Inventory of Teachers’ Perceived Knowledge, Interest, and Practices: Classroom Acoustics

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Introduction

The typical classroom may not be providing the best environment for listening and learning due to poor acoustic characteristics. Important information may be lost because a deteriorated or weak speech signal reaches the learner. This lost information makes listening difficult and creates significant gaps in learning. Young learners are at risk for missing acoustic cues necessary to understand speech because they have not acquired mature language skills which allow them to fill in missing information (Nelson, & Soli; Smaldino & Candell). Older students may be at risk because information becomes increasingly complex. At-risk students are in double jeopardy because their listening or attending skills may already be weak.

Factors which have an effect on classroom acoustics include all types of background noise, teacher-student distance, and the types of surfaces comprising the walls, ceilings, and floors. Therefore, classrooms must be specially designed with transmitting an intact speech signal in mind (Siebein, et al.). Good classroom acoustics is related to well-designed direct and indirect or reflected speech signals that enhance rather than interfere with speech intelligibility (Berg, et al.; Siebein et al.). With good acoustics, important speech cues can be heard (Larsen & Blair). When a stronger more complete speech signal reaches the student under good acoustic conditions, many benefits may occur including: reduction in students requiring Level II Response to Intervention, reduction in student off-task behaviors, learning improvement in special needs populations, improvement in standardized test scores, improvement in school accountability ratings, and improvement in teacher vocal health (Berg, et al.; Larsen & Blair; Nelson & Soli; Smaldino & Candell).

By 1998, there has been substantial evidence that classroom acoustics requires modernization (U.S. Access Board). Recently, federal support from the U.S. House of Representatives has been realized with the passage of two pieces of legislation that include provisions which allow the schools to apply for grants to improve classroom acoustics. Both the 21st Century Green High-Performance Public Schools Facilities Act (H.R. 2187) and the Student Aid and Fiscal Responsibility Act of 2009 (H.R. 3231) are currently under consideration in Senate committees. With overwhelming evidence that classroom acoustics impact learning, this study was designed to provide information on teachers’ perception of their classrooms’ acoustical properties, and their knowledge, interest, and practices related to classroom acoustics and learning.

Method

A questionnaire was created composed of 20 statements that the participants were to rate using a five-point-interval Likert-type rating scale. Three statements requested the teacher rate classroom noise levels and their interest in acoustic modifications. Twelve questions assessed knowledge of acoustics and its impact on learning and listening. These 15 items were rated using a “strongly agree” to “strongly disagree” scale. Five questions assessed teachers’ perceived knowledge of classroom acoustics and legislation concerning acoustics using a five-point scale with qualifiers from “no knowledge” to “considerable knowledge”. The questionnaire also requested the teachers’ demographic information, the acoustic characteristics of their classroom, and their teaching style. The participants completing the questionnaire were 129 elementary and middle school teachers in three school districts in Northeast Mississippi.

Results

For teachers responding, 80% had been teaching over 6 years and 60% had been teaching over 10 years. Eighty percent of the teachers reported having little knowledge regarding the impact of classroom acoustics on learning. 87% reported little knowledge regarding acoustical barriers that existed in the regular classroom, 91% said that they had never experienced a classroom that had been specifically designed with acoustical provisions or an amplification system, and 95% reported that they had not obtained any written material or been in-service regarding classroom acoustics. The teachers reported little knowledge regarding the School Modernization Bill (94%) or grants that can assist in getting an amplification system for the classroom (93%).

Overall only 33% of the teachers rated their classrooms as noisy; however, 58% of the teachers reported having tired voices at the end of the day and 66% of the teachers said they lost their voices at least once a year. In fact, 49% of the teachers who reported that their classrooms were not noisy said their voice was tired by the end of the day. In addition, 81% of the teachers reported 3 or more sources of noise in their classrooms in addition to child activity noise. These findings suggest that teachers may not be aware of the noise levels in the classroom.

Fifty-nine percent of the teachers reported that they taught by either walking the aisles or from the front of the classroom, even though 60% of them believed that many children across a classroom from the teacher may receive low-level speech input, which would place those seated farthest away from the teacher at a learning disadvantage. In addition, 63% of the classrooms served at least two or more at-risk populations with 76% of them in K-4 classrooms where learners need good acoustics because they have the least developed skills for listening and learning.

Overall, the teachers were generally uninformed regarding the impact of acoustics on learning. For the 12 items designed to assess knowledge of acoustics and its impact on learning, the mean score for correct items was 52%. This general lack of awareness concerning acoustics may account somewhat for the finding that 76% said they never attempted to make modifications in their classrooms to improve acoustics, and less than half reported they would welcome an amplification system (40%) or acoustic modifications (26%). The lack of interest in making any acoustic improvements in over at least half of the teachers is interesting in light of the fact that 70% of the teachers agreed that improvements in classroom acoustics can reduce behavioral problems in the classroom, which most teachers know is not only an impediment to student learning, but is a common source of teacher burn-out.

Conclusions

Generally, teachers have little knowledge regarding classroom acoustics. Speech pathologists should consider in-services covering the effects of poor acoustics on student learning, at-risk students, teacher voice health, and the means for obtaining grants for amplification systems until designs for acoustical accommodations can be provided for classrooms.

Voice Disorders in the United States account for two sick days per year per teacher, costing $638 million each year for health care and substitute teachers.

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