

Faculty's Awareness to the Situation of Students with Mild Hearing Loss in a Single School in a Large City in China

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Abstract: Plenty of research has shown that noisy environment has significant impact on children's speech recognition, especially on children with different degrees of hearing impairment. Modifications on the construction of classroom and improvement in study environment help assist children with MHL to perceive more information in class. Several research studies assessing environment of classrooms in normal schools which are for normal children and children with hearing loss in China have found that traffic noise, speech shape masking, babble noise and other typical noises around school sites impose negative impact on Chinese speech intelligibility of children in elementary school. By analyzing the result of a designed questionnaire, this research focused on the faculty's awareness to the situation of students with mild hearing loss in a single school in Wuhan, a large city in China in order to find possible measurements that can be taken by the faculty to improve the learning experience of students with hearing loss at school.

Keywords: children with hearing loss, teacher support, noisy environment

1. Introduction

Plenty of research has shown that noisy environment has significant impact on children's speech recognition, especially on children with different degrees of hearing impairment [1][2]. It is also noted by many studies that noise is one of the main problems that children with hearing loss confront when they study in school along with children with normal hearing (NH) in classroom [3]. Particularly, children with mild or minimal hearing loss (MHL) show poorer performance than children with NH in class. Previous research has shown that the performance decrement between the two groups, which are children with NH and hearing impairment, increased as the listening environment became less favourable [3]. To reduce this decrement, modifications on the construction of classroom and improvement in study environment have been suggested to be made in order to assist children with MHL to perceive more information in class. For instance, studies showed that installing carpet on the floor and paying attention to proper classroom furniture arrangements would be beneficial [4]. Teachers are also offered with some possible measurements to be taken when teaching in a classroom so that children with MHL may have greater ability of speech recognition. Several teaching techniques, such as reducing the distance between the student and the teacher, using more pictures and graphics, and using frequency modulation (FM) system, have been proven to be favourable in teaching children with MHL [5].

While previous research has suggested multiple techniques to improve the classroom performance for children with MHL, more details should be taken into when trying to produce a better classroom's environment for children with MHL. It also important to investigate the degree of education and training received by school and teacher to help children with MHL by applying specific measurements like installing noise absorbing materials or using amplification during class.

Particularly, several research studies assessing environment of classrooms in normal schools which are for normal children and children with hearing loss in China have found that traffic noise, speech shape masking, babble noise and other typical noises around school sites impose negative impact on Chinese speech intelligibility of children in elementary school [6][7]. Some studies and investigations also offer possible suggestion about acoustical treatments. For instance, installing sound absorption materials on the ceiling of the classroom for control sound reverberation reduce different types of noises perceived in the classroom. Obvious improvement was found in grades 2, 4 and 6 students [8]. Since classrooms in urban areas of China tend to have a greater area to accommodate more students in each class [9], it is meaningful to have a review on China's classroom environment and provide specific modifications that may help children with MHL.

2. Methodology

The current project aims to assess the degree of training received by school and teacher about how to enhance the study experience of children with MHL in classroom, and to investigate whether children with MHL actually benefit from acoustical treatment in classroom. Specifically, the following aims will be addressed via questionnaires for both children with HL and teachers.

2.1. Study Participants

The target participant of this study will be the faculty in a single high school in Wuhan, China. Specifically, data will be collect from elementary schools in Wuhan. Participants include bilingual teachers teaching specific subjects at the school as well as the administrators in the school.

2.2. Questionnaire

To understand faculty's awareness to the situation of students with mild hearing loss, a questionnaire include 12 questions was designed and sent to all the faculties in the school through an email demonstrating the purpose of the questionnaire and the research. 32 results were collected in total.

3. Results

3.1. Potential Impact of This Study

Reflections from the results of questionnaires may provide appropriate information and methods about helping teachers to improve performance of children with MHL in class. Then, general proper classroom arrangement could also be provided.

3.2. Background Knowledge of Teachers

For the basic knowledge about hearing loss, 50% of our teachers were aware of different categories of hearing loss (HL), including sensory neural hearing loss (SHL) and conductive hearing loss (CHL). However, a smaller proportion of the teacher participants (i.e., 46.88%) realized the existence of more detailed types of hearing loss, i.e., mild or minimal hearing loss (MHL). This finding indicates that most teachers only had some basic knowledge about HL, which mostly comes from their common sense.

When our participants were asked to characterize a child with HL through their behaviors or symptoms, 65.63% of them indicated that limited or unclear speech, as well as asking for repetitions may signal hearing issues. It was even more obvious for teachers (87.5%) to undercover the hearing problem if students were not able to hear sounds such as the school bell or morning announcements. However, fewer teachers were aware that students not following the class (53.13%) and demonstrating learning problems (56.25%) may also experience HL. This shows that most of them fail to undercover the correlation between student's academic performance and their hearing.

3.3. Experience of Teachers

Based on the self-report experience, 3 out of 32 participants received special training in working with children with HL. Despite of this, 31.25% of these teachers have experience in teaching students with MHL in their classes. This finding emphasizes the materiality of providing all faculties with proper trainings to support students with HL, since the possibility of meeting a student with MHL is non-negligible.

For faculties, we found that most administrators (95%) considered this professional training as a significant task to be taken. On the other hand, only one of these administrators offers teachers with special training about how to support students with HL. This result suggests that although most administrators understand the significance of offering training, they may have difficulty in turning the thought into action. Consequently, support from society should also be granted to administrators for providing faculties with related training.

3.4. Teaching Techniques

Teaching techniques refer to those skills that can be applied in a class to improve the learning experience of a student with MHL. According to the result of the questionnaire, most teachers (87.10%) marked 4 or 5 for the techniques of making seating changes, so that students with MHL could sit closer to the front of the class. This showed a positive attitude toward the method to help students with MHL acoustically. The rest of the teachers also considered this measurement as an important technique. In addition, implementing a frequency modulation system in class is considered essential in favoring students with MHL in class, as 48.39% of participants rated a 5 for this option. The finding of this question illustrated a greater difference among administrators, since only 38.10% of the answerers ranked this measurement as 5. The difference between these two techniques may derive from the fact that the FM system is less familiar to teachers who are not professional in acoustics, although the mechanism of how an FM system functions has been briefly explained in the question. Instead, the utilization of visual aids, such as pictures and graphics, was more recognizable among teachers as a tool to improve the learning experience for students with MHL, as evidenced by 83.87% raters for 4 or 5.

3.5. Speech

Some typical speech techniques were taken into account as means to support students with MHL, too. Among them, directly facing a student when speaking (67.74%), as well as repetition or rephrasing information when needed (87.10%), were reckoned in feasible ways to favor students with HL in class. Employing different tones and rhythms when speaking during class was rated as 4 by 38.71% of participants, and the others rated it as 3 or 5 with the exception of 2 person. These findings suggest that most teachers understand the utility of implementing different speech techniques in class to improve the learning experience of students. From the pattern of these three scoring options, the manner of supporting students with MHL by applying speech techniques was recognized by most teachers. A technique with little usefulness, speaking louder "over the noise" when the classroom is

noisy, can also be recognized by 41.94% of the teachers, whereas only 19.35% of the participants chose 5 for this measurement. From the results of the usefulness of some common speech techniques, we can tell that since several of these techniques are applied by teachers even when there's no student with MHL present in class, most teachers developed a general understanding of the utility of these actions.

3.6. Classroom Environment

The setting and the surroundings of a classroom also affect the acoustic environment, which impacts the speech intelligibility of students with MHL in class directly. Guaranteeing the conditions of facilities in a classroom by regular check, with adding acoustical treatment, i.e., installing curtains, was recognizable in the reducing classroom noise level among administrators. This was revealed by the data that 71.43% of the administrators labeled these modifications as 4 or 5 to outline their significance. 80.95% of the administrators also chose 4 or 5 for diminishing noise inside the classroom through modifications including adding rubber caps to the bottoms of chairs. Most uniform agreement appeared on providing sound-absorbing surfaces, which received a 4 or 5 from 85.71% of the voters and none of the participants gave 1 to this modification. Equal percentage of administrators also considered having a consultant in the profession of acoustics as an effective measurement to support students with MHL better. Additionally, speech of students on the playground was the most frequent answer to the source of noise outside the classroom. This betokens that administrators have noticed the defect of the classroom environment in this school. Further measurements should be taken to lower the level of noise from the playground.

3.7. School Location

The site of a school plays an important role in determining the sources of major noises that could affect students having classes. 72.73% of the responders considered this school to be located in a residential area. However, noises of resident activities nearby were not nominated as the dominant source of noise to the school. On the other hand, it was mentioned only 10 times while traffic noise was mentioned 12 times, and speech of students on the playground was mentioned 17 times. 77.73% of the administrators described the school as being near a construction site, indicating that noises produced by the construction could be a source of noise to students in the school as well.

4. Discussion

4.1. Background Knowledge of Teachers

The feedback of our participants about basic knowledge of audiology suggested that most teachers' understanding of hearing loss only derived from their common sense, as the major categories of hearing loss were only heard of by half of our participants. This does not reflect the conclusion drawn from previous research very well [10], possibly because of the different roles of teachers in these surveys. Participants from the former were all working in school that the majority of students were healthy and did not have HL, different from teachers in the latter whose students were mostly deaf or experiencing HL.

From the judgement on a student having hearing loss within their behaviors, it can be found that most teachers only detect the possible existence of hearing problems from anomalies of students that are directly related to their listening. It should be realized that, however, hearing loss results in several aspects of inconvenience including students' study as well as their mental health [11]. The failure to the complete judgment of hearing loss may derive from the lack of sufficient and detailed knowledge about MHL. Hence, regular lessons by audiologist may be an opportunity for teachers to master more

basic audiological knowledge and enhance the quality of education for students with MHL as well [11][12].

4.2. Experience of Teachers

The experience of teaching a student with hearing loss is not rare among our responders. Nevertheless, the lack of professional training in audiology should be notified by both teachers and society. Although most administrators understand the significance of offering training, they may have difficulty in turning the thought into action, as only one administrator manage to offer training for teachers. This reflects that most teachers need acquisition for many perspectives of audiology in order to support students with HL, which is different from the result that a large part of teachers have obtained these knowledge in previous research [10]. This may be explained by the difference between teachers' working place. In this research, participants work in a private international school in which there's a lower chance to have a student with MHL than in a school where many teachers promote sign language to communicate students with hearing problems.

4.3. Teaching Techniques

Making seat changes was a common skill applied by teachers to support students with HL. Nonetheless, as an also efficient measurement to improve speech intelligibility, the usefulness of the FM system was less known among teachers. This corresponds to the great need in support of learning the FM system in another research [10]. Consequently, a solid background knowledge of audiology and HL should be obtained by teachers through regular training.

Implementing visual aids such as pictures, graphics and text labels in class is highly recommended by answerers. These visual aids are suggested to be used in class in order to benefit students with MHL [13]. This indicated the similarity of the learning requirement among students with normal hearing and MHL, showing that a variation in presentation would fasten students' attention to the class and the teacher, and guarantee that students can receive the information granted by teachers accurately.

4.4. Speech

Tools of speech that were regarded as serviceable techniques to strengthen the ability to absorb information in class of students showed a semblable trend in teaching techniques. Most teachers understand the effectiveness of implementing different speech techniques. However, a method with little utilization was mistaken to be useful by many teachers, that is, to speak louder over the noise. Previous research shows that intentionally shouting or yelling weakens speech comprehension [7]. This deviation between participants' understanding and the truth demonstrated that detailed knowledge of audiology was not mastered by most teachers. Hence, to fortify students' experience in class, more audiological information and suggestions for speech techniques should be provided to teachers. For example, teachers can rephrase with words central to the core idea of the class after students understand the statement to improve communication with students with MHL [7]. Much information is granted by American Speech-Language-Hearing Association and could be looked through by teachers systematically.

4.5. Classroom Environment

Reducing noise levels in the classroom employing adding acoustical treatment as well as insuring little noise is made by facilities was recommended by our administrators. This finding is consistent with previous research that found a significant effect of classroom noise reduction on child learning

outcome [11]. Another way to reduce sources of noise in the classroom is to add rubber caps [4]. These options received the highest rating, indicating that most teachers understood that various modifications to reduce noise by preventing the production of noise or eliminating noise during transit were substantial to support students with HL. Most administrators also recommended having an acoustical consultant for classroom settings. The results supported the proposal that appropriate measurements to improve classroom environment can be identified by the majority of our answerers. Nevertheless, our participants still need instruction from the professionals to put them into effect. Frequent reference to the speech of students on the playground as the major noises outline the significance of further monitoring and measurement to lower the level of noise from the playground.

4.6. School Location

Although the school is near a residential area, entertainment activities were not listed as the major source of noise. Instead, the speech of students on the playground and traffic noise were regarded as the main contributors to the classroom noise sources, which deviates from another research that reveal babble noise as the major problem [8]. The deviation may derive from the difference in location of the target school. Result from the questionnaire might suggest that comparing with being near an arterial road, a residential area is more suitable for a school to be located in. In addition, implementing acoustic treatment is an effective way improve the classroom environment [6]. Administrators should take more actions to reduce the noise level outside the classroom, and attention should be paid to the speech of students on the playground as well as the noise from the construction site.

5. Conclusion

The results of the questionnaire suggest the insufficient knowledge of faculty in a normal school in China on MHL, including the audiology knowledge as well as proper techniques to improve the acoustic condition for students with MHL. This elucidates the low degree of education received by the school and teachers to help students with MHL. The situation can be improved by providing more frequent and comprehensive training to faculties on audiology and appropriate treatments to students with HL. In refer to the large area of Chinese classroom, the significance of well-designed classroom setting and proper school location should also be emphasized, including the importance of installing noise-absorbed material.

6. Limitations and Future Directions

First, the questionnaire was only administered with a total number of 32 participants. The small sample size limits the reliability and generalizability of the results. Second, this questionnaire was distributed in one private school, which limits the insight of whether similar findings can be found in other school settings (i.e., public schools; special education schools). Finally, this questionnaire did not include other factors such as the size of the classroom and the average number of students in each class, which may differentially affect speech intelligibility. Therefore, future studies should replicate findings from the current study by increasing the sample size and collecting data from different school settings.

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