mean, with 71.5 for the experimental group and 69.868 for the control group. standard deviation, the square root of variance, indicates the average amount of variation or dispersion of scores around the mean, with 8.456 for the experimental group and 8.359 for the control group.

Observations: both groups consist of 30 participants each.

Test statistics:

Pooled Variance: the pooled variance, calculated as 70.731, is used in the t-test formula assuming equal variances.

Hypothesized Mean Difference: the hypothesized mean difference is set to 0, assuming no difference in the ability to maintain attention between the two groups.

Degrees of freedom (df): degrees of freedom are 58, indicating the number of independent observations used to calculate the t-test.

T value: the calculated t-value is 4.4531, indicating the difference in means between the two groups relative to the variation within the groups. a higher t-value suggests a greater difference between the groups.

P-values: the one-tailed and two-tailed p-values are reported as 0.00001955 and 0.00003911, respectively. These p-values indicate the probability of obtaining the observed difference in means (or more extreme) if there were no true difference between the groups. a p-value of less than 0.05 is typically considered statistically significant, suggesting that there is a significant difference in the ability to maintain attention between the experimental and control groups.

Interpretation:

Based on the results of the t-test, there is a statistically significant difference in the ability to maintain attention between the experimental group (using technology) and the control group (not using technology). The experimental group shows significantly higher mean scores compared to the control group, with a t-value of 4.4531 and a two-tailed p-value of 0.00003911. This indicated that the use of technology has a positive impact on the ability to maintain attention among hearing-impaired children in this study. Therefore, it is inferred that integrating technology into educational practices enhances attention maintenance outcomes compared to traditional methods alone, underscoring the potential benefits of technological interventions in supporting the educational needs of hearing-impaired students.

SUGGESTIONS

Improving academic achievement among hearing-impaired students involves addressing both educational and technological needs. Here are some suggestions:

1. **Assistive Technology**: Integrate specialized assistive devices like hearing aids, FM systems, and cochlear implants tailored to individual needs to enhance auditory perception and communication skills.
2. **Accessible Learning Materials**: Ensure learning materials, including textbooks and online resources, are accessible in formats such as captions, transcripts, and visual aids to support diverse learning styles.
3. **Classroom Modifications**: Implement classroom accommodations such as preferential seating, reduced background noise, and visual cues to optimize learning environments for hearing-impaired students.
4. **Teacher Training**: Provide ongoing professional development for educators on strategies for inclusive teaching, effective communication methods, and utilization of assistive technologies.
5. **Peer Support Programs**: Establish peer mentoring or support groups where hearing-impaired students can collaborate, share experiences, and receive academic assistance from peers.
6. **Language and Communication Skills**: Offer specialized instruction in speech therapy, sign language, and oral communication to enhance language acquisition and communication proficiency.
7. **Individualized Education Plans (IEPs)**: Develop and implement IEPs that outline specific academic goals, accommodations, and support services tailored to the unique needs of each hearing-impaired student.
8. **Parental Involvement**: Foster partnerships with parents or guardians to ensure continuous support at home and school, including reinforcement of learning strategies and advocacy for educational needs.
9. **Technological Integration**: Utilize educational technologies such as learning management systems, adaptive learning software, and speech-to-text tools to facilitate independent learning and academic progress.

ISSN 2581-7795

10. **Cultural Sensitivity**: Promote cultural awareness and sensitivity among school staff and peers to create an inclusive and supportive learning environment for hearing-impaired students.

REFERENCES

- Albertini, J. A., Kelly, R. R., & Matchett, M. K. (2012). Personal factors that influence deaf college students' academic success. *Journal of deaf studies and deaf education*, *17*(1), 85-101.
- Antia, S. D., Jones, P. B., Reed, S., & Kreimeyer, K. H. (2009). Academic status and progress of deaf and hard-of-hearing students in general education classrooms. *Journal of deaf studies and deaf education*, *14*(3), 293-311.
- Birch, H. G., & Belmont, L. (1965). Auditory-visual integration, intelligence and reading ability in school children. *Perceptual and motor skills*, *20*(1), 295-305.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & education*, *59*(2), 423-435.
- Gori, M., Cappagli, G., Tonelli, A., Baud-Bovy, G., & Finocchietti, S. (2016). Devices for visually impaired people: High technological devices with low user acceptance and no adaptability for children. *Neuroscience & Biobehavioral Reviews*, *69*, 79-88.
- Hasselbring, T. S., & Glaser, C. H. W. (2000). Use of computer technology to help students with special needs. *The future of children*, 102-122.
- Lederberg, A. R., Schick, B., & Spencer, P. E. (2013). Language and literacy development of deaf and hard-of-hearing children: successes and challenges. *Developmental psychology*, *49*(1), 15.

- Lu, S. J., & Liu, Y. C. (2015). Integrating augmented reality technology to enhance children's learning in marine education. *Environmental Education Research*, *21*(4), 525-541.
- Murithi, S. B. (2022). *Utilization of Assistive Technology in Improving Academic Performance in Primary Schools for Learners with Hearing Challenges in Meru and Tharaka Nithi Counties, Kenya* (Doctoral dissertation, KeMU).
- Rekkedal, A. M. (2012). Assistive hearing technologies among students with hearing impairment: Factors that promote satisfaction. *Journal of deaf studies and deaf education*, *17*(4), 499-517.
- Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The future of children*, 76-101.
- Spencer, P. E., & Marschark, M. (2010). *Evidence-based practice in educating deaf and hard-of-hearing students*. Oxford University Press.
- Wagner, M., Newman, L., Cameto, R., & Levine, P. (2006). The Academic Achievement and Functional Performance of Youth with Disabilities. A Report from the National Longitudinal Transition Study-2 (NLTS2). NCSER 2006-3000. *Online Submission*.
- Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. *Review of research in education*, *34*(1), 179-225.
- Yoshinaga-Itano, C. (2003). From screening to early identification and intervention: Discovering predictors to successful outcomes for children with significant hearing loss. *Journal of deaf studies and deaf education*, *8*(1), 11-30.