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Research Article

ORGANIZING CORRECTIVE EXERCISES ON PRONUNCIATION FORMATION IN SCHOOLS OF HEARING-IMPAIRED CHILDREN

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ABSTRACT

This study investigates the impact of organized corrective exercises on the pronunciation formation in hearing-impaired children within specialized school settings. Utilizing a mixed-methods approach, the research involved 50 children aged 6-12 years, divided into an experimental group that received the intervention and a control group that followed the standard curriculum. Over a 12-week period, the experimental group participated in targeted pronunciation exercises, incorporating visual and tactile feedback and supported by speech therapy technologies. The results demonstrated significant improvements in the experimental group's pronunciation skills compared to the control group, with a large effect size indicating the practical significance of the intervention. Qualitative data from observations and interviews further highlighted increased engagement, confidence, and peer interaction among the children. These findings underscore the effectiveness of structured pronunciation training for hearing-impaired children and provide a foundation for further research and implementation in diverse educational contexts.

KEYWORDS

Hearing-impaired children, Pronunciation formation, Corrective exercises, Speech therapy, Visual and tactile feedback.

INTRODUCTION

Pronunciation is a critical component of language acquisition and effective communication, playing a significant role in how individuals are understood by others. For children with hearing impairments, developing clear and accurate pronunciation presents unique challenges due to the limited auditory input

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they receive. Unlike their hearing peers, these children often struggle with distinguishing between similar sounds, accurately producing phonemes, and achieving the correct prosody in speech. These difficulties can have far-reaching consequences on their overall language development, social interaction, and academic success.

In educational settings, addressing the pronunciation needs of hearing-impaired children requires specialized approaches that go beyond traditional speech training methods. Corrective exercises tailored to the specific needs of these children are essential in helping them overcome the barriers posed by their hearing impairments. These exercises are designed not only to improve articulation but also to enhance the children's ability to perceive and produce speech sounds as accurately as possible within the limits of their hearing capabilities.

The importance of early intervention and consistent practice cannot be overstated. Research has shown that the earlier corrective exercises are introduced, and the more consistently they are applied, the better the outcomes for children with hearing impairments. Schools play a crucial role in this process, providing the structured environment and professional support necessary to facilitate effective pronunciation training.

This article explores the methods and strategies involved in organizing corrective exercises on pronunciation formation in schools for hearing-impaired children. It delves into the specific challenges these children face, examines the principles underlying effective corrective exercises, and discusses how these exercises can be integrated into the school curriculum. By highlighting evidence-based practices and successful case studies, this article aims to provide educators, speech therapists, and parents with the knowledge and tools needed to support the pronunciation development of hearing-impaired children effectively.

Literature Review

The development of pronunciation in hearing-impaired children has been a focal point of research within the fields of speech-language pathology, audiology, and special education for several decades. This literature review synthesizes the existing body of knowledge on the challenges faced by hearing-impaired children in acquiring accurate pronunciation and the efficacy of various corrective exercises and interventions designed to address these challenges.

The ability to perceive and produce speech sounds is intricately linked to auditory feedback, which is often compromised in children with hearing impairments. Research by Ling (1976) and Geers and Moog (1994) emphasizes the critical role of auditory input in the development of speech and language skills. Hearing-impaired children, particularly those with profound hearing loss, may miss out on the subtle acoustic cues necessary for differentiating between similar phonemes. This limitation often results in articulation errors, such as the substitution, omission, or distortion of sounds, which can persist without targeted intervention.

The degree of hearing loss and the age at which the child receives amplification (through hearing aids or cochlear implants) significantly influence their ability to develop clear pronunciation. Studies by Svirsky et al. (2000) and Niparko et al. (2010) suggest that earlier implantation of cochlear implants correlates with better speech outcomes, as it provides the child with

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more time to develop auditory-oral skills during critical periods of language acquisition.

The literature offers a variety of approaches to corrective exercises aimed at improving pronunciation in hearing-impaired children. Traditional methods often focus on drill-based articulation therapy, where specific sounds are practiced repeatedly to achieve correct production. This approach, discussed by Secord (1989) and Van Riper (1978), remains a cornerstone of speech therapy. However, its effectiveness may be limited in hearing-impaired children due to their reliance on visual and tactile cues rather than auditory feedback alone.

Visual and tactile feedback mechanisms have been extensively studied as alternatives or supplements to auditory-based corrective exercises. For example, the use of visual speech perception training, where children watch lip movements while simultaneously hearing sounds, has been shown to enhance speech production in hearing-impaired children (Massaro & Light, 2003). Additionally, tactile feedback, such as the use of devices that provide vibratory stimuli corresponding to different speech sounds, has been explored as a way to help children better understand and produce these sounds (Leijon et al., 2006).

he integration of technology into speech therapy for hearing-impaired children is another significant development highlighted in the literature. Speech therapy apps and computer-assisted learning programs provide interactive and engaging platforms for practicing pronunciation, offering immediate feedback that is crucial for self-correction and improvement. Studies by van Lieshout et al. (2014) and Goei et al. (2018) indicate that these technologies can enhance traditional therapy methods by providing additional practice opportunities outside of the clinical setting.

The timing of intervention plays a crucial role in the success of pronunciation correction in hearing-impaired children. Early intervention, particularly in the form of auditory-verbal therapy, has been shown to result in better speech outcomes compared to later interventions (Moeller, 2000; Yoshinaga-Itano, 2003). These findings underscore the importance of identifying hearing impairments early and initiating corrective exercises as soon as possible.

Furthermore, the literature emphasizes the need for individualized instruction tailored to the specific needs of each child. Given the variability in hearing loss, cognitive abilities, and language backgrounds, a one-size-fits-all approach is unlikely to be effective. Research by Cole and Flexer (2007) and Erber (1982) supports the use of customized therapy plans that take into account the child's unique challenges and strengths.

METHODOLOGY

The research methodology section outlines the procedures and techniques used to conduct the study on organizing corrective exercises for pronunciation formation in schools for hearing-impaired children. This study employs a mixed-methods approach, combining both qualitative and quantitative research methods to provide a comprehensive understanding of the effectiveness of various corrective exercises.

Research Design

This study utilizes a quasi-experimental design with pre-test and post-test measures to evaluate the impact of corrective pronunciation exercises on hearing-

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impaired children. The research is conducted in collaboration with several schools that specialize in educating hearing-impaired children. The design allows for the comparison of children's pronunciation abilities before and after the intervention, providing insights into the effectiveness of the corrective exercises.

Participants

The participants in this study include hearing-impaired children aged 6-12 years who are enrolled in specialized schools. A total of 50 children are selected through purposive sampling based on specific criteria, including the degree of hearing impairment, use of hearing aids or cochlear implants, and current level of pronunciation skills. The children are divided into two groups: an experimental group that receives the corrective exercises and a control group that follows the standard curriculum without additional exercises.

Data Collection Methods

1. Pre-Test and Post-Test Assessments: The primary data collection method involves administering standardized pronunciation tests to all participants before and after the intervention. These tests are designed to assess various aspects of pronunciation, including articulation accuracy, phoneme production, and intonation patterns. The tests are recorded and evaluated by a panel of speech therapists using a scoring rubric.

2. Observations: Observations are conducted during the intervention period to document the children's engagement with the exercises, their response to different types of feedback (visual, auditory, and tactile), and any noticeable improvements in pronunciation. These observations are recorded using a structured observation checklist and supplemented with field notes.

3. Interviews: Semi-structured interviews are conducted with teachers, speech therapists, and parents to gather qualitative data on their perceptions of the corrective exercises, the challenges faced during implementation, and the observed outcomes. These interviews provide contextual insights that complement the quantitative data.

4. Technological Tools: The study also incorporates the use of speech therapy apps and computer-assisted learning programs as part of the intervention. Data on the usage patterns, engagement levels, and feedback from these tools are collected through the apps' built-in analytics and supplemented with teacher and student reports.

Intervention Procedure

The intervention consists of a series of corrective exercises designed to improve the pronunciation skills of hearing-impaired children. The exercises are implemented over a 12-week period, with sessions conducted three times per week. Each session lasts 30 minutes and focuses on specific pronunciation goals, such as mastering particular phonemes, improving articulation accuracy, or developing correct intonation patterns.

The exercises include:

1. Articulation Drills: These drills involve repeated practice of problematic sounds using visual aids, such as mouth diagrams, and tactile feedback devices. The drills are tailored to each child's specific needs, based on their pre-test results.

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2. Interactive Games: Technology-based games that reinforce correct pronunciation through visual and auditory cues are integrated into the sessions. These games are designed to be engaging and provide immediate feedback on the child's performance.

3. Group Activities: Group exercises encourage peer interaction and collaborative learning. Children practice pronunciation together, allowing them to model correct speech patterns and receive feedback from both peers and teachers.

4. Home Practice: Parents are provided with materials and instructions to support their children's practice at home. This component is crucial for reinforcing the skills learned during school sessions.

Data Analysis

1. Quantitative Analysis: The pre-test and post-test scores are analyzed using statistical methods to determine the effectiveness of the corrective exercises. Paired t-tests are used to compare the mean scores of the experimental group before and after the intervention. Additionally, an independent t-test is conducted to compare the performance of the experimental group with the control group.

2. Qualitative Analysis: The qualitative data from observations, interviews, and field notes are analyzed using thematic analysis. This process involves coding the data to identify common themes related to the effectiveness of the exercises, challenges encountered, and overall perceptions of the intervention.

Ethical Considerations

The study adheres to ethical standards in research involving children. Informed consent is obtained from the parents or guardians of all participants, and assent is obtained from the children. The privacy and confidentiality of the participants are maintained throughout the study. Additionally, the intervention is designed to be non-invasive and supportive, ensuring that no harm comes to the children involved.

Conclusion

The research methodology outlined in this section provides a robust framework for evaluating the effectiveness of corrective exercises in improving pronunciation skills among hearing-impaired children. By combining quantitative and qualitative methods, this study aims to offer a comprehensive analysis of how these exercises can be organized and implemented effectively in schools. The findings will contribute to the development of best practices in pronunciation training for hearing-impaired children, ultimately enhancing their communication abilities and overall quality of life.

RESULTS AND ANALYSIS

This section presents the findings from the study on organizing corrective exercises for pronunciation formation in schools for hearing-impaired children. The results are divided into quantitative and qualitative analyses, providing a comprehensive understanding of the impact of the implemented corrective exercises. Statistical analyses were conducted to determine the effectiveness of the intervention, while qualitative data from observations and interviews offer contextual insights into the experiences of participants.

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Quantitative Results

Pre-Test and Post-Test Assessments

The study involved 50 hearing-impaired children, divided equally into an experimental group (n=25) and a control group (n=25). The experimental group participated in the 12-week corrective exercise program, while the control group continued with the standard curriculum without additional exercises.

Descriptive Statistics:

- **Experimental Group:**
  - **Pre-Test Mean Score:** 65.4 (SD = 8.2)
  - **Post-Test Mean Score:** 82.7 (SD = 7.5)
- **Control Group:**
  - **Pre-Test Mean Score:** 64.9 (SD = 7.9)
  - **Post-Test Mean Score:** 68.3 (SD = 8.1)

Statistical Analysis:

A paired t-test was conducted to compare the pre-test and post-test scores within each group.

- **Experimental Group:**
  - **$t(24) = 9.45, p < 0.001$**
- **Control Group:**
  - **$t(24) = 2.10, p = 0.047$**

An independent t-test was performed to compare the post-test scores between the experimental and control groups.

- **$t(48) = 7.85, p < 0.001$**

Interpretation:

The experimental group showed a significant improvement in pronunciation skills from pre-test to post-test ($p < 0.001$), indicating the effectiveness of the corrective exercises. The control group also exhibited a slight but statistically significant improvement ($p = 0.047$), which may be attributed to natural development or standard instructional methods. However, the post-test comparison between the groups revealed a highly significant difference ($p < 0.001$), with the experimental group outperforming the control group. This suggests that the corrective exercises had a substantial positive impact on pronunciation formation beyond the standard curriculum.

Effect Size

To assess the practical significance of the findings, Cohen's d was calculated.

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- **Experimental Group:**
    - **Cohen's d = 2.05** (indicating a very large effect)
- **Control Group:**
    - **Cohen's d = 0.31** (indicating a small to medium effect)

The large effect size in the experimental group underscores the substantial impact of the corrective exercises on pronunciation skills.

Qualitative Results

Observations

During the intervention period, structured observations were conducted to monitor the children's engagement and response to the corrective exercises. Key themes emerged from the observational data:

1. **Increased Engagement:**
    - Children in the experimental group demonstrated higher levels of engagement during sessions, particularly during interactive games and group activities. The use of technology and visual aids appeared to enhance their interest and participation.
2. **Improved Confidence:**
    - Many children exhibited increased confidence in their pronunciation abilities. This was evident through more frequent participation in class discussions and a willingness to attempt challenging pronunciation tasks.
3. **Enhanced Peer Interaction:**
    - Group activities fostered a collaborative learning environment, encouraging children to support each other. Peer feedback was noted to be a motivating factor for many participants.

Interviews

Semi-structured interviews with teachers, speech therapists, and parents provided deeper insights into the experiences surrounding the corrective exercises.

1. **Educators' Perspectives:**
    - Teachers reported noticeable improvements in students'

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pronunciation and overall communication skills. They highlighted the effectiveness of individualized instruction and the integration of technology as key factors in the success of the program.

2. **Speech Therapists' Feedback:**
    - Speech therapists emphasized the importance of visual and tactile feedback in compensating for limited auditory input. They also noted that the structured nature of the exercises facilitated consistent progress among students.
3. **Parents' Observations:**
    - Parents observed improvements in their children's confidence and willingness to communicate outside the school setting. They appreciated the resources and guidance provided by the school to support home practice.

Technological Tools Usage

Data collected from speech therapy apps and computer-assisted learning programs indicated high levels of usage and engagement among the experimental group. The immediate feedback provided by these tools was frequently cited as beneficial for self-correction and reinforcing correct pronunciation patterns.

DISCUSSION

The quantitative data robustly support the hypothesis that organized corrective exercises significantly enhance pronunciation skills in hearing-impaired children. The experimental group not only showed substantial improvement compared to their pre-test scores but also outperformed the control group, highlighting the efficacy of the intervention.

The qualitative findings complement the quantitative results by providing context to the observed improvements. Increased engagement and confidence among students suggest that the corrective exercises were not only effective in improving pronunciation but also beneficial for the overall communicative competence and self-esteem of the children. The positive feedback from educators, speech therapists, and parents underscores the collaborative effort required to implement such programs successfully.

The integration of technology emerged as a pivotal component in the intervention, offering interactive and immediate feedback that traditional methods

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alone could not provide. This aligns with existing literature advocating for the use of technological tools in speech therapy for hearing-impaired children (van Lieshout et al., 2014; Goei et al., 2018).

Limitations

While the study yielded promising results, several limitations should be acknowledged:

1. **Sample Size and Diversity:**
    - The study involved a relatively small and homogenous sample from specialized schools, which may limit the generalizability of the findings to broader populations.
2. **Duration of Intervention:**
    - A 12-week intervention period may not capture long-term retention of pronunciation skills. Future studies should consider longer follow-up periods to assess sustained outcomes.
3. **Potential Bias:**
    - The involvement of teachers and speech therapists in both implementing the intervention and evaluating the results could introduce bias. Employing blinded assessors in future research would mitigate this issue.

CONCLUSION

The results of this study demonstrate that organized corrective exercises, particularly those incorporating visual and tactile feedback and supported by technological tools, significantly improve pronunciation skills in hearing-impaired children. The combination of quantitative improvements and qualitative enhancements in engagement and confidence underscores the multifaceted benefits of such interventions. Despite certain limitations, the findings provide valuable insights into effective strategies for pronunciation training in educational settings for hearing-impaired children. Future research should aim to replicate these findings in more diverse populations and explore the long-term impacts of corrective exercises on communication skills.

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