

Knowledge and attitudes of teachers regarding the impact of classroom acoustics on speech perception and learning

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Abstract

This study investigated the knowledge and attitude of primary school teachers regarding the impact of poor classroom acoustics on learners' speech perception and learning in class. Classrooms with excessive background noise and reflective surfaces could be a barrier to learning, and it is important that teachers are aware of this. There is currently limited research data about teachers' knowledge regarding the topic of classroom acoustics. Seventy teachers from three Johannesburg primary schools participated in this study. A survey by way of structured self-administered questionnaire was the primary data collection method. The findings of this study showed that most of the participants in this study did not have adequate knowledge of classroom acoustics. Most of the participants were also unaware of the impact that classrooms with poor acoustic environments can have on speech perception and learning. These results are discussed in relation to the practical implication of empowering teachers to manage the acoustic environment of their classrooms, limitations of the study as well as implications for future research.

Key Words: Classroom acoustics; Background noise, Reverberation, Teacher's voice,

School classrooms with poor acoustic environment (i.e. excessive background noise levels and too much reverberation) are not suitable for educational activities that requires listening (Anderson, 2004; Crandell & Smaldino, 2000; Dockrell, Shield & Rigby, 2004). Excessive background noise in a classroom makes the communication between the teacher and learners difficult because it can cover up part of the verbal message conveyed by the teacher to learners and vice versa (Crandell & Smaldino, 1994). Similarly, too many reflective surfaces in the classroom (hence too much reverberation) can cause speech sounds communicated by the teacher to the learners to bounce around the room, leading to blurring of the final speech signal heard by the learners (Guckelberger, 2003). This will make it hard for some learners to hear and understand what is being communicated to them due to poor speech perception. Speech perception in this study refers to the process of hearing and understanding speech signals during normal human communication (Massaro, 2001).

POOR CLASSROOM ACOUSTICS AS A BARRIER TO LEARNING

Primary school children are more vulnerable to the effects of extraneous noise sources (Shield & Dockrell, 2004). Therefore, classrooms with too much background noise and reverberation can have a negative impact on learners' speech perception, and consequently their learning (Anderson, 2004). Several studies

that investigated the impact of too much background noise in the classroom on learners' ability to learn have shown marked negative effects of noise on learners' reading and numeracy skills, as well as on overall academic performance (Lundquist, Holmberg & Landstrom, 2000; Mackenzie, 2000; Maxwell & Evans, 2000; Shield, & Dockrell, Asker & Tachmatzidis, 2002). Meaningful irrelevant speech, such as noise from people speaking in an adjacent classroom, has been shown to affect speech understanding, and or learning, to a higher degree than other types of noises (Boman, Enmarker & Hygge, 2005). Poor acoustics in the classroom have also been shown to have the following effects on learners: high levels of listening fatigue (Hicks & Tharpe, 2002); poor attentive behaviour, especially when the subject matter is complex or unfamiliar (Anderson, 2004); degradation of the learners' memory capabilities (Boman et al., 2005). Furthermore, apart from being a barrier to the learning process, noise can also be perceived as a nuisance by children. Young children exposed to high levels of noise in their environments report high levels of annoyance with the specific sounds that they are exposed to (Cohen, Evans, Krantz, Stokols & Kelly, 1981). That is, young children are sensitive to noises in their environment and can

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discriminate between those noise sources that annoy them and the ones that do not annoy them (Dockrell & Shield, 2004; Manlove, Frank & Vernon-Feagans, 2001).

Classrooms with poor acoustic environments impact negatively on the educational achievement and performance of all learners in the class (Knecht, Nelson & Whitelaw, 2002), however there are certain categories of children who are at a higher risk for the negative effects of too much background noise in the classroom. These include young children at various stages of language development, learners with home languages different from the language of learning, as well as those with hearing loss (Crandell & Smaldino, 2000). A study by Broom (2004) revealed that most South African primary school classrooms have learners who are learning in a language that is not necessarily their home language. This means that most South African primary school learners belong to a category of learners who can be considered to be at a higher risk of the negative effects of poor classroom acoustics.

There has not yet been a detailed national study looking at the status of the acoustic environment of classrooms in South African schools. A pilot study conducted in 2006 involving measurement of background noise levels in 15 classrooms from 15 primary schools in the Johannesburg metropolitan area showed that the majority of these classrooms had background noise levels that exceeded both the South African National Standards (SANS) and

Table 1: Background noise levels and reverberation times (RT) measured in 15 Johannesburg primary schools

Location	Schools	Unoccupied background noise level	Unoccupied RT60 value
Suburban	S1	39.9	0.87
	S2	40.52	0.91
	S3	41.85	0.86
	S4	42.81	0.79
	S5	45.2	0.98
	S6	45.54	0.59
Township	S1	40.5	0.78
	S2	41.04	0.88
	S3	45.08	0.81
	S4	52.52	0.66
School close to a noise source	S1	40.94	0.72
	S2	43.06	0.71
	S3	48.02	0.95
	S4	51.81	0.72
	S5	62.5	0.51

World Health Organization's (WHO) standards of 35-40 dBA and 0.6 seconds for maximum background noise levels and maximum reverberation times respectively, recommended for an unoccupied classroom (Ramma, 2007).

TYPICAL STRATEGIES FOR ADDRESSING POOR CLASSROOM ACOUSTICS

The practice in developed countries such as the United States of America for dealing with poor acoustic environments in a classroom involve the use of services of professionals such as acoustical consultants and educational audiologists. Typical interventions include physical modification to the classroom space to enhance its acoustic characteristics, and / or installation of hearing-assistive technology to overcome the problem of noise in the classroom (American Speech-Language Hearing Association (ASHA), 2005). Such intervention measures may not be feasible in a South African context due to the scarcity of skilled personnel such as acoustical consultants and audiologists required to provide these services, and budget constraints to pay for modifications and assistive technology that may be required in these classrooms.

However, one way to address the problem of poor classroom acoustics in South African primary schools could be to work with teachers and to empower them to intervene when their classrooms are not acoustically appropriate. When given the right strategies, teachers responsible for day-to-day management of the classroom environment can play a crucial role in managing background noise levels and amount of reverberation in their

classrooms. Examples of simple and yet effective strategies that can be shared with teachers include: closing doors or windows (especially those facing noise sources such as traffic noise from busy streets), padding learners' chairs with old tennis balls (De Villiers, 2003) or even removing most of the reflective materials (e.g. mirrors) from the walls to lower the amount of reverberation. Other strategies may involve planning of lessons in a way that takes into account noise levels during the course of the day, with subjects that require more reading being taught during less noisy times than other subjects (Boman et al., 2005).

According to ASHA (2005), the negative effect of classrooms with poor acoustic environments is not self-evident to teachers. Unless this information is brought to their attention, teachers do not usually treat poor classroom acoustics as barriers to learning (ASHA, 2005). The purpose of this study therefore was to explore the knowledge and attitudes of school teachers in selected South African primary schools regarding the impact of too much background noise and reverberation in the classroom on learners' speech perception and learning.

For the purposes of this study, the criteria for adequate knowledge would be met if the respondents indicated that they had some type of input about the subject matter (i.e. impact of poor classroom acoustics on speech perception), and if their responses in the questionnaire showed that they were aware of the impact that too much background noise and reverberation in the classroom (i.e. poor classroom acoustics) or poor quality of the teacher's voice would have on speech perception and the learning process. That is, a declarative knowledge about these topics at a relational level of understanding when using the SOLO taxonomy (Biggs & Tang, 2007). According to Biggs and Tang (2007), declarative knowledge refers to "knowing about things, or knowing what," while a relational level of understanding requires one to, among other things, 'relate' things or concepts (p.79). In this study, teachers were required to relate impact of noise to speech perception and learning.

METHOD

AIM

To explore the knowledge and attitude of teachers in selected South African primary schools regarding the impact of poor classroom acoustics on learners' speech perception and learning.

OBJECTIVES

The objectives of this study were therefore as follows:

□ To determine teachers' knowledge of classroom acoustics (background noise and reverberation) and its impact on speech perception and learning in class.

□ To determine teachers' knowledge about the level of teacher's voice during classroom communication and its impact on speech perception and learning.

□ To ascertain teachers' opinions and attitudes regarding classroom acoustics, the level of teachers voice and the impact of these factors on speech perception and learning.

□ To identify strategies used by teachers to enhance speech perception and audibility in class.

□ To determine whether there is any association between teaching experience or type of qualification and knowledge of classroom acoustics.

RESEARCH DESIGN

To meet the aims of this study a descriptive cross-sectional survey research design (Bowling, 2009) using quantitative data collection methods was used.

PARTICIPANTS

To qualify as a participant in the research, subjects had to be currently practising in the teaching profession at primary school level. Therefore, participants included primary school principals, deputy-principals and classroom teachers. School principals and deputy principals at all of the three participating schools were also included as participants in this study because they are also directly involved in day-to-day classroom teaching.

SAMPLING

Purposive sampling was used to select participating schools. Schools were selected such that one school was from a quiet Johannesburg suburb, the other school was from a major Johannesburg township and the last school was located in a Johannesburg inner-city area (close to most noisy areas). At each school, participants were recruited to participate in this study by way of convenience sampling. All teachers that were present at each of the schools on the day of the survey were invited to participate in this study (and all those who were recruited agreed to participate).

A total of 70 teachers (including principals and deputy principals) volunteered to participate in this study. Fifty-four of the participants were female and sixteen were male. Forty-four had more than 10 years' teaching experience and twenty-six had less than 10 years teaching experience. Twenty-three of the participants had a four year university degree in education or higher while the remaining forty-seven had a diploma in education or equivalent. All of the participants reported using English as the primary medium of instruction in their classes.

DATA COLLECTION PROCEDURE

Permission was first requested from Gauteng Education Department to conduct the study. This project was also approved by the University of the Witwatersrand Human Research Ethics Committee (non-Medical) (Protocol number H070205). Once permission and ethical clearance were granted, participating schools and participants in this study were selected as described above. School principals were contacted by telephone to request their permission and consent to participate in this study. If they gave permission, an appointment was made at a time convenient for the principal and the entire staff to go and administer the survey questionnaire. At all three schools, the survey was conducted either during the staff lunch break or at the beginning of the weekly staff meeting to avoid disrupting teaching activities.

Each participant was given an information sheet explaining the aims of the study and a consent form to indicate their willingness (or lack of) to take part in the study. After the aim of the study was explained to participants and consent forms were signed, each participant was given the survey questionnaire to complete. The researcher was physically present to answer any questions that arose during the completion of the questionnaire. Questionnaires were collected immediately upon completion, and participants were thanked for their participation.

DATA COLLECTION TOOL

A specially constructed questionnaire developed by the researcher was used to gather information for this study. The questionnaire was anonymous and self-administered. It comprised mostly close-ended questions, and contained the following four sections (see Appendix):

- Section A: Biographical information;
- Section B: Specific knowledge on classroom acoustics;
- Section C: Opinion and attitude of participants regarding classroom acoustics and its impact on classroom learning; and
- Section D: Strategies used to enhance audibility and speech perception in the classroom.

PILOT STUDY

The questionnaire was piloted with 10 participants with similar characteristics to the intended study sample to establish reliability and content validity (Maxwell & Satake, 2006) as well as to obtain representative and unbiased feedback about the questionnaire. The results of pilot testing revealed that teachers were not familiar with most of the technical terms or phrases that are commonly used when discussing room acoustics. The most problematic words or phrases were 'reverberation', 'speech perception' and 'classroom acoustics.' These words (and or phrases) were therefore replaced with more familiar words: reverberation was replaced with 'too many reflective surfaces in the classroom'; speech perception was replaced with 'hear and understand speech' and classroom acoustics was broken into 'background noise' and 'too many reflective surfaces.'

DATA ANALYSIS

The results of the questionnaire were analysed using a statistical software package (Statistica-9) to establish patterns of responses between different variables in this study. The statistical test chosen for this purpose was the Pearson Chi-square (X^2). This test is commonly used to compare the observed results with results that are expected based on a certain assumption or according to specific hypotheses (Maxwell & Satake, 2006). For instance, in this study it was expected that newly qualified teachers (e.g. <10 years experience) and teachers with at least a four year university degree in education will be more likely to report knowledge about classroom acoustics than teachers who hold diplomas in education or teachers who have been teaching longer (> 10 years experience).

RESULTS

This section will present the findings of the study as follows: (1) teachers self-reported knowledge of classroom acoustics; (2) attitude regarding classroom acoustics and the level of teacher's voice in the class and the impact of these factors on speech

perception in class; (3) strategies used by teachers to enhance speech perception in class, and (4) association between teaching experience, type of qualification and knowledge of classroom acoustics.

Seventy teachers from three primary schools completed the survey questionnaire for this study. However, eleven of the seventy questionnaires (16%) had to be discarded because the participants left an entire section of the questionnaire blank. Only fifty-nine (84%) questionnaires were used in the analysis, therefore the findings reported in the following sections will be based only on responses from these questionnaires (n=59).

1) KNOWLEDGE REGARDING CLASSROOM ACOUSTICS

Twenty-one (36%) of the participants reported that their classes were next to a noise source. Traffic was the most frequently cited source of noise, followed by noise from other learners in the playground. Participants were then asked whether they had any formal input on classroom acoustics while they were training to become teachers and / or while working as teachers. Twenty three (39%) of the participants reported that they had some type of input on classroom acoustics during their training as teachers, and eight (14%) said they had received some input about classroom noise via in-service training workshops.

Participants were then asked to rate their knowledge regarding the following three factors: too much background noise, too much reverberation in the classroom and level of teacher's voice and furthermore, the impact of these three factors on speech perception (hearing and understanding speech) and learning in the classroom. A five-point Likert scale was used with the following categories: limited, satisfactory, average, good and very good. Most teachers (fifty-one; 86%) rated themselves as having average to very good knowledge about the level of the teacher's voice and its impact on learning in the classroom (see Figure 1).

Forty-three (75%) of the respondents felt they had average or good knowledge about background noise and its impact on

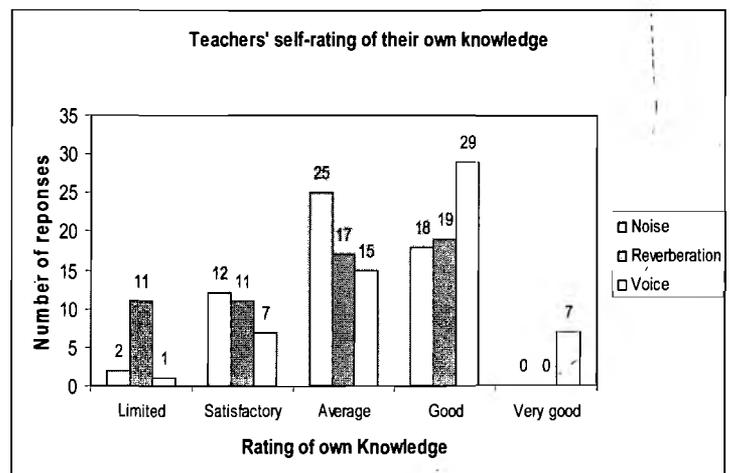


Figure 1: Teachers' self-rating of their own knowledge regarding classroom acoustics

classroom learning. None of the respondents reported very good knowledge of background noise and its impact on learning. Thirty-six teachers (62%) rated their knowledge of the impact of having too many reflective surfaces in the classroom on learning as average or good. None of the respondents rated their knowledge here as being very good. Almost all of the respondents (with the exception of four) felt that teachers need some input on classroom acoustics and other factors that influence or affect speech perception in the classroom. Seventeen (31%) of those who responded felt that this input should be given during teacher training, while sixteen (29%) felt that this should be given both during teacher training and as part of in-service training.

2) ATTITUDE REGARDING CLASSROOM ACOUSTICS AND TEACHER'S VOICE AND ITS IMPACT ON SPEECH PERCEPTION AND LEARNING

Most of the respondents in the survey (thirty-eight; 64%) were of the opinion that the teacher can play an important role in controlling factors that can impact on speech perception and learning in the classroom (e.g. background noise). Forty-four (75%) of the teachers who completed the questionnaire reported that they were satisfied with their classroom environment in terms of facilitating adequate speech perception by learners in the classroom. An overwhelming majority (87%) of the respondents agreed with the statement that if learners' speech perception is compromised due to poor acoustics in the classroom then overall academic achievement will be negatively impacted. However, when respondents were asked to rate the impact that too much background noise, too much reverberation in the classroom, and low level of the teacher's voice may have on speech understanding and learning in the classroom, most were of the opinion that these factors will only have an average (even little or no) impact on classroom learning (Figure 2).

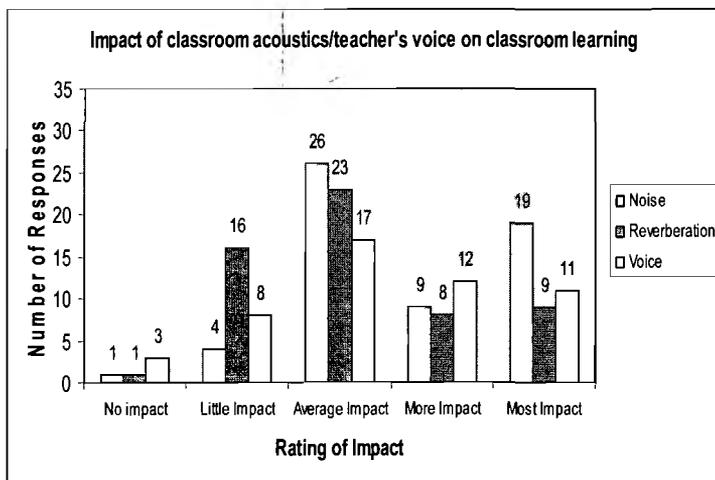


Figure 2: Teachers' views of impact of background noise, reverberation & level of the teacher's voice on speech perception in the classroom.

3) STRATEGIES USED BY TEACHERS TO ENHANCE SPEECH PERCEPTION AND UNDERSTANDING IN CLASS

Twenty-eight (47%) of the respondents reported that they often needed to raise their voices when talking to the learners during normal teaching activities. Only 19 (32%) reported that they considered the acoustic environment of their classroom when planning or preparing for their daily lessons. The most common strategies used by respondents in this survey to deal with noisy classrooms were; "to speak louder, more clearly and more slowly". Some respondents reported varying their voices according to the noise conditions, while some addressed a noisy classroom environment by organising the learners' seating arrangement in the classroom to favour learners with limited English language communication skills. One respondent reported playing classical music while students did written work as a strategy to help them concentrate better.

4) ASSOCIATION BETWEEN TEACHING EXPERIENCE, TYPE OF QUALIFICATION AND KNOWLEDGE OF CLASSROOM ACOUSTICS

Tables 1a and 1b show the results of a Pearson chi-square analysis regarding an association between the following variables:

- 1 -Teaching experience and knowledge of classroom acoustics (Table 2a).

Table 2a: Association between teaching experience and knowledge of classroom acoustics

	Knows about classroom acoustics		Row totals
Experience (No. of yrs teaching)	Yes	No	
<10	9	11	20
>10	27	12	39
Column Totals	36	23	59
Pearson Chi-Square	$\chi^2 = 2.150096, df = 1, P = 0.14256$		

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2 -Type of qualification and knowledge of classroom acoustics (Table 2b).

Table 2b: Association between type of qualification and knowledge of classroom acoustics

Type of qualification	Knowledge about classroom acoustics		Row Totals
	Yes	No	
Diploma	17	22	39
4 year degree or higher	7	13	20
Column Totals	24	35	59
Pearson Chi-Square	$\chi^2 = 0.9111253$, $df = 1$, $P = 0.33982$		

The results of this study showed that there was no association between teaching experience and the probability of being taught about classroom acoustics while training or while working ($p = 0.05$). There was also no association between the type of qualification and reporting being taught about classroom acoustics while training or after qualifying as a teacher ($p = 0.05$).

DISCUSSION

School classrooms are the environments in which most of the learning activities at school occur. The quality of what the learners are expected to learn is therefore partially dependent on the environment in which they learn (i.e. the classroom environment). It is therefore important that the classroom environment should be free of extraneous distractions (e.g. too much background noise) that can interfere with the learning process. Despite the fact that the suitability of learning spaces is planned by architectural designers as early as the design of the school or classroom building (Guckelberger, 2003), teachers are ultimately the people with more control of the daily management of that space. This was a view that was also held by the majority of the participants (64%) in this study

It was encouraging to see that some of the participants had received some input on classroom acoustics either during training (36%) or after their training as teachers (12%). However, overall the results of this study showed that the majority of participants did not have adequate knowledge about the topic of classroom acoustics and the impact that a classroom with a poor acoustic environment could have on the learning process. These findings are consistent with those of other studies, such as the

one by Dockrell et al. (2004), in which it was found that despite the fact that noise is a serious problem in urban schools in the United Kingdom, teachers show little awareness of the importance of noise levels in their classrooms and of the need to monitor noise for particular tasks and teaching contexts.

Participants in this study generally rated their knowledge of classroom acoustics and the importance of voice in classroom learning as high (average or better). However, it was evident from responses in later parts of the questionnaire that despite this high self-rated knowledge, most participants did not have adequate knowledge of the impact that a sub-optimal classroom acoustic environment may have on the learners' speech perception in class. For instance, almost half (44%) of the participants were of the opinion that excessive background noise in the class will only have an average impact on speech understanding in the classroom while a third (33%) of the respondents were of the opinion that deterioration in the teacher's voice will have an average impact on speech understanding. One explanation for this observed high self-rating could be the fact that these topics, especially background noise and teacher's voice are generally intuitive phrases to an average teacher. Therefore, teachers may be familiar with the phrase or words because they are part of everyday language in a school setting. However, that does not necessarily mean that they are fully aware of the impact that these factors may have on speech perception and consequently learning in the classroom.

Participants also tended to assume that background noise had a greater negative impact on speech perception and learning than the teacher's voice. This is despite the fact that the negative effect that background noise has in a classroom situation is due to the fact that it covers up part of the teacher's voice and hence degrades the quality of the message communicated to the learners (Crandell & Smaldino, 1994). The teacher's voice is therefore the most important variable in a classroom situation. Any situation or event in the classroom that compromises the teacher's voice is bound to have the most impact in the learning process. It was therefore expected that participants would rate the impact of the teacher's voice on the learning process higher than any other factors or variable. Surprisingly, a third (33%) of the teachers who participated in this study were of the opinion that the level of the teacher's voice is less important than too much background in terms of impact on speech perception and learning in the classroom.

Most respondents (75%) reported that they were satisfied with the suitability of their classroom environment as a learning environment. This is consistent with the findings of another study (Manlove et al., 2001), in which teachers tended to be more accommodating of noisy classrooms and often dismissed excessive background interference as the "price of doing business." This accommodating attitude is likely to be prevalent if the interfering

noise is from learners on the school property (Manlove et al., 2001) as opposed to noise sources external to the school environment (e.g. traffic noise), even though meaningless, irrelevant speech (noise from an adjacent class or other learners in the playground) has been shown to have the greater effect on interfering with speech perception than other types of noise (Boman, Enmarker & Hygge, 2005).

Almost half of the respondents said that they often need to raise their voices above their normal talking levels when communicating with learners. This need to raise their voices could be an indication of excessive background noise levels in the classroom. Doyle & Dye (2003) advised that the best approach to dealing with interfering background noise in the classroom is to be aware of sources of noise (both extraneous and internal) and to start planning teaching activities with this in mind rather than simply talking louder. In the present study only 32% of respondents said that they considered the acoustic environment of their classroom when planning their lessons. None mentioned any of the common strategies that involve physical modification of the classroom (e.g. carpeting the classroom floors, cushioning the legs of the learners' chairs) as a strategy for enhancing the acoustics.

IMPLICATIONS OF THE STUDY AND FUTURE RESEARCH

This study showed that the majority of the teachers who took part in this study did not have adequate knowledge about poor classroom acoustics. Teachers therefore need to be given more information on this and also to be trained to recognise the need for an intervention when working in classroom environments that are acoustically inappropriate. Teachers also need to be trained on simple and yet effective solutions to use when the classroom environment is not conducive to learning due to poor classroom acoustics. This should ideally be addressed in the curriculum during teacher training, as well as in refresher courses for later in-service training for teachers. The results of this study showed that there was no association between teaching experience or the type of qualification that the teacher holds and the likelihood of having received some input on classroom acoustics. This means that refresher courses should target all teachers who are currently working regardless of teaching experiences or the type of qualification they hold.

While this study attempted to investigate key aspects of classroom acoustics (e.g. background noise and reverberation), it was not possible to provide an in-depth investigation of this subject matter due to time and resource constraints. Future studies should aim to explore the feasibility of training current teachers to manage the acoustic environment of the classroom to optimise its use as a space for learning.

LIMITATIONS OF THE STUDY

Since information for this study was obtained by using a ques-

tionnaire with predominantly close-ended questions, respondents were limited on what they could say because they were not given the opportunity to elaborate on their responses. The questionnaire also contained many terms that were not necessarily familiar to the teachers. While an attempt was made to minimise the number of unfamiliar words during the piloting of the questionnaire, as well as during a briefing before completing it, some of the respondents may have found the questionnaire to be time-consuming since they were dealing with a subject not necessarily familiar to them. Lastly, this survey was conducted with teachers from only a three schools using non-random sampling and participant selection methods. Although an attempt was made to ensure that the schools selected were heterogeneous and represented diverse geographical areas, it is not possible to generalize the findings of this study to all teachers or schools in the Johannesburg area or to other parts of the country.

CONCLUSION

The results of this study showed that teachers who participated in this study did not have adequate knowledge about classroom acoustics. Knowledge was especially lacking when it came to indicating how classroom environments with poor acoustics are likely to affect speech perception, and consequently the learning process. Given the linguistic diversity of most classrooms in South African primary schools, it means that most learners who have not mastered the language of learning are likely to be disadvantaged when the classroom environment is not acoustically suitable. This means that teachers need to be given the necessary input to manage the acoustic environment of their classrooms. Different stakeholders, such as teachers, acoustics experts and educational audiologists should come together to address this issue. Management of the acoustic environment of the classroom should ideally also be addressed during teacher training. For teachers who are currently working but do not have adequate knowledge about classroom acoustics and its impact on the learning process, refresher courses could be offered to equip them with strategies to better manage the acoustic environments of their classrooms.

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Appendix

Speech Perception Survey Questionnaire

Directions for completing the questionnaire:

1. Please use ink pen
2. Please mark with an "X" to indicate your selections

A. Demographic information

1. Gender

Male Female

2. Number of years teaching

0-1 2-5 6-10 >10

3. Highest education qualification

Dip. Prim. Ed. B. Prim Ed. BA Ed. MA. Ed. Other: _____

4. Where did you qualify? Specify training institution: _____

5. Current post at the school

Classroom teacher Deputy Principal Principal

6. Grade currently teaching (**please select one**)

0 1 2 3 4 5 6 7 8 9 10

7. Grades taught in the past 5 years (**select a maximum of 3**)

0 1 2 3 4 5 6 7 8 9 10

8. Current number of learners in your class

<20 20-25 25-30 30-35 35-40 40-45 >45

9. Primary language used as a Medium of instruction in class (**Please select 1**)

English isiZulu seSotho Afrikaans isiXhosa Other _____

10. Number of learners in your classroom who speak English as their first/home language (**estimate**) _____

11. Is your school/classroom located close to a noise source (e.g. freeway, busy street etc.)?

YES No

12. If YES above, please specify the nature of noise source: _____

13. Does your classroom have the following:

	YES	NO	NOT SURE
a. Double wall construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Acoustical ceiling tile in hallways	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Fully carpeted floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Brick wall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Posters on the walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Curtains/Blinds in all windows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Concrete floors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Ceramic Tiles on the floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Ceramic Tiles on the walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Vinyl tiles on the floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B. Knowledge on Speech perception and classroom acoustics

1. While you were training as a teacher, did your training curriculum include:

	YES	NO
a. Background noise and its impact on learning	<input type="checkbox"/>	<input type="checkbox"/>
b. Reflective surface in class and their impact on learning	<input type="checkbox"/>	<input type="checkbox"/>
c. Teaching in a multi-language context	<input type="checkbox"/>	<input type="checkbox"/>
d. Optimizing speech understanding by pupils in the classroom	<input type="checkbox"/>	<input type="checkbox"/>
e. Vocal hygiene and voice projection	<input type="checkbox"/>	<input type="checkbox"/>

2. Since you started working as a teacher, have you had additional continuing education training on:

	YES	NO
a. Background noise and its impact on learning	<input type="checkbox"/>	<input type="checkbox"/>
b. Reflective surfaces in class and their impact on learning	<input type="checkbox"/>	<input type="checkbox"/>
c. Teaching in a multi-language context	<input type="checkbox"/>	<input type="checkbox"/>
d. Optimizing speech understanding by pupils in the classroom	<input type="checkbox"/>	<input type="checkbox"/>
e. Vocal hygiene and voice projection	<input type="checkbox"/>	<input type="checkbox"/>

3. Are you aware of any legislation, national education department policy or national standard that deals with any of the following?

	YES	NO
a. Learner to teacher ratio in the classroom If yes, please specify: _____	<input type="checkbox"/>	<input type="checkbox"/>
b. Maximum background noise in the classroom If yes, please specify: _____	<input type="checkbox"/>	<input type="checkbox"/>
c. Maximum reverberation time in the classroom If yes, please specify: _____	<input type="checkbox"/>	<input type="checkbox"/>
d. Language of instruction in the classroom If yes, please specify: _____	<input type="checkbox"/>	<input type="checkbox"/>

4. How would you rate your knowledge of the following factors and their impact on speech understanding and learning in the classroom:

- a. Background noise
 Limited Satisfactory Average Good Very Good
- b. Reverberant classroom
 Limited Satisfactory Average Good Very Good
- c. Signal to noise ratio
 Limited Satisfactory Average Good Very Good
- d. Listening distance
 Limited Satisfactory Average Good Very Good
- e. Hearing ability of individual learners
 Limited Satisfactory Average Good Very Good
- f. Linguistic experience of the learners
 Limited Satisfactory Average Good Very Good
- g. Level of teacher's voice
 Limited Satisfactory Average Good Very Good
- h. Too many reflective surfaces in the classroom
 Limited Satisfactory Average Good Very Good

5. Do you think teachers need specific training on the above mentioned factors that influence/affect speech perception in class?

YES	NO
<input type="checkbox"/>	<input type="checkbox"/>

6. If you answered YES in 6 above, when should this training occur?

- | | YES | NO |
|---|--------------------------|--------------------------|
| a. during teacher training in teacher training colleges | <input type="checkbox"/> | <input type="checkbox"/> |
| b. in service training as continuing education | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Both (during training and as an in-service training) | <input type="checkbox"/> | <input type="checkbox"/> |

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C. Opinion regarding classroom acoustics and its impact on speech understanding and learning

1. Are you satisfied with your classroom environment as far as facilitating learners' ability to hear and understand speech?

YES NO

2. If NO, please explain (use back page if you need more space)

3. In your opinion who has the greatest control on the afore mentioned factors that influence hearing and speech understanding in the classroom? (Please do not select more than 2 choices)

- Classroom/School designers and planners
- School administrators (e.g. Principal)
- Classroom teacher
- National department of education

4. Rate the following factors on how much impact they will have on speech understanding and learning in the class room?

a. Level of the teacher's noise

No Impact Little Impact Average Impact More Impact Most Impact

b. Too many reflective surfaces in the classroom

No Impact Little Impact Average Impact More Impact Most Impact

c. Background in the classroom

No Impact Little Impact Average Impact More Impact Most Impact

d. Hearing ability of the pupils in classroom

No Impact Little Impact Average Impact More Impact Most Impact

e. Reverberation in the classroom

No Impact Little Impact Average Impact More Impact Most Impact

f. Linguistic experience of the learners

No Impact Little Impact Average Impact More Impact Most Impact

g. Listening distance

No Impact Little Impact Average Impact More Impact Most Impact

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5. In your opinion, poor hearing and speech understanding in class will lead to:

	Agree	Disagree	Not Sure
a. Poor reading/spelling skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Poor mathematics and science skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Behavior problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Attention and concentration problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Poor academic achievement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. In your opinion, what acoustic features in your specific classroom impact negatively on speech understanding? Please list as many as you can:

D.Strategies to enhance hearing and understanding speech as well as audibility in the classroom

1. Do you need to raise your voice when talking to your students during normal teaching activities?
 YES NO

2. Do you teach with:

	YES	NO
a. Door open	<input type="checkbox"/>	<input type="checkbox"/>
b. Windows open	<input type="checkbox"/>	<input type="checkbox"/>
c. Fan on	<input type="checkbox"/>	<input type="checkbox"/>

3. Do you consider the acoustic environment of your classroom when you plan and prepare for your lesson?
 YES NO

4. Do you have learners with special listening needs (e.g. hearing impairment etc.) in your classroom?
 YES NO

5. List some of the things that you do or have done to improve speech understanding in class. List:

6. If you have concerns about the status of your classroom acoustics, what should you do to address that? List:

7.

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