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Why Do Students with Hearing Impairment Resist Wearing FM Amplification?

by

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Thesis

Submitted to the Department of Special Education of the College of Education

Eastern Michigan University

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for the degree of

MASTER OF ARTS

in

General Special Education

Thesis Committee:

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Dedication

One rarely sets out to achieve greater things without the support of loved ones and friends. I am grateful for the many thought-provoking conversations I shared with them as this project developed. This thesis is dedicated to all those who encouraged me. I am especially grateful to my mother, who always planted seeds of aspiration and motivation.

Abstract

The benefits of Frequency Modulation (FM) amplification usage among school-aged children is widely researched and established. The benefits provided from FM systems for students with a hearing impairment (HI) would suggest that consistent usage among these students would be high. However, interactions with various-aged HI students and their teachers have shown the opposite: there appears to be a lack of consistent usage. Previous research has looked at what influences people with a hearing loss not to wear their hearing aids. Research investigating reasons why FM systems are not used is limited. There are well-known benefits of FM usage among those with hearing loss. This leads to the question why those with hearing loss are not using their equipment consistently. This is the basis for the following qualitative research that surveys students with hearing impairments, their parents, and various staff to examine the phenomenon.

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Introduction

Background

Frequency modulation (FM) amplification has become increasingly used in classrooms to amplify the teacher's voice, increasing the signal-to-noise ratio and allowing students to focus on this important signal as opposed to other, less important, background sounds. Anderson & Goldstein (2004) explain that FM systems have also been beneficial addressing reverberation times that exist per ANSI recommendations for optimal listening environments conducive to learning in classrooms (as cited in ANSI, 2002). Younger students are particularly susceptible to difficulty hearing in less-than-ideal acoustical settings as their ability to decode and listen does not mature until they are age 15 (Smith, 2006). FM systems have been found helpful for multiple student population groups including students with special needs (Franks, 2006), English language learners (Nelson, Kohnert, Sabur & Shaw, 2005; Crandell 1996), and seemingly the most likely group of students to benefit from FM usage as it amplifies sound, those who have a hearing impairment (Franks, 2006).

Despite all of the supportive research documenting the beneficial results yielded from FM system use, there appears in actuality to be an inconsistency in its usage among students with a hearing impairment, who seem to have the most to gain from its use. Attempting to document how often FM systems are consistently used and why the use is at times sporadic will prove not to be an easy thing if one is limited to a review of the current literature alone. Research is needed to examine why students with a hearing impairment resist using their equipment. It would likely provide beneficial knowledge to

educators who could take the information learned and better encourage students and educators in overcoming these barriers, assisting students with a hearing impairment to gain better access to educational material.

Questions

Is there a correlation between the type or degree of hearing loss and the frequency of FM amplification usage? Is there a correlation between how adults feel about FM systems and how often students use their equipment? If students have negative feelings and opinions about FM amplification systems, do they use their equipment less often? Finding the answers to these questions might assist parents and educators to understand why students with a hearing impairment resist using their equipment, ultimately limiting their educational benefit by attending lessons without using FM amplification.

FM systems work using radio frequency, FCC-approved FM and UHF bands (Smith, 2006). Infrared technology also exists, but for the purposes of this study, the terms *FM* and *FM systems* will be used to describe the wireless transmitter and receiver units used in classrooms whether they are actually powered by infrared or FM technology. FM systems also may vary in style: soundfield, with one to four speakers mounted in a classroom where everyone in the room can hear the amplification; desktop, which is one speaker on a desk; teleloop, which is a wire loop that transmits sound only to a hearing aid wearer; and personal FM, in which a student wears either a hearing aid-looking ear level FM or attaches a boot onto his/her existing hearing aid. All of the FM systems mentioned here require a transmitter with a microphone and receiver. FM systems

increase the understanding of speech by amplifying the teacher's voice louder than any competing background sound.

Students who have only one impaired ear have a unilateral hearing loss. These students may have limited to no functioning in their impaired ear. However, doctors typically no longer amplify the damaged ear as the sound quality, once amplified, might detract from the quality of sound that may be obtained out of the better ear. Many students with a hearing loss in both ears, or a bilateral hearing loss, do wear one or two hearing aids. To better hear in the classroom, many students benefit from the use of an FM amplification system in tandem with personal hearing aids.

Review of Related Literature

Literature Review

English and Church (1999) surveyed 26 audiologists regarding their collective 446 (423 after exclusions) students with a unilateral hearing loss. Of the 423 students with a unilateral hearing loss, only 26% (111 students) were said to be using personal hearing aids, FM systems and/or sound-field amplification.

FM systems benefit students with a hearing impairment because with its use, students understand an increased percentage of what is said by the teacher (Anderson & Goldstein, 2004). Use of hearing aids alone leaves students with a hearing loss at a disadvantage when their hearing aids fail to amplify all speech sounds due to increased distance from the teacher. Anderson and Goldstein collected data from eight students ages nine to twelve with a hearing impairment demonstrating that students who used a desktop or personal FM system understood 93.5% to 94.4% of speech versus only 82.4% with hearing aids alone, while controlling for language level and vocabulary knowledge variances.

Smaldino and Crandell (2000) reviewed whether personal amplification alone was sufficient in aiding students with a hearing loss in the classroom to understand speech accurately. They concluded that "...hearing aid technology cannot reliably improve speech acoustics for a child in a classroom that has excessive noise and reverberation." (p. 374). Poor classroom acoustics and students' inadequate knowledge of language are other negative factors cited. When students are not hearing well, some develop poor listening habits and an indifference to sound (Smaldino and Crandell, 2000).

In one of the research journal articles, there was a five-question survey that asked eight hearing-impaired students and their parents about their opinions regarding four types of FM systems (Anderson & Goldstein, 2004). Although the focus of the article examined the effectiveness of four types of FM systems used with students who wore hearing aids, these five questions were posed and later discussed by the authors. The questions attempted to address some social values that the authors suspected existed. Students and their parents were asked which system provided the best quality sound, which one they anticipated the teacher would prefer, which one the other students in their classrooms would think is the “coolest,” and which system they would most and least like to use.

Of the eight student participants, six of them chose the FM system that helped them best decipher the target sentences in the study. One student chose a system not based on its effectiveness but on the knowledge that the other students and her teacher had and liked that particular system already in her classroom. Seven parents participated in answering the survey questions as well. Six of the seven also chose the same system as their child.

In examination of their results, the authors believed that the students’ attitudes were influenced by the system’s appearance, sound quality, and user friendliness. They cited some parents’ comments that they might pick systems based on the assumption that the teacher would want to use the FM system with other students in the class. Students may have chosen various equipment based on what they felt would be easiest for the teacher to use. Anderson and Goldstein (2004) state:

...classroom sound field amplification can be considered the least stigmatizing of the educational amplification devices used in this investigation. It could be anticipated that that classroom sound field technology would be most acceptable to peers and, therefore, have the least negative social consequences to the students with hearing impairment. (p. 180)

Although true in this study, evidence provided to support this claim is not sufficient for truly generalizing the results to other students with a hearing impairment. This survey portion of the study is interesting and worthy of further inquiry. All of the above journal research articles strongly suggest that the use of FM amplification equipment enhances the perception of speech by students with a hearing impairment. If that is the case, why are there so many instances within my field of view where students or teachers do not use or do not want to use these FM systems?

There is little to be found on preferences of types of FM systems. Two studies examining social stigma opinions regarding hearing aid usage were reviewed.

Erler & Garstecki (2002) conducted a study to examine the degree of stigma for women wearing hearing aids in three age groups: 35-45 years, 55-65 years, and 75 – 85 years. The 191 women all had hearing within normal limits. Younger women viewed having a hearing loss negatively. They viewed wearing hearing aids less negatively. The authors associated the stronger dislike for the hearing loss due to women equating hearing loss with aging. The probability that this train of thought could be generalized to primary and secondary students is not likely. Younger students who have hearing loss do

not likely correlate children's hearing loss to aging. This phenomenon and its generalizations are best left to the middle-aged and older populations.

A second study looked at a younger group of post-secondary students and their views on hearing aid usage. The literature review for the experiment seemed to look mostly at late-onset deafness in older persons, making the experiment's generalization to older people somewhat irrelevant. Nevertheless, the data collected may be closer applied towards school-aged students as to why they do not consistently use FM systems.

Blood (1997) instructed 100 undergraduate students to listen to recorded discourse both presented clearly and again with simulated hearing loss (not necessarily in that order for all groups). Her findings indicate that even though people may agree that hearing aids would assist in clarifying what is said, there exists a negative stigma against their use. Even if participants agreed that a hearing aid would assist them in hearing better (82%), only three quarters would agree to actually wear one. These findings might be applied to users of FM systems, but generalizing the results this way may not be accurate.

One might conclude then similarly that how an FM *system* looks, among other relevant factors as well, may play a role in deterring students from wearing equipment they find old-fashioned or strange.

Most of the material available regarding teacher perspectives are positive. However, it seems not all teachers view FM systems positively (Franks, 2006). Franks reviewed a study (as cited by Allen, 1990) wherein 90 elementary teachers were surveyed to determine whether they believed FM systems were beneficial in schools. The three groups of teachers either had never used an FM *system*, had been exposed to them, or had

used them sometimes. Teachers were asked to rank usefulness of various teaching aids, with FM systems on the list. Allen's results may indicate that with more exposure, teachers may view FM systems more favorably. Of the teachers who had never used FM systems, none marked FM systems as their favorite. Ten percent of the teachers who had some exposure to FM systems marked them as their favorite teaching tool. Last, of the group who stated they had experience using FM systems, 34% ranked them their preferred tool (Allen, 1990). Perhaps with more training and exposure, classroom teachers will look upon FM systems as a useful tool (Franks, 2006).

One element missing in the current literature is data to inform educators, audiologists, parents, and other interested professionals of a current percentage of consistent use, intermittent use, and non-use of FM equipment among hearing-impaired students.

Personal experience on the subject would not support the theory that socio-economic status is a factor in student, parent, or educator support of the use of FM systems. Relatively equal amounts of non-usage appear evident in both groups. In addition, parents and administrators seem to push for classrooms to become amplified. However, subsequent training and support for teachers seems to be lacking.

Subsequent research is also needed to discover to what degree and why students with a hearing impairment resist using FM amplification systems when there is overwhelming evidence supporting its use. In this qualitative study, a research survey was created in an attempt to address the potential factors, including ideas like social stigma, sound quality, discomfort, compliance, teacher dislike, and dated technology.

Methods

Participants

Those invited to participate in this study included 116 professionals and 17 students and their parents. Students who were invited to participate were both male and female, ages eight to eighteen, who resided in lower east Michigan and were found eligible for special education services as a student with a Hearing Impairment. All students had some form of hearing loss, whether temporary or permanent, in one or both ears. All students had access to an FM amplification system/ device, whether or not the systems were being used. All students attended school in Wayne County, MI, in cities that are located near, but are not a part of, Detroit, MI.

Of the 17 students, 6 were girls and 11 were boys. The student participant ethnic make-up included students who were African American, of Arabic or Middle Eastern descent, and Caucasian. There were seven males and one female of African American descent. Three males and one female were of Arabic/Middle Eastern descent. There was one Caucasian male and two females.

Adult participants invited to take the survey were the parents of the 17 students with a hearing impairment, teachers of speech and language impaired, educational audiologists, general education teachers, special education teachers, and other personnel. All had had personal experience working with a student with a hearing impairment as described above, such as categorical teachers of autism spectrum disorder, emotionally impaired, or mildly or moderately cognitively impaired.

While both male and female parents, general education teachers, special education teachers, and other personnel were asked to participate, only female teachers of the speech and language impaired and educational audiologists worked in the districts available to this researcher. All of these positions were filled with female professionals.

Of those invited, 68 people participated in the study (45.3%). Participants included nine students, five parents, fifteen special educators, eleven general educators, seven teachers of speech and language, eight educational audiologists, and twelve other personnel who have worked with students with a hearing impairment.

Data Collection

A single page, double-sided survey (see Appendix A) was developed asking five questions regarding demographical-type information of participants, two questions designed to determine what type, if any, FM amplification equipment was used, and four questions about the frequency of usage. The other five multiple-choice questions asked participants' opinions of FM usage including reasons for resistance among students with a hearing impairment. Finally, two open-ended questions inquired about the main reasons equipment is not used regularly and allowed for original comments from participants, if desired.

Procedures

Students and professionals were approached and asked if they would be interested in participating in a survey asking questions about FM amplification systems. It was explained that it is an opportunity for their opinions to be included in the student researcher's thesis project study. Professionals approached were either working or had

worked with a student with a hearing impairment. Interested professionals were given a consent form which they signed and were then given a survey which was then left to the professional to return to the evaluator. Students were given a packet including a request for their parent/guardian to participate in the study along with permission forms for students and assenting forms for students indicating their consent to participate as well. Instructions were given indicating the nature of the survey and procedures to follow, should they want to participate. Permission slips that were returned to the examiner were collected and exchanged for a copy of the survey, which participants completed and returned.

Of the 86 permission slips collected, 68 participants completed and returned the survey (79% of those who signed a permission slip, 45.3% of the population invited to take the survey). Adults' and students' surveys were collected, including nine from students, five from parents, fifteen from special educators, eleven from general education teachers, seven from speech and language pathologists, eight from Educational Audiologists, and twelve from all other teachers who work or have worked with students with a hearing impairment, such as a categorical classroom for students with a moderate cognitive impairment.

Analysis of Data

Information gathered was computed in several ways. Both percentages and P-values were generated using statistics gathered from the survey. There was an open-ended question asking participants to list the main reason they believed FM systems were not used on a consistent, daily basis. Similar answers were grouped together and categories

developed. From the participants' survey answers, six main themes developed: social, mechanical, comfort, support, benefit, and convenience (see Table 4).

Students who indicated that they did not wear their FM amplification system (seven students), were asked to circle the reasons why not from the choices listed. Responses were tallied and placed in a graph (see Table 6).

An area where participants could make comments about FM systems in general was placed at the end of the survey (see Appendix A). These comments were reviewed and they are included in this thesis (see Table 5).

Other methods of organizing data had to be dismissed due to a small sample size and some participants not answering all of the questions.

Results

Findings

Participants responded regarding their reasons why FM equipment is not used consistently. Their answers were categorized and groups of answers were organized around social, mechanical, comfort, support, benefit, and convenient themes.

Many participants answered that they did not think students wanted to feel or look different from their peers by using the equipment. These became the answers grouped as “social.” Some participants indicated that FM units worked inconsistently, were broken, or were bulky. These were categorized as “mechanical” issues. Some participants noted that FM systems that require a student to wear a different earmold from what they are used to might make the student uncomfortable. These were catalogued into the group “comfort.” Some participants felt that students and teachers are not adequately trained in using the equipment or that there is insufficient reinforcement from teachers. These types of answers were grouped together as “support.” Some participants indicated that they believed teachers did not understand the benefits of FM amplification. Some participants indicated they believed the FM wasn’t useful or needed because the information missed could be gathered in another way. These types of comments were categorized as “benefit.” Some participants believed that it was too much of a hassle to pass the FM system from teacher to teacher. Comments like these were categorized as “inconvenient.”

It was noted which type of participant made the above various comments.

Percentages were developed from answers and divided by the total number of participants

in the same category (see Table 2). For example, of the participants taking the survey, eleven people indicated that they were general education teachers. Of the responses categorized as “social,” five of the respondents were general education teachers. Therefore, five out of the eleven general education teachers, or 45%, believed one of the main reasons FM systems are not used on a consistent daily basis is based on social reasons and not wanting to appear different.

The highest percentage among general educators who took the survey believed that social factors, listed at 45%, were the highest influencing reason why students don't wear their amplification. Among special educators, 60% believed social factors were the main reason. In fact, among all groups, social factors were the number one reason given why participants thought students did not use FM amplification on a daily, consistent basis. The breakdown was 57% among teachers of the speech and language impaired, 50% among other teachers, 60% among parent participants, 44% among educational audiologists and 56% of students who took the survey.

Information was also gathered as a whole and catalogued. These percentages were developed by taking the number of respondents answering in a certain category and dividing it by the total number of participants taking the survey. For example, one general education teacher, two other teachers, and two students believed “inconvenience” was the main reason that FM systems are not used on a consistent, daily basis. Added together, there are five participants with this shared belief. The total number of participants taking the survey was 68; therefore, five divided by 68 is an uneven 0.07352... or 7.4% (see Table 3).

More than 50% (52.9%) of those surveyed considered social pressures to be the biggest reason students resisted wearing their FM amplification equipment. By far, this was the most common answer, followed by lack of support of use and mechanical problems at almost 15%, with benefit and comfort tied at 10.3% and convenience at only 7.4%, one of the least frequently listed reasons.

Students who indicated that they did not wear their FM amplification system (seven students) were asked to circle the reasons why they didn't out of the choices listed. Out of twelve reasons listed, not one reason was indicated by all seven students. In fact, the reason listed most often was chosen by five students, indicating their dislike of having to give the teacher the microphone. Three other reasons were circled by four students: not liking to have to carry the equipment, not liking the equipment on their desk, and not liking to have to wear the equipment. Only three students indicated the following four reasons: not liking having to walk to charge it, not liking others seeing equipment on their desk, not liking how the equipment looks, and not liking that it made them feel different (see Appendix A).

One of the differences among students with a hearing impairment participating in this study is type of hearing loss (unilateral vs. bilateral). One student's information is omitted here because he marked on the survey that he didn't know/ didn't remember what type of hearing loss he had. Information regarding student reported type of hearing loss and use of FM system was plotted into an online chi-square chart (Lowry, 2008), but results could not be validated as all numerical values had to be greater than five. None of the statistics used were greater than five; therefore, Fisher's Exact Probability Test was

used instead (see Table 5). To have any statistical significance, the resulting p-value would need to be at least $<.05$. When the numbers are run, the p-value is exactly 1.000. Using the data collected in this survey, there is no correlation found between type of hearing loss and likeliness of students to use or not use their FM amplification equipment. The likelihood of this mathematical answer occurring randomly is high. Type of hearing loss does not appear to statistically influence the likelihood of use or non-use of FM systems.

Discussion

Analysis

It appears that at least half of all participants believe that one of the main reasons students with a hearing impairment do not wear their FM amplification systems is because of a social factor, specifically, not wanting to appear different from their peers. This popular belief seems to hold some credibility with all participants as it was listed as the number one reason FM systems are not used in all categories developed. Understanding how important the social stigma is to these students might be key in finding a way to encourage more students to take advantage of using FM amplification.

Students, more than any other group, did not appear to see the value of the amplification system. This might mean students do not understand the potential benefit that they can gain from their equipment as well as adults understand. This might be an indication that students need to be taught about the benefits FM amplification systems can bring to their educational experience. Often students with a hearing loss are unaware of what they are missing; this may hold true here as well. When any student has missed information, one of the coping skills used in general education is to ask someone for the missed information. Students with a hearing impairment may prefer to exercise this coping strategy over wearing equipment as evidenced by one of the student participants' comment, "I also feel [an FM system] doesn't make a huge difference because I can just ask my friend if I think I missed something" (see Table 4).

Another recurrent problem that emerged from the survey is the notion of support needed for both staff and students to ensure equipment is used correctly and consistently.

Often when equipment is not used, even for a short period of time like when a student or teacher is absent, or if the unit malfunctions, the routine of wearing FM equipment is broken and seems difficult for both teacher and student to resume consistent use (see Table 4). Participants cite that sometimes teachers do not enforce the systems' use and therefore students are less likely to use them consistently.

Mechanical issues were another problem mentioned by almost 15% of participants that prevents consistent, daily use of FM systems. Malfunctioning equipment was one of the problems mentioned among the theme of mechanical issues found in many survey answers. Attention-drawing feedback squeals, bulky equipment, and misunderstandings of how to best use the equipment were among mechanical complaints. Different individuals have varying tolerances for understanding electronic equipment. If someone does not tolerate electronics well, (s)he might be hesitant to use an FM system or may fear breaking the system. Some individuals do not troubleshoot well and have to rely on support service personnel to keep units in working order on a consistent basis instead of making small adjustments independently.

More than ten percent of all 68 respondents thought that lack of comfort was an issue in keeping students with a hearing impairment from using their equipment. Some students use different earmolds with their FM amplification systems, which may fit differently than their earmolds on their hearing aids. Some students aren't used to using equipment because they never have in the past. The teacher's level of comfort in using the equipment was also counted here, whether they are uncomfortable using electronic equipment or wearing anything extra on their body.

Five of the 68 respondents indicated that using an FM system consistently was inconvenient.

Some interesting comments were made in question number 20 on the surveys (see Appendix A) including ideas about how to lessen the amount of attention drawn to students, making them look less different than their peers. One of the suggestions was to amplify entire school rooms to aid all students and not only students with a hearing impairment. Another was to change from the earmold model to headphones similar to current MP3 players with earbuds.

Limitations

One of the limitations of this study was in collecting input from students and parents because of the difficulty obtaining permission from the parents allowing their children to participate. One way to remedy this might be to conduct the survey over a longer period of time and meet the parents in person when asking if interested in participating, such as during an individualized educational planning meeting.

Another limitation is sample size. With a small population, like students who have a hearing impairment, it is difficult to access a larger sample size. Perhaps a larger study could cover a larger population area, increasing the sample size, thereby increasing some of the generalizing of information that might be learned through the study's results. A larger sample size would also allow for more statistical manipulation of data.

While the main intention of this researcher was to compile the main reasons students with a hearing impairment resist wearing FM amplification systems to enhance their hearing and gain better access to auditory information in the classroom, it was also an

attempt to attempt to link various occurrences with a likelihood of an increase or decrease of usage.

The survey design should have formulated separate survey questions for students and adults. Several designs were initially developed, and a single survey to distribute to all participants was selected. There might have been less confusion among participants had there been two separate surveys, one for students and another addressing the adults. A new survey working out the problem areas encountered would help to give researchers more accurate information. Sending out separate surveys would also limit some of the confusion encountered while completing the survey. A survey that is intended solely for students and another for parents would allow for the researcher to spend more time collecting data from these important individuals. Clearer data collected would allow researchers to run chi square analyses to determine whether information gathered contains any statistical significance.

In addition, the wording of some of the questions was not clear. Several questions may have been confusing and participants may have had difficulty deciding which questions to answer, which to skip, and which to mark “not applicable.”

Another problem with the wording of the survey was that the questions sometimes did not solicit the information sought. For example, question number six on the survey (see Appendix A) intended to seek information regarding whether FM amplification equipment was recommended to be used and provided to the student. However, the actual question asked whether the student used an FM system at school. The question as worded inadvertently asked for information about students’ use of equipment.

There were no questions addressing the adequacy or lack of training of using the FM amplification systems among professionals or students. The level of user support and follow up care available could have been addressed, as well.

These errors may have provided valuable information to the research findings. As such, it is not possible to clarify whether the participants read and answered the question the way the author intended or how the question actually read.

Conclusion

Summary

The widely shared view of students not wanting to be noticed as different was clear. Those working with students providing FM equipment should seek students' input in choosing equipment that the student perceives as less apparent to increase usage. Also, working with manufacturing companies in making systems look more like other modern day audio and cellular telephone equipment that students already use would likely increase student willingness to use FM amplification more consistently.

Further Research

More research is needed to determine whether any strong correlation exists between adult opinions and student usage. It would be interesting to note if adults communicating more with their students about FM systems found that their students wore their equipment more consistently than a group that didn't receive that counseling.

A study focused on only one group's opinions may produce more detailed information. Single groups such as only students or only parents would give a more narrow focus to the issue. Interviews could be held with an individual group of participants. A case study following one or more students would generate useful information. Research should also focus on teachers and finding out how often they really wear their equipment both in a day and in a school year.

Observing a student's educational team in school may produce a clearer view of where breakdowns in usage exist or how teams can work positively together in tandem. Questions should also be asked about what determining factors influence students who do wear their amplification equipment consistently.

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APPENDICES

Appendix A: Survey Form

Please read and answer the questions below. Please circle only one answer for each question, unless otherwise noted.

1. Which of the following titles best describes you:
 - a. Student with a hearing loss
 - b. Parent of child with a hearing loss
 - c. General Education Teacher of child with a hearing loss
 - d. Educational Audiologist
 - e. Teacher of the Speech and Language Impaired
 - f. Special Education Resource Teacher
 - g. Other personnel who has worked with a student with a hearing impairment
2. Which of the following types of hearing loss do either you or your child/student have?
 - a. Conductive (outer/ middle ear dysfunction)
 - b. Sensorineural (inner ear/ nerve damage)
 - c. Mixed hearing loss (some components of both)
 - d. Don't know/ don't remember
3. Which of the following scenarios best describes the level of hearing loss either you have or your child/ student has:
 - a. Unilateral (one ear)
 - b. Bilateral (both ears) – one ear hears much better than the other
 - c. Bilateral – one ear hears a little better than the other
 - d. Bilateral – both ears hear about the same
 - e. Don't know/ don't remember
4. What level of hearing do you have in your right ear?
 - a. Normal/ borderline normal <25dB
 - b. Mild 26dB – 40dB
 - c. Moderate 41-55dB
 - d. Moderate-Severe 56dB-70dB
 - e. Severe 71dB-90dB
 - f. Profound 91dB–120dB
 - g. Don't know/ don't remember
5. What level of hearing do you have in your left ear?
 - a. Normal/ borderline normal <25dB
 - b. Mild 26dB – 40dB
 - c. Moderate 41-55dB
 - d. Moderate-Severe 56dB-70dB
 - e. Severe 71dB-90dB
 - f. Profound 91dB–120dB
 - g. Don't know/ don't remember
6. Do you/ does your student use an FM amplification device at school?
 - a. Yes
 - b. No
 - c. Don't know
 - d. Don't remember
7. Is the system used on a consistent basis either daily for certain classes or all day?
 - a. Yes
 - b. No
 - c. Don't know
 - d. Don't remember
 - e. I don't use
8. **You may circle as many answers as you like for this question**
If the FM system is **NOT** used on a consistent basis, why not?
 - a. I/ student do/does not like it
 - b. It doesn't help me/ him/ her hear better
 - c. It doesn't work consistently
 - d. The equipment is broken
 - e. The teacher(s) don't or won't use it
 - f. The parent does not want it to be used
 - g. Not applicable (FM is used)
9. **You may circle as many answers as you like for this question**
If you are the student, and if you do not use your FM equipment, why not?
 - a. I do not like having to wear my equipment
 - b. I do not like how my equipment feels on my body
 - c. I do not like having equipment on my desk
 - d. I do not like others seeing my equipment
 - e. I do not like how my equipment looks
 - f. I do not like that it makes me look different
 - g. I get teased if I use my equipment
 - h. I do not like how my equipment sounds
 - i. I do not like having to give my teacher the microphone/transmitter
 - j. I think my teacher does not like/ does not want to use the equipment
 - k. I don't like having to carry the equipment
 - l. I don't like having to walk to charge it
 - m. N/A - I am not a student
10. Does using FM amplification help you/ the student **hear the teacher better?**
 - a. Helps me/ the student a lot
 - b. Helps me/ the student somewhat
 - c. I / the student hear the same with or without FM amplification
 - d. I / the student hear better without the FM amplification
 - e. I / the student doesn't wear an FM system
 - f. N/A – I am not a student

Appendix B: Student Permission Forms

Eastern Michigan University
Student (ages 8 – 18) Consent Form

Students,

I would like for you to complete a survey about FM (Frequency Modulation) Systems. You do not have to participate. It is your choice if you want to participate. If you want to participate and fill out the survey, please sign the enclosed permission slip. You can change your mind at any time and decide you do not want to participate. Your grades and progress reports will not be affected if you decide to participate or not participate.

FM amplification systems help students with a hearing impairment to hear the teacher better as he or she explains lessons. Completing the survey will help parents and teachers better understand how students feel about FM amplification systems. Your opinion is important.

I will share the results with other people. Your name will not appear on any of the papers that I will share. Your name will be kept private. The results may be talked about by professionals at a conference or they may be published in an educational journal (teacher magazine).

If you or your parents have any questions or concerns, you may address them to myself, my thesis project advisor or the College of Education (COE) Human Subjects Research Chair:

Jennifer Franks
Teacher Consultant
jfranks@emich.edu
(313) 432-3870

Dr. Brenda Doster
Thesis Advisor
bdoster@emich.edu
(734) 487-3300

Dr. Michael Bretting
COE HSRC
Michael.Bretting@emich.edu
(734) 487-1060

Thank you,

Ms. Franks
Teacher Consultant for Hearing Impaired Students
& Eastern Michigan Graduate Student

Please return completed consent to:
Jennifer Franks c/o BARNES SCHOOL 20090 MORNINGSIDE DR. GROSSE POINTE WOODS, MI 48236

A copy of the final thesis document can be found when posted on Eastern Michigan University's website:
<http://www.eaglespace.emich.edu>

Eastern Michigan University
Student Participation Consent (ages 8 – 18)

I give my permission to participate in a research study about Frequency Modulation (FM) Amplification Systems as they are used or not used by students with a hearing impairment.

I understand that if I no longer want to participate I can take back my permission. Nothing bad will happen if I decide I don't want to participate.

Please Print Your Name Here

Please Sign Your Name Here

Write Today's Date Here

Please return completed consent to:
Jennifer Franks c/o BARNES SCHOOL 20090 MORNINGSIDE DR. GROSSE POINTE WOODS, MI 48236

A copy of the final thesis document can be found when posted on Eastern Michigan University's website:
<http://www.eaglespace.emich.edu>

Appendix C: Parent Permission Forms

Eastern Michigan University
Parent/ Guardian Consent for Student Participation

Dear Parents and Guardians,

This document is to inform you of a research study of perceptions of the use of FM (Frequency Modulation) amplification equipment used by students with a hearing impairment. Surveys will be distributed to willing students following the signing of a consent form by their parent/guardian and their own assenting agreement to participate. They will then be collected, tallied and interpreted.

Using FM equipment gives students with a hearing impairment better access to educational material. However, in my professional experience, FM systems are not consistently used across the board. I wish to survey students with a hearing impairment and those other adults who have been a part of the student's education to find the reasons why equipment use might be forfeited and compile those responses in one place.

The results may be presented at conferences, published in educational journals and thesis. Confidentiality will be maintained. Participant's names will remain anonymous and no identifying information from the surveys will be made public.

I hope you will allow your student to complete and return the investigative survey. Participation is voluntary. The research will contribute to the understanding of why some students with a hearing impairment resist using their recommended FM amplification on a consistent basis. The findings may benefit educators, teacher education programs, and researchers with effectively providing information about current perceptions of FM amplification systems. Ultimately, the findings may benefit students with a hearing impairment to gain more knowledge from their classroom educational experiences.

If you wish for your student to participate, please sign indicating your consent to allow your student to participate and complete the survey he/she will receive. Participation or non-participation is completely voluntary. No repercussions or adverse affects will result of opting to participate or not participate, and you may rescind your consent at any time without any loss of benefits for which you are otherwise entitled as an EMU research participant and/or parent of a student enrolled in _____ School.

Questions or concerns may be addressed to myself, my thesis project advisor or the College of Education (COE) Human Subjects Research Chair:

Jennifer Franks
Teacher Consultant
jfranks@emich.edu
(313) 432-3870

Dr. Brenda Doster
Thesis Advisor
bdoster@emich.edu
(734) 487-3300

Dr. Michael Bretting
COE HSRC
Michael.Bretting@emich.edu
(734) 487-1060

Thank you,

Jennifer Franks
Eastern Michigan University Graduate Student &
Teacher Consultant for the Hearing Impaired

Jennifer Franks c/o BARNES SCHOOL 20090 MORNINGSIDE DR. GROSSE POINTE WOODS, MI 48236

A copy of the final thesis document can be found when posted on Eastern Michigan University's website:
<http://www.eaglespace.emich.edu>

Eastern Michigan University
Parent/ Guardian Consent for Student Participation

I hereby give my voluntary consent to allow my student to participate in a research study designed to survey opinions about Frequency Modulation (FM) Amplification Systems as they are used or not used by students with a hearing impairment.

I understand that my student's participation is voluntary. I understand that if I no longer wish for my student to participate in the survey I may rescind my consent with no adverse affect.

Name of student – Please print

Name of Parent/ Guardian – Please print

Signature of Parent/ Guardian

Date

Please return completed consent to:
Jennifer Franks c/o BARNES SCHOOL 20090 MORNINGSIDE DR. GROSSE POINTE WOODS, MI 48236

A copy of the final thesis document can be found when posted on Eastern Michigan University's website:
<http://www.eaglespace.emich.edu>

Appendix D: Adult Permission Forms

Eastern Michigan University
Adult Participation Consent

Dear Parents and Colleagues,

This document is to inform you of a research study of perceptions of the use of FM (Frequency Modulation) amplification equipment used by students with a hearing impairment. Surveys will be distributed to willing participants following the signing of a consent form and collected, tallied and interpreted.

Using FM equipment gives students with a hearing impairment better access to educational material. However, in my professional experience, FM systems are not consistently used across the board. I wish to survey students with a hearing impairment and those other adults who have been a part of the student's education to find the reasons why equipment use might be forfeited and compile those responses in one place.

The results may be presented at conferences and published in educational journals. Confidentiality will be maintained. Participant's names will remain anonymous and no identifying information from the surveys will be made public.

I hope you will complete and return the investigative survey. Participation is voluntary. The research will contribute to the understanding of why some students with a hearing impairment resist using their recommended FM amplification on a consistent basis. The findings may benefit educators, teacher education programs, and researchers with effectively providing information about current perceptions of FM amplification systems. Ultimately, the findings may benefit students with a hearing impairment to gain more knowledge from their classroom educational experiences.

If you wish to participate, please sign indicating your consent to participate and complete the survey you will receive. Participation or non-participation is completely voluntary. No repercussions or adverse affects will result of opting to participate or not participate, and you may rescind your consent at any time without any penalty.

Questions or concerns may be addressed to myself, my thesis project advisor or the College of Education (COE) Human Subjects Research Chair:

Jennifer Franks
Teacher Consultant
jfranks@emich.edu
(313) 432-3870

Dr. Brenda Doster
Thesis Advisor
bdoster@emich.edu
(734) 487-3300

Dr. Michael Bretting
COE HSRC
Michael.Bretting@emich.edu
(734) 487-1060

Thank you,

Jennifer Franks
Eastern Michigan University Graduate Student &
Teacher Consultant for the Hearing Impaired

Please return completed consent to:
Jennifer Franks c/o BARNES SCHOOL 20090 MORNINGSIDE DR. GROSSE POINTE WOODS, MI 48236

A copy of the final thesis document can be found when posted on Eastern Michigan University's website:
<http://www.eaglespace.emich.edu>

Eastern Michigan University
Adult Participation Consent

I hereby give my consent to voluntarily participate in a research study designed to survey opinions about Frequency Modulation (FM) Amplification Systems as they are used or not used by students with a hearing impairment.

I understand that my participation is voluntary. I understand that if I no longer wish to participate in the survey I may rescind my consent with no adverse affect.

Name of volunteer consenting to participate – Please print

Signature of volunteer to participate

Date

Please return completed consent to:
Jennifer Franks c/o BARNES SCHOOL 20090 MORNINGSIDE DR. GROSSE POINTE WOODS, MI 48236

A copy of the final thesis document can be found when posted on Eastern Michigan University's website:
<http://www.eaglespace.emich.edu>

Table 1
Opinion: Main Reasons FM System is Not Used Consistently

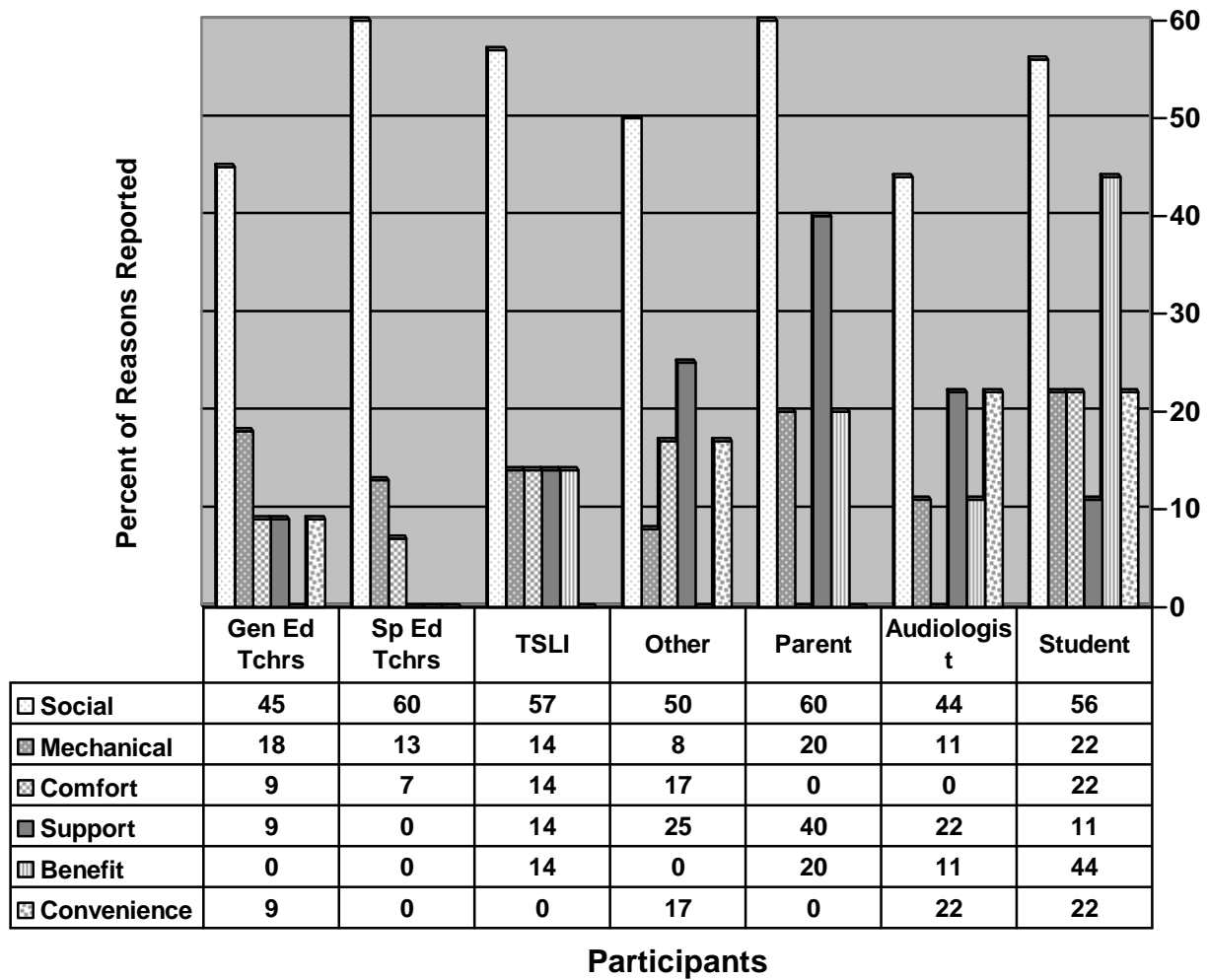


Table 2
Survey Response Percentages

Looking different

Gen Ed	5/11 = 45%
Sp Ed	9/15 = 60%
TSLI	4/7 = 57%
Other	6/12 = 50%
Parent	3/5 = 60%
Audio	4/9 = 44%
Student	5/9 = 56%

Mechanical

Gen Ed	2/11 = 18%
Sp Ed	2/15 = 13%
TSLI	1/7 = 14%
Other	1/12 = 8%
Parent	1/5 = 20%
Audio	1/9 = 11%
Student	2/9 = 22%

Comfort

Gen Ed	1/11 = 9%
Sp Ed	1/15 = 7%
TSLI	1/7 = 14%
Other	2/12 = 17%
Parent	0
Audio	0
Student	2/9 = 22%

Support of Use

Gen Ed	1/11 = 9%
Sp Ed	0
TSLI	1/7 = 14%
Other	3/12 = 25%
Parent	2/5 = 40%
Audio	2/9 = 22%
Student	1/9 = 11%

Valued as Beneficial

Gen Ed	0
Sp Ed	0
TSLI	1/7 = 14%
Other	0
Parent	1/5 = 20%
Audio	1/9 = 11%
Student	4/9 = 44%

Inconvenient

Gen Ed	1/11 = 9%
Sp Ed	0
TSLI	0
Other	2/12 = 17%
Parent	0
Audio	2/9 = 22%
Student	2/9 = 22%

Availability

Student	1/9 = 11%
All others	0

Cost

Sp Ed	1/15 = 7%
All others	0

Volume

Parent	1/5 = 20%
All others	0

Table 3

Shared Opinions Among Participants

(*Some participants listed more than one reason which accounts for total exceeding 100%)

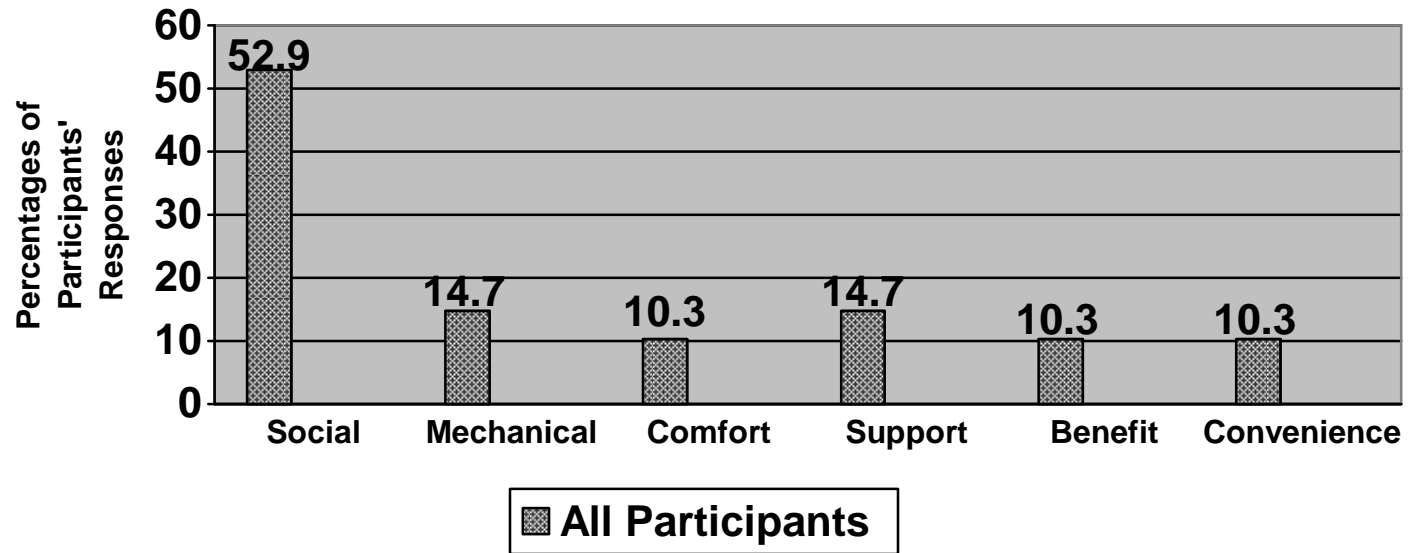


Table 4
Summary of Actual Participant Responses – Main Reason FM is Not Used

Theme	Comments	Participant
<i>Social</i> - Looking different		
	Being seen by others wearing the system	General Education Teacher
	At the middle school students do not want to be viewed as different.	General Education Teacher
	Teenagers do not like to look different than their peers because they may be teased or embarrassed	General Education Teacher
	They don't like others to see them wearing equipment/they don't want to look different	General Education Teacher
	They don't like others to see them wearing equipment/they don't want to look different	General Education Teacher
	FM system identifies them as disabled	Special Education Resource Teacher
	Student does not have one though student would probably feel embarrassed to wear one	Special Education Resource Teacher
	Students don't like to look different	Special Education Resource Teacher
	Students are self-conscious about using the system	Special Education Resource Teacher
	Because the student feels self conscious	Special Education Resource Teacher
	The student does not like to appear different; especially at middle school age	Special Education Resource Teacher
	For middle school-students don't want to be or look different	Special Education Resource Teacher
	Kids don't want to look different	Special Education Resource Teacher
	Students are self conscious & do not want to appear different.	Special Education Resource Teacher

Theme <i>(continued)</i>	Comments <i>(continued)</i>	Participant <i>(continued)</i>
	Students don't want to look different	Teacher of the Speech and Language Impaired
	This particular student does not want to look different	Teacher of the Speech and Language Impaired
	I believe the main reason for not wearing them is that the students don't want to appear different	Teacher of the Speech and Language Impaired
	Middle school students are resistant to using because it makes them look different than their peers	Teacher of the Speech and Language Impaired
	Being seen by others wearing the system	Other Personnel
	Kids are always trying to fit in & wearing the systems make them feel self-conscious	Other Personnel
	Students don't want others to ask about system. Don't want to look different.	Other Personnel
	Student does not want to draw attention to disability	Other Personnel
	Because the student does not want to be different than peers	Other Personnel
	From a student standpoint, they don't want to look different or be singled out	Other Personnel
	Kids don't want to feel different	Parent
	She don't like to look different	Parent
	students not wanting to stand out as "different" is probably the main reason.	Parent
	Don't want to draw attention	Educational Audiologist
	Student does not want to look different	Educational Audiologist
	Not wanting to be different	Educational Audiologist
	peer pressure	Educational Audiologist
	[it] makes you stand out	Student

Theme (<i>continued</i>)	Comments (<i>continued</i>)	Participant (<i>continued</i>)
	They don't like how it looks on them or it makes them feel ostracized by the other students	Student
	Students ask "What is that?" I really dislike that. No I'm not worried about what the students think, it's just about how I feel...	Student
	Because students don't like it. Because they feel embarrassed	Student
	I don't like how people look at me while I am wearing the FM system	Student
<i>Mechanical</i> – Mechanical Problems		
	Bulky system draws attention to student	General Education Teacher
	Broken and wait to be fixed so teacher gets out of the habit of using it	General Education Teacher
	Teacher's forget to turn off system when charging; once it is not consistently used, then it is forgot about	Special Education Resource Teacher
	Many times there were problems with the system not working properly. A lot of time was lost for the student-waiting for repairs and finding out what was wrong.	Special Education Resource Teacher
	People (i.e. staff members) are not educated on how to use/obtain use of FM systems	Teacher of the Speech and Language Impaired
	In my classroom, it didn't always work properly. Other than that, it was used	Other Personnel
	Poor maintenance	Parent
	Mine used to always make weird loud noises that attracted attention to me.	Student

Theme (<i>continued</i>)	Comments (<i>continued</i>)	Participant (<i>continued</i>)
	It is broken	Student
	It's not one main reason. In spite of inservicing, often teachers, staff, and students misunderstand how the equipment works and why it is needed. That just feeds into the other reasons listed in #16 (a, b, c, e, f)	Educational Audiologist
Comfort - Uncomfortable		
	[The student] found it uncomfortable and sometimes it would squelch and it hurt his ears.	General Education Teacher
	Makes student uncomfortable	Special Education Resource Teacher
	Some teachers are just not comfortable using the system.	Teacher of the Speech and Language Impaired
	Student not comfortable with different aid in ear.	Other Personnel
	General Ed. Teachers are not comfortable using FM systems.	Other Personnel
	Especially if students didn't grow up using the FM units, they don't feel comfortable with them.	Student
	It is annoying	Student
Support of use – Lack of Support		
	Gen Ed Teachers may not understand how the system works best	Other Personnel
	Gen Ed Teachers need more in-depth training. They may be afraid of "breaking" it	Other Personnel

Theme (<i>continued</i>)	Comments (<i>continued</i>)	Participant (<i>continued</i>)
	Teacher apathy	Other Personnel
	Student doesn't bring to class, teachers don't mandate parent reinforcement	General Education Teacher
	Lack of proper counseling for the student	Teacher of the Speech and Language Impaired
	Poor maintenance or training of staff	Parent
	Teachers will subtly discourage use by saying, "I speak very loudly, it isn't necessary in my class" I've had numerous teachers say this and while they don't refuse outright, they discourage a student who doesn't want to impose upon their teacher.	Parent
	Combination of lack of teacher enforcement and child motivation.	Educational Audiologist
	lack of teacher support or student desire	Educational Audiologist
	The teacher forgets	Student
<i>Valued as Beneficial</i> – Lack of Benefit		
	People (i.e. staff members) are not educated on the benefits of FM	Teacher of the Speech and Language Impaired
	My student states she does not need it in every class. I leave this up to her judgment as she will use it when necessary	Parent
	They may possibly think that it's a lot for them to do just because somebody told them to use it, and don't necessarily view the FM system as something beneficial for them.	Student
	Able to hear well enough in certain classrooms without the FM	Student

Theme (<i>continued</i>)	Comments (<i>continued</i>)	Participant (<i>continued</i>)
	Maybe not needed	Student
	I also feel it doesn't make a huge difference because I can just ask my friend if I think I missed something.	Student
	Students sometimes think it is not helping them; Class size is small; degree of hearing loss such that FM does not benefit.	Educational Audiologist
<i>Convenient</i> – Inconvenient to Use		
	Sometimes student forgets it	General Education Teacher
	It's a pain to have to give the teacher the stuff to put on/take off for every class everyday	Other Personnel
	I feel as a teacher, many teachers don't want the hassle	Other Personnel
	I have found as an educational audiologist that my biggest resistance to FM is coming from the teachers not wanting to wear the transmitter/ and or/ they feel they are loud enough/ Even HI teachers of classrooms do not wear their transmitters regularly.	Educational Audiologist
	Teachers believe it takes too much time out of their day to put them on and check that they're working (especially if it's a whole class).	Educational Audiologist
	You feel bad for the teacher	Student
	FM systems aren't used on a daily basis because I don't like the fact that I have to give it to the teachers	Student

Theme <i>(continued)</i>	Comments <i>(continued)</i>	Participant <i>(continued)</i>
Availability		
	the system is available	Special Education Resource Teacher
	I used to have one I just don't anymore	Student
Cost	cost of battery replacements	Special Education Resource Teacher
Volume	Teacher's not Loud enough	Parent

Table 5
Participants' Original Comments

Participants	Original comment about FM amplification systems
General Education Teacher	With the technology available today, it could be made to look less conspicuous.
General Education Teacher	They must be used the first day of class. And they must get fixed quickly when a problem arises. Teachers have so much to do already. FM needs it own staff to up keep it and fix it quickly.
General Education Teacher	I've used them with several students and I believe they are very beneficial. After having one I went to an amplification system for the entire class.
Special Education Resource Teacher	The use of an FM system has allowed the student to display a marked improvement on his academic performance
Special Education Resource Teacher	I believe they would be useful but student did not want to be single out for his disability
Special Education Resource Teacher	FM amplification systems are very important to the student & teacher, but I don't like the part of sharing the equipment and making sure it got to the student's next class.
Special Education Resource Teacher	I believe the FM system is an effective piece of assistive technology, if staff is trained and understand then systems' operation
Special Education Resource Teacher	The teachers in our building find the FM system easy to use however in my experience the students do not want to draw attention to themselves. I wish that teachers were all miked all the time. They wouldn't have to raise their voices & our ADHD kids are helped by it. My son's elementary school had speakers in the ceiling & the teacher always used a mike. Made a dif...
Teacher of Speech and Language Impaired	My impression is they are useful not only with hearing impaired students but with many other students, especially those with ADD and ASD. My hope would be for classrooms to be designed so that the whole class benefits from the acoustic system
Teacher of Speech and Language Impaired	More training needed for all parties involved- more detailed medical information- should be provided
Other personnel	I think it's a great tool to utilize...if you can get kids to buy into wearing one 😊
Other Personnel	I had experience with several students who are ashamed of wearing the system. If system looked more like an IPOD students would be more apt to where it
Other personnel	It would be great if the teacher was wired all day (like in church)
Other personnel	I know they are expensive & don't know real benefit especially when student is in a small group

Other personnel	FM systems can benefit many students in instructional settings. Hearing impaired students need consistency from all staff members when using an FM system.
Other personnel	For my student it was very helpful and he could hear me wherever he was in the classroom
Other personnel	Have seen multiple FM systems used in schools.
Other personnel	The student I had three years ago really liked and depended on it for lectures, instruction.
Other personnel	My student at first in the HS was embarrassed. Then it grew to be a “cool” thing and the other kids wanted to sit by her to use the advantages of the system as well.
Parent	The FM system currently used by my son (attach to a hearing aid) is working very well and is hidden from view to not add any unnecessary uncomfortableness.
Educational Audiologist	FM systems can be extremely helpful for students with hearing impairment in a large classroom w/ large no. of student.
Educational Audiologist	I have found as an educational audiologist, that my biggest resistance to FM is coming from the teachers not wanting to wear the transmitter/ and,or/ they feel they are loud enough! Even HI teachers of classrooms do not wear their transmitters regularly.
Educational Audiologist	(#16 g. [FM systems do not help them hear better] selection: refers to profound loss where FM unit or hearing aid is not beneficial due to lack of residual hearing. Also, refers to minimal or unilateral losses, in some cases, where student does not perceive any beneficial difference. However, some of these cases may be a students response due to a lack of motivation to wear an f.m. unit. As an educational audiologist, I service a large caseload of students in several school districts. For the purpose of this survey, I have selected one student as a case study.
Educational Audiologist	As an educational audiologist, it is very difficult and frustrating when teachers do not comply with the use of the FM system. If written in the IEP – it is mandated but who is responsible for monitoring that? The child is the one who suffers in the long run.
Educational Audiologist	Because the auditory systems of children under age 15 are not fully developed, ALL classrooms should have free field. Regular education grades K – 8 at the very least would benefit in order to offset the effects of distance, background noise, and reverberation in these often poor listening environments. So, the hearing impaired students would already have this in place, at lest in some way. Of course, all hearing losses are different and must be addressed case by case.
Student	THEY REALLY WORK!!!!!!!!!!!!!!!!!!!!!! They just can be annoying sometimes (MOST OF THE TIME...)

Table 6
Fisher's Exact Probability Test of Unilateral vs. Bilateral Hearing Loss
Affect on FM Usage

	Students Who Use FM System	Students Who Don't Use FM System	<u>Total</u>
Students with Unilateral Hearing Loss	1	1	2
Students with Bilateral Hearing Loss	2	4	6
<u>Total</u>	3	5	8

The two-tailed P value equals 1.000

Table 7
 Students' Responses: Why FM Equipment is Not Used

