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Teachers' Perception of Urban Noise in The Classroom: Case Study in Mukah, Sarawak

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Abstract

Environmental noise is an unwanted sound created by urbanisation and industrialisation processes, which has been linked to problems of teachers in the school such as lack of concentration, annoyance, speech interference and low performances. The impact of noise in the classroom during the teaching session can cause increased stress and fatigue to teachers. This study aims to identify the noise factor in the school and the impacts of urban noise on teachers during the teaching session through subjective evaluation. In the present study, a questionnaire survey was distributed to the teachers at three secondary schools in Mukah, Sarawak. The developed questionnaire was evaluated by the experts and pilot study was carried out prior to the actual survey. A total of 204 respondents from secondary schools named as School A, School B and School C were participated in this study. The questionnaires were sent to all teachers in three schools in the form of Google Forms and sent by using the WhatsApp application. The main factor of environmental noise that affects teachers from all schools studied came from transportation. Most of the teachers agreed that they need to raise their voice and walk around inside the classroom during the class in order to make sure students can hear their message clearly.

1. Introduction

Urbanization and rapid economic growth have led to serious noise pollution in many cities. This urban noise in schools can have an adverse impact on students and teachers which affects their well-being, health, and overall learning environment. It's worse when the schools are close to the traffic road [1]. This urban noise will become the main factor of noise contributing to disturbing the concentration of teachers during the teaching and learning sessions in the school and reducing the working productivity of the teachers and leading to misunderstanding among pupils in the classroom [2]. The traffic noise that affected many institutions or schools was not only limited to the urban areas, but also influenced the teacher and students in the sub urban areas and rural areas. The traffic noise on roadside schools was found to be the most noise source that reduced student performance and satisfaction [3].

A good internal acoustic performance of a classroom is also required to ensure the efficacy of the teaching and learning process, as well as that the room's role is accomplished. The disturbances from student chatting, moving furniture, and adjacent classrooms may result in a loss of attention during teaching and learning activities

in a classroom [4]. Thus, the study on determining teachers' perceptions of the acoustic comfort of classroom situations was carried out. This study also aims to identify the sources of noise in the classroom during the teaching and learning sessions and identify the impacts of this noise on the teachers.

2. Subjective Evaluation

In this study, subjective evaluation of the source of urban noises that have an impact on the teachers' performance in the classroom was carried out through a questionnaire survey. All teachers in the selected schools were chosen as the respondents for the present study. A total of 204 teachers responded to the survey in determining the main sources of noise in the classroom and the impacts of this urban noise on their teaching performance and acoustic comfort.

2.1 Case Study Locations

The surrounding environment can have a significant impact on noise levels and influence the background noise of the school [5]. Three public secondary schools at Mukah, Sarawak with different school surrounding environments were chosen as case studies for this study as shown in Fig. 1. School A is located next to heavy traffic roads and surrounded by greeneries. The urban noise which may interrupt the teaching and learning process may be due to the traffic noise. School B is situated next to the church, near the road, primary school, and driving license school where the urban noise from the surrounding environment may come from different sources. School C is located near the main road, fire and rescue station, hospital, and residential areas which may contribute to the numerous sources of urban noise that may interrupt the teaching and learning sessions in the classroom.

(a) **(b)** **(c)**

Fig. 1 *Location of studied areas (a) School A; (b) School B; (c) School C*

2.2 Questionnaire Development

The present study used questionnaire survey to identify the sources and impacts of noise in the classroom and evaluate the acoustic comfort of the teachers in the school environment. The questionnaire is divided into a few sections as shown in Table 1 with the closed-ended questions. Section A consists of basic demographic information. The questions in Section B were the sources of noise in the classrooms which included noise that come from classroom itself and school compound such as students chattering, moving furniture (tables, chairs, bench, and others), electric teaching appliances or equipment, neighbouring class/ corridor, and school field. On the other hand, the sources of noise from outside the classroom which listed in the questionnaire are noise from nearby construction, commercial/ food truck, nearby community (daily activities), devices (false alarm, lawn mowing and others), animals (barking dogs, chirping birds and others), vehicle noise (engines, exhaust, tyres, and horn), emergency vehicles (ambulance siren, police siren and fire truck siren). In Section C, the respondents were asked on the impacts of urban noise to their teaching performances and activities which covered before, during and after the teaching sessions. The questions in Section D consist of approaches that teachers implement in the classroom/ school to overcome the urban noise problem. The last section covered the questions related to the teachers' judgement on the acoustic comfort of the classroom in their school. The 5-Likert scale as shown in Table 2 was used in this study.

2.3 Expert Review and Pilot Study

The developed questionnaire was reviewed by three experts and undergoes pilot study before it is used for the actual survey. The questionnaires have been examined for their validity by referring to experts with extensive expertise and knowledge in this subject. Two university academic staff who are specialists in questionnaire survey and a teacher with more than ten years of teaching experience were chosen as experts in reviewing the present questionnaire. The questionnaire items that had been modified in terms of language, presentation, and substance after reviewed by three experts were then used for the pilot study. The pilot study was undertaken to guarantee the reliability of the instruments.

Int. Journal of Integrated Engineering Vol. 16 No. 4 (2024) p. 64-71

A total of 10 teachers from a public primary school in Mukah were chosen at random to answer the questions for the reliability test. The Cronbach's Alpha value for this study is 0.923 based on the data from the Statistical Package for Social Science (SPSS) version 25.0 software. This value indicated that the internal consistency of the questions is excellent.

Table 1 *Questionnaire development information*

Sections	Items	Techniques
A: Demographic	• Gender • Age • Teaching experience	Multi-choices
B: Teachers' perspective on factor of urban noise in classroom/ school	• Noise from inside the school environment. • Noise from outside the school environment.	5 – Likert scale
C: Teachers' perspective on effects of urban noise in classroom	• Before teaching and learning session in the classroom. • During teaching and learning session in the classroom. • After teaching and learning session in the classroom.	5 – Likert scale
D: Approaches by teachers to overcome the noise during teaching and learning session in classroom	• Walk around in the classroom during teaching and learning session. • Use the microphone to speak during teaching and learning session. • Ask the students to keep quiet during the teaching session. • Punish the students who make noise in the classroom. • Close the windows or doors to reduce the noise from outside classroom. • Warn the students from the neighbouring classrooms to keep quiet. • Put the keep the quiet sign in the classroom or around the school compound	5 – Likert scale
E: Teachers' perspective on acoustic comfort in school	• Satisfied with the noise condition of the school environment. • Satisfied with the surrounding existing acoustic comfort classrooms.	5 – Likert scale

Table 2 5-*Likert scale used in this study*

Scale	Feedback
1	Never
2	Rarely
3	Sometimes
4	Often
5	Always

3. Data Analysis

The results from the subjective evaluation of survey except Section A: demographic of respondents will be discussed in the mean score values as shown in Table 3.

Table 3 *Mean score adopted by Moidunny [6]*

Mean Score	Interpretation
1.00 – 1.80	Very low
1.81 – 2.60	Low
2.61 – 3.20	Medium
3.21 – 4.20	High
4.21 – 5.00	Very high

3.1 Demographic of Respondents

Table 4 indicates the demographic profile of the respondents. The data was obtained based on a questionnaire survey that was gathered from 80 teachers in School A, 42 teachers from School B and 82 teachers from School C. Majority of the teachers in the three schools are female and range age between 40 to 49 years old. The teachers from School A and School B mostly have teaching experience of more than 10 years. On the other hand, most of the teachers in School C had the experience of teaching for more than 15 years and followed by those who have been teaching for 5 to 1[0 years.

Table 4 *Demographic data of respondents*

	School A		School B		School C	
Total respondents	80		42		82	
	Male	Female	Male	Female	Male	Female
Gender	20	60	17	25	30	52
	25%	75%	40%	60%	37%	63%
Age						
≥ 50 years old	6%	18%	10%	4%	10%	12%
40 - 49 years old	14%	38%	12%	48%	14%	50%
30 - 39 years old	4%	26%	11%	33%	8%	26%
20 - 29 years old	0%	4%	2%	2%	1%	1%
Teaching experience						
> 15 years	14%	35%	14%	32%	14%	38%
11 - 15 years	9%	32%	10%	36%	16%	24%
5 - 10 years	3%	25%	12%	28%	5%	36%
< 5 years	0%	8%	5%	4%	3%	2%

3.2 Teachers' Perception on The Sources of Urban Noise in Classroom

Fig. 2 shows the perception of teachers in studied areas on the sources of noise in the classroom. The sources of noise separated into two groups are noises that generate within the school compound and another group is noise from outside the school environment. From the chart, it can be noticed that urban noise coming from nearby traffic becomes significant noise pollution in the classrooms for all schools. Based on the responses from the teachers, this noise ranked as the primary noise contributor in School A and School C with mean score values of more than 4.50. Most of the respondents agreed that vehicles noises are the sources of noise in the classroom during their teaching sessions as the schools are located near to traffic roads, especially School A which is located next to the main road of Mukah town. Teachers from School B also rated this urban noise as a significant noise source in their classrooms. Since all studied schools are located near the traffic road, it is expected that noise from vehicles will be the main contributor of noise that affected the teaching and learning sessions of the study. The location of School C is less than 30 meters from the main road, that is why it contribute to high traffic noise. As for School A and School B, the school is less than 100 meters away from the main road. As supported by Wen et al. [7], traffic noise is the main factor that influences the teaching and learning sessions of roadside schools. Besides, traffic also is the main factor of noise contributed to disturb the concentration of teachers during the teaching and learning session in the school [2].

From the data, the hospital located near School C is obviously influenced by the background noise of the classroom which led to the higher mean value of emergency vehicles as the factor of noise. Teachers from this school evaluated the noises from emergency vehicles as disturbance noises in their classroom during the teaching

Int. Journal of Integrated Engineering Vol. 16 No. 4 (2024) p. 64-71

sessions. The siren from the ambulance may often interrupt their teaching sessions and interfere with the concentration of the students, which is in line with the previous study when the sensitive receiver is near the hospital [8]. Respondents from School A rated animals and devices as sources of noise that often disturbing their teaching and learning sessions. Although the school is situated next to a forest, the sound from the animals in the forest also disturb the teaching lessons. As many activities such as cutting grass and trimming the trees happened near to this school, the teachers responded that devices from the outside the school environment contribute to the noises in their classrooms.

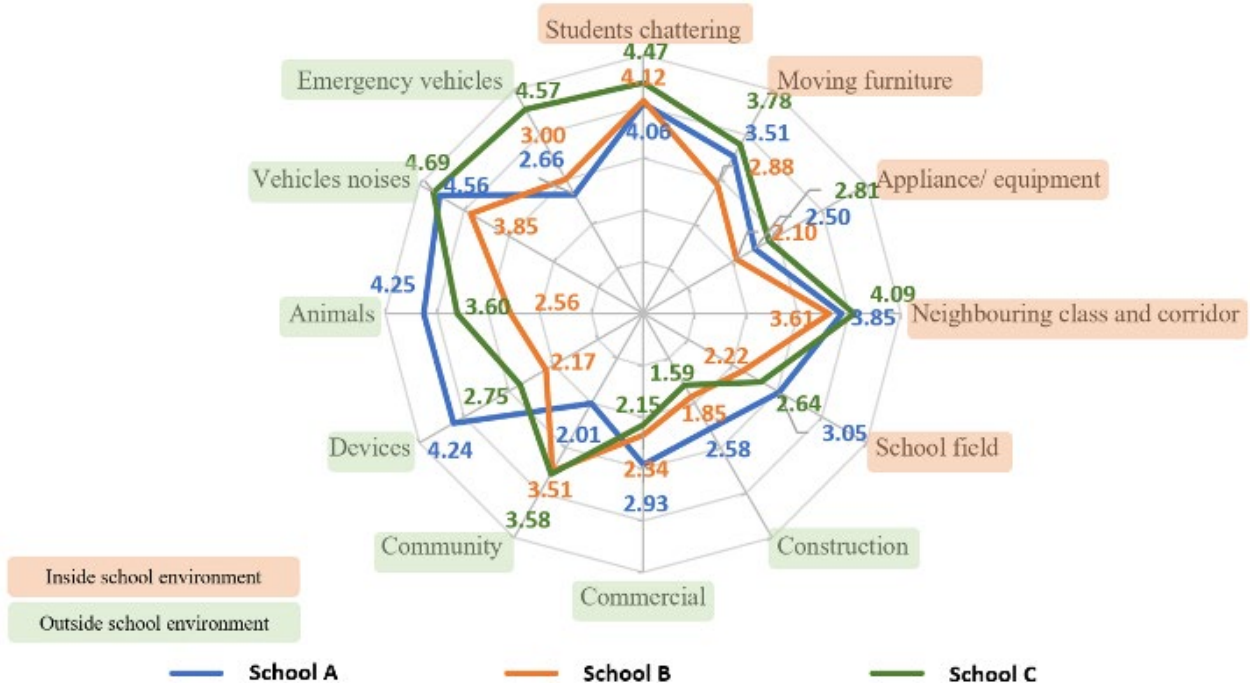

Fig. 2 *Perception of teachers on the sources of noise in the classroom*

Another significant noise source in the classrooms for all schools is students chattering in the class. Teachers from School B selected noise from student chattering as the top main source of noise in their classrooms with the mean score of 4.12. The sound from the student chattering masking the teachers' voice which makes them felt this noise is also contributor of noise in the classrooms. The teaching task for the teachers can be tough in a noisy classroom. Moreover, noise from neighbouring classes and corridors is also considered as important noise source in the classrooms for all schools. The disturbances from neighbouring classrooms or activities from the adjacent rooms may result in a loss of attention during teaching and learning activities in a classroom [4].

Due to the School B and School C are located close to residential areas and some public facilities, the respondents reacted that they experience noise problems coming from the local community during teaching and learning hours with the mean values roughly 3.50. In contrast, teachers from School A responded that they are not affected by the noise from the surrounding community as there are no residential areas near the school environment. Moreover, from the viewpoint of all teachers, construction noise is considered very low to low that affected their teaching session in the classroom.

3.3 Perception on Effects of Urban Noise in Classroom

Appendix A shows the responses of teachers in 3 schools on the effects of the noise during the teaching session. The data was analysed in mean and standard deviation (SD) values based on different genders and schools to get a more comprehensive understanding of the perception between male and female teachers. In general, there is not much difference between the mean values of two group genders of the respondents. Not only the average values of these two groups are similar, the standard deviation
, SD on perception of noise impacts to male and female teachers also is considered low which below 1.00 or roughly 1.00. This indicated that there are low variations of responses among the respondents.

Most of the respondents in this survey gave feedback that they often need to raise up their voice during the teaching and learning session to make sure students can hear their messages clearly. The mean values for this effect of noise recorded more than 4.00 for all schools. Moreover, all teachers from School A and School C responded that they experienced annoyance during teaching session in the classroom with the mean value range 3.50 to 4.00. As the teachers from School A and School C need to raise their voice during the class, they are also

experiencing physical health problems, especially sore throat. This effect is predictable as teachers are frequently forced to talk loudly due to the noisy sound environment in the classrooms and resulting in sore throats and hoarseness [9]. The noise in the classroom is crucial as it can harm the teachers 'voice.

From the table, even though the teachers get the impacts of noisy classroom, they are not affected their motivation and willingness to teach their students. Comparing between two gender of teachers, male teachers are easily to experience mental health issues such as stress, migraine, depression, and others despite of this scenario rarely happened after teaching and learning session.

3.4 Teachers' Perception on Approaches to Overcome the Noise in The Classroom

Respondents' feedback on their actions toward the noisy classroom condition is shown in Appendix A. For all studied schools, most of the teachers agreed that they always have to walk around in the classroom during teaching and learning sessions to make sure all students can hear their voices clearly. The mean score for this approach was more than 4.50 and the SD values of this item were low as well which are roughly 0.50. In order to overcome the noisy situation in the classroom, there is quite often the teachers in all studied schools have to ask their students to keep quiet during the teaching sessions. Based on the interpretation of the mean score for this approach, it was considered as high as the mean values are in the range of 3.80 to 4.00 with the SD below 1.00. Besides, the majority of the teachers agreed that they often warn the students from the neighbouring classrooms to keep quiet where this solution recorded mean values of range 3.30 to 3.90 with the SD ≤ 1.0.

The next approach with a medium level of mean score is that teachers in all 3 schools choose to close the windows or doors to reduce the noise from outside classrooms. The findings also show that teachers from School A and School C have to punish the students who make noise in the classroom which the data showed in the medium range of mean value. This punishment method is used for teacher School B at a very low level. From the survey, it shows that most of the teachers never or rarely use microphones to speak during teaching and learning sessions to make sure all students can hear their voices. In addition, the approach of using quiet signs in the classroom or around the school compound is also considered a very low level of implementation among the teachers in all studied schools.

3.5 Teachers' Perception on Acoustic Comfort in School

Section E in Appendix A shows the perception of teachers on the acoustic comfort of their schools. Only female teachers in School A responded that their satisfaction with the acoustic condition of the classrooms was at a slightly high level with a mean value of 3.23 compared to other teachers in all 3 schools were only rated it as a medium level of satisfaction with the mean score of range 2.40 to 3.00. Similarly, all teachers only rated a medium level of satisfaction with the existing noise condition of their school environments.

4. Conclusion

In this study, subjective evaluation of factors, effects, and acoustic comfort of teachers in 3 schools located in Mukah, Sarawak was carried out. From the survey, the dominant noise that appeared in the school environment is coming from vehicles nearby. Noise from the emergency cars is also the main contributor urban noise in the classroom in the school where the hospital is located nearby. Apart from the urban noise from outside school compound, noise come from school environment itself which including student chattering, neighbouring classrooms and corridors also are the significant noise source in the classroom that interrupt the teaching and learning sessions. The noisy environment has caused the teacher to have to speak loudly to ensure that the students can hear clearly. In overall, teachers feel that the level of acoustic satisfaction in the classroom is at a moderate level.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Tong Yean Ghing, Cheung Liu Yee;* ***data collection:*** *Aurelia Paul;* ***analysis and interpretation of results:*** *Aurelia Paul, Tong Yean Ghing, Cheung Liu Yee;* ***draft manuscript preparation:*** *Tong Yean Ghing,* Seyed Jamalaldin Seyed Hakim*. All authors reviewed the results and approved the final version of the manuscript.*

Int. Journal of Integrated Engineering Vol. 16 No. 4 (2024) p. 64-71

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	School A			School B			School C		
Section C: Teachers' perspective on effects of urban noise in classroom	**Male**	**Female**	**All**	**Male**	**Female**	**All**	**Male**	**Female**	**All**
a) Before teaching and learning session	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD
I feel unmotivated to teach in the classroom	2.50 0.6	2.13 0.72	2.23 0.71	1.35 0.49	1.44 0.58	1.40 0.54	2.43 0.57	2.04 0.74	2.20 0.70
I feel unwilling to teach in the classroom	2.45 0.69	2.02 0.68	2.13 0.70	1.12 0.33	1.12 0.33	1.12 0.33	2.20 0.48	1.81 0.66	1.96 0.63
b) During teaching and learning session									
I experience annoyance during teaching session in the classroom	3.75 0.44	3.48 0.62	3.55 0.59	3.12 0.93	3.04 0.84	3.07 0.87	4.03 0.76	3.48 1.02	3.70 0.97
I need to raise my voice during the teaching and learning process in classroom	4.55 0.60	4.25 0.70	4.33 0.69	4.18 1.19	4.32 0.99	4.26 1.06	4.60 0.72	4.10 0.93	4.28 0.89
c) After teaching and learning session									
I experience physical health problem (eg: sore throat)	4.00 0.46	3.55 0.67	3.66 0.65	2.88 0.93	2.84 1.03	2.86 0.98	3.73 0.58	3.35 0.81	3.49 0.76
I experience mental health issues (eg: stress, migraine, depression, etc.)	2.35 0.49	1.85 0.63	1.98 0.64	1.88 0.60	1.92 0.57	1.90 0.58	3.03 0.93	2.40 1.03	2.63 1.04
Section D: Approaches by teachers to overcome the noise during teaching and learning session in classroom									
I have to walk around in the classroom during teaching and learning session to make sure all students can hear my voice clearly	4.45 0.51	4.37 0.52	4.39 0.52	4.53 0.80	4.64 0.57	4.60 0.66	4.73 0.64	4.73 0.60	4.73 0.61
I have to use the microphone to speak during teaching and learning session to make sure all students can hear my voice clearly in the classroom	1.05 0.22	1.07 0.25	1.06 0.24	1.59 0.51	1.64 0.57	1.62 0.54	1.23 0.43	1.58 0.70	1.46 0.63
I ask the students to keep quiet during the teaching session in the classroom	4.05 0.51	4.00 0.64	4.01 0.61	3.76 0.66	3.88 0.53	3.83 0.58	4.07 0.83	3.90 0.82	3.96 0.82
I have to punish the students who make noise in the classroom	2.85 0.49	2.53 0.70	2.61 0.67	1.88 0.60	1.76 0.66	1.81 0.63	2.83 0.65	2.62 0.82	2.69 0.76
I have to closed the windows or doors to reduce the noise from outside classroom that interrupt the teaching and learning session	2.75 0.72	2.53 0.89	2.59 0.85	2.88 0.93	2.76 0.78	2.81 0.83	3.17 0.87	2.77 0.96	2.94 0.95
I have to warn the students from the neighbouring classrooms to keep quiet	3.90 0.45	3.82 0.57	3.84 0.54	3.47 1.01	3.32 0.95	3.38 0.96	3.87 0.78	3.56 0.98	3.69 0.92
I have to put the keep quiet sign in the classroom or around the school compound	1.15 0.37	1.25 0.51	1.23 0.48	1.88 0.93	1.64 0.70	1.74 0.80	2.17 0.79	1.98 0.80	2.06 0.80
Section E: Teachers' perspective on acoustic comfort in school									
I am satisfied with the (noise / sound) condition of the classroom in this school.	2.85 0.67	3.23 1.08	3.14 1.00	3.00 0.35	3.08 0.28	3.05 0.31	2.37 0.76	2.85 0.96	2.65 0.92
I am satisfied with the surrounding existing acoustic comfort in the school	2.50 0.76	2.98 0.91	2.86 0.90	2.94 0.43	2.96 0.45	2.95 0.44	2.43 0.86	2.87 0.95	2.69 0.94