

Traffic Noise Effects on the Efficiency of Teaching and Studying Classrooms

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Abstract:

Traffic noise is unpleasant sounds generated due to vehicles and pedestrians activities. Its effect on the efficiency of teaching and studying classrooms continuously increases. That is because of the population growth, vehicles ownership increasing, scientific development, and urbanization process, which leads to variety of traffic noise sources and increasing the generated noise level. Students opinion at fifteen different classrooms is used to investigate the traffic noise effectiveness on the teaching and studying classrooms efficiency. Different characteristics of students, and survey with questions of short answer and multiple-choice are selected for this aim. Level of generated traffic noise from both vehicles and pedestrians was measured inside some classrooms to study its relation with some characteristics of both vehicles and pedestrians. Also this study shows some of suitable treating manners to mitigate the traffic noise and increase the teaching and studying classrooms efficiency.

Keywords: traffic noise, classrooms, generated noise.

Introduction

In the noble Quran at soora Luqman god told his prophet Mohammed (mercy and peace of god be upon him) some of Luqmans advices to his son, God said at verse(13):”and(remember)when uqmans Advices his son, when he was exhorting him: my dear son! Ascribe no partners unto Allah.Lo!To describe partners (unto him) is a tremendous wrong” (31:13) [1]. God continue mentions these advices of Luqman to his son until verse (19) when God mentions the last advice, God said: "And be moderate (or show no insolence) in your walking,and lower your voice, the harshest of all is the voice (braying) of ass" (31:19) [1] Luqman was wise man. Wisdom meaning is emplacing things in its place. So it is from wisdom when beginning with the most important thing then the important. There is no doubt that belief, monotheism, and purifying minds and societies from describing partners unto Allah is the main credo that must be begin with it , and not beginning with any other thing

before it. Anyone whose encroaching this path and create another paths disagree this path be verily strayed from the right way^[2].

Therefore Luqman at first warns his son from the tremendous guilt (describe partners unto Allah), He ordered him to warship non but Allah, worship God alone and avoid worshipping anything besides him, whether it is a person, place, or thing; directly or indirect. That is because "Gad is the creator, sustainer, the owner of the universe and its contents, the provider of everything, the giver of life and causer of death, God is the only one who has the right to be worshipped"^[3].

Luqman explains at first the right of God (the creator), then he explains the right of others (the creatures) as in verse (19) when Luqman orders his son to lower his voice ant not to higher it, so as not to harm others and because of the similarity with ass voice which is the harshest because of its loudness.

Ibn Katheer said that this simulation in that with ass meaning its forbidden and severely censure, that is because Prophet Mohammed (mercy and peace of God be upon him) said: "not for us, the bad simulation..."^[4].

Al-Bukhary mentions this hadeeth (the Prophet Mohammed (mercy and peace of God be upon him) saying) in his book the collection right connected of Prophet Mohammed saying and his manners and days (Sahih Al-Bukhary) at number (2622)^[5].

Ibn Hajar explained the meaning of this hadeeth, he said it means that we (moslems people) must not have bad description especially when this description found at worst animals at its worst conditions, then he mentions God saying at verse (60) – soorat An-

Nahl "for those who believe not in the hereafter is an evil description, and for Allah is the highest description..."(16:60)^[6]

Teaching and studying operation needs attention and understanding which depends on many essential elements so as provide appropriate environment for teaching and studying for each of pupil and teacher. One of these important elements is quietness degree. Islamic religion orders people to keep quietness and not making noise so as to attaining best environment for people in their living and activities, and to prevent getting any mischief that may result due to noises. Noise generally described as unpleased, unwanted sounds.^[7] It can be defined as unwanted or excessive sound, an undesirable by product of our modern way of life^[8].

Vicente et al (2010) describe noise as universally perceived as a negative factor effecting human well being. They said that noise source plague everyday activities, making life less pleasurable and slowly eroding overall health in ways that are difficult to observe in the short term^[9].

Tiffen and Mc Gromick (1971) said that the scientist at industrial psychological science agreed that noise is one of the nature conditions that have negative effect on the efficiency of human performance^[10].

Cohen (1980) said that exposing workers to the noises connected with increasing of their feeling of worrying^[11].

Mc Gromic and Ilgen (1980) said that noise effect exceeding the psychologist case of workers and their performance to another psychological side like feeling with discomfort and annoyance, therefore noise considered

as human discomfort source, also as confusing parameter for connection operation between people ^[12]. Baron, Byrne, Griffit (1974) said that exposing to the noises for long time increases the nervous ^[13]. Noise can be annoying, can interfere with sleep, work, or recreation, and in extremes may cause physical and psychological damage ^[8]. Providing appropriate sounds level for teaching and studying classrooms including three steps: Isolating classrooms from outer and inner noises, and preventing echo (sounds frequency). Traffic noise considered as outer source of noise. With the population growth, vehicles ownership increasing, scientific development, and urbanization process; the generated traffic noise has increased in its levels and sources varieties. Schults (1978) said that noise effect depends on many characteristics such as noise adjective like family: where strange sounds have larger effect, and like frequency: where high frequencies have higher effect. He said that noise effect also depends on its happens way when it is continuous or discontinuous, the second type has large effect because human has the ability to condition with the first type. Providing quietness degree (acceptable level of sounds) at teaching and studying classrooms needs controlling the noises. There are two essential ways for controlling traffic noises. First one by decreasing generated traffic noise level, that may achieve by improving the characteristics of traffic problem elements (vehicle, human, and road) such as using materials with suitable properties in manufacturing tires, and making pavement mixture, appropriate design for tires grooves, and educate peoples about the noise harms, and the best manners to mitigate the traffic noise that produced when they are driving, walking and speaking. Second

way to controlling traffic noises is by decreasing transported traffic noise amount, that may achieve by good planning for lands and buildings position and designing, traffic noise barriers, walls with high isolating properties could used for this aim. As we all know, sound is created when an object moves: the rustling of leaves as the wind blows, the air passing through our vocal cords, and the almost invisible movement of the speakers on a stereo. This movement causes vibrations or waves in air molecules, like ripples on water. When the vibrations reach our ears, we hear sound. Sound is quantified by a meter which measures units called decibels (dB). For highway traffic noise, an adjustment, or weighting, of the high- and low-pitched sounds is made to approximate the way that an average person hears sounds. The adjusted sounds are called "A-weighted levels" (dBA). The A-weighted decibel scale begins at zero. This represents the faintest sound that can be heard by humans with very good hearing ^[8]. The noise level criteria at teaching and studying classrooms is 40 dBA ^[15] ^[16]. At this research the sources of effected traffic noise on the teaching and studying classrooms efficiency, and its effects were investigated. Some manners to controlling traffic noise and rising the efficiency of the classrooms performance were investigated too.

Literatures Review

Noises effects on humans life are noticed and apparent, its effect dose not stopping at annoying step, but exceeding that stag. Noises may decreases attention and understanding levels of students. Many studies have been carried to study the effect of noise on human health and its activities. Vicent et al (2010) studied the impact of traffic noise on human health within life cycle assessment.

They concluded that special characteristics of noise as a pollutant (relevance of spatial data, human perception issues) appear to justify the adoption of distinct indicator, namely, number of annoyed persons. Incorporating annoyance as the preferred indicator for the impact of traffic noise on human health is thought to make assessment results more intelligible and readily applicable to decision making in matter like infrastructure policing and urban planning, whilst placing the focus on damage prevention, more one, the adoption of standard dose-respond relation between self – reported annoyance and L_{den} (primary indicator for the evaluation of environmental noise) levels can expected to lower the uncertainty of this type of assessments, while the endorsement of L_{den} by the European Commission for noise mapping purposes is certain to improve the availability of the quality data they require. Laboratory measuring for annoyance that generated from different traffic noise sources done by Bjorkman E. and Rylander R. (1980). They makes their study on forty students at medicine college (20 males, and 20 females) with mean age equals to 25 years. His study including recording sounds of four different sources of traffic noise (big Lories, airplanes, small light carriage ways like motorcycle, and trains), they also used a questionnaire manner at their study. They found that there are different effects of traffic noise on students depending on their living conditions and habituation on noises.

Bahjet R. and Mahmmad M. (2000) studied the effect of transported sound on the efficiency of halls performance, their studying conducted on three different halls (median volume halls) at engineering, pharmaty, and medicine colleges in the university of Mosul,

they recommended to covering halls walls with sound deafen materials to reduce the level of each outer and inner noises. Yaser A. Balila and Anis A. Siddiq (1999) studied the critical evaluation of the noise environment with respect to the academic activities. Their studying carried out on some buildings in faculty of engineering in the University of Kink Abdul-Aziz, they found that there are high levels of the environmental noise that generated from many sources and these noises are generated from changeable and mobile sources. Zhang and Geng (2008) studied the noise pollution at campus of Bouji University for arts and science, they found that there is noise pollution in the Bouji university campus at levels exceeding the acceptable limits, also they found that the traffic noise is the main source of the noise pollution. Zhang Oing et. Al. (2007) studied the impact analysis and control of campus environmental noise in the Guangxi University. They concluded that the whole campus was polluted with noise. They found that the environmental noise is larger than the inside noise, the traffic activities were the main reason for the noise pollution. S. K. Jha ET. Al. (2010) studied the noise effect in classrooms on the academic performance of students in Kreshna engineering college in India, their study including survey to investigate the reasons of unclearing teacher voice. Pamela Woolner and Elaine Hall (2010) studied the noise at school buildings in British, they concluded that the suit solution for noise in schools depending in partially case on the nature of the noise pollution, they explain that preventing the environment noises on the human health, happiness, and education is one of the main actors in the designing of school buildings.

Wolf Gang Kropp et. Al. (2007) studied the technical potential to decrease noise emission from road traffic; special focus is given on the need for coordination between the demands upon actions by the three main actors: the car industry, the tire industry, and the road owner. They concluded that there is a technical potential to reduce the emissions substantially and proposes how to accelerate this process in a positive way, this includes political actions as well as research needs.

Procedure and Methodology

Procedure and methodology of this research includes two parts, the first was survey for student's opinion, the other was practical part represented by measuring levels of traffic noise that generated from traffic sources. The survey instrument was used to investigate the sources of traffic noises, and its effect on teaching and studying operation. Opinion of students with different characteristics, and classrooms at different places are used for this aim. The practical part represented by measuring levels of traffic noise that generated from some traffic sources. Different classrooms at different places and different sources of traffic noise are used for this aim.

Survey format

The questionnaire involved short answer and multiple choice questions, the short answer questions were designed to identify students characteristics and the multiple choice questions to identify their opinion in the survey clauses. Five multiple choice questions chosen to explain students opinion about noticing traffic noise, sources of generated traffic noises, types of generated traffic noises, and the effect of traffic noises on the teaching and studying operation

in the classrooms. The multiple choice format was adopted instead of the open ended format because it is more user friendly, and takes less time to answer the questions which encourage students to cooperate and participate. The survey was presented in Arabic to the participants, and in English, as shown in figure (1), in this research.

Sampling plan

A sample of 300 students was targeted to get representative results for various subgroups. The sampling plane was selected such that it was representative to the student population in the University of Tikrit with respect to the following characteristics:

College. The participant's students were studying at five colleges: college of engineering, science, Islamic religion, law, and management and economy. Studying stage; first, second, third, and fourth stage. Classroom elevation, earth, and first floor. Student seat position; front, middle, and rear rows, also beside, and non beside the windows. Gender. The participants students were divided into: male, and female. Marital status. The participants students were divided into married, and single. Area type of residence; urban, and rural.

Data sources

Study stations were selected such that to have a wide representation of studying side; so as to investigate the educational side effect. Five colleges from Tikrit University: engineering, science, Islamic religion, law, and economy and Management College. Classrooms were selected such that to have earth, and first floor.

Traffic noise measurement

Measuring traffic noise is required to find the highest traffic noise levels, and

its sources. Also it is required to ensure the reliability of the students opinions, and to compare their opinion with the field measurement of the traffic noise levels. In this study; traffic noise measurement was done by using a sound level meter produced by Bruel and Kjaer (type 2235 B-K). Traffic noise levels were measured inside and outside the classrooms, with noticing the type of the traffic noise source and the type of the generated traffic noise. The distance between traffic noise source and the point of measuring was noticed, also the position, and the activity type of the traffic noise sources were noticed.

Results of the study

Survey results

Survey results for all participle students were 24, 35, 41 % for noticing effective, little and non effective, and no traffic noise respectively. It is clear that there is significantly large level of traffic noise. This traffic noise level increases with time.

Results based on college type

For students at engineering, science, Islamic religion, law, and economy and management college; the results for noticing effective traffic noise were 20 ,19 ,16 ,27 , and 34 % respectively, for little and non effective traffic noise were 29, 43, 27, 38, and 42 % respectively, and for no traffic noise were 51, 38, 57, 35, and 24 % respectively.

Students at Islamic religion had lower level of noticing effective traffic noise, and higher level of no traffic noise, that is due to their studying nature, and their ethics. Scientific colleges had low level for noticing effective traffic noise, and high level for no traffic noise, that is because their students are

very busy with their study. Results are shown in figure (2).

Results based on age

Results based on age were neglected, because all students have - approximately- the same age at the same studying stage, and all students - approximately- from the same age period except few rare uncommon cases.

Results based on studying stage

Results of noticing effective traffic noise for students at first, second, third, and fourth stage were 8, 17, 31, and 33 % respectively at engineering college, and 28, 32, 37, and 39 % respectively at management and Economy College.

Results of noticing no traffic noise were 80, 57, 30, and 28 % respectively at engineering college, and 40, 29, 14, and 13 % respectively at management and Economy College. neophytic stages had lower level for noticing effective traffic noise, and higher level for noticing no traffic noise because they are new for the varsity environment. Results are shown in figures (3), and (4).

Results based on gender

Males and females results were 21, and 39 %, 30, and 54 %, and 49, and 7% for noticing effective, little traffic, and no traffic noise respectively. Generally females are more sensitive to noise, so they had higher level for noticing effective traffic noise, and lower level for noticing little non effective traffic noise. Results are shown in figure (5).

Results based on marital status

Single and married results were 18, and 26 %, 23, and 37 %, and 59, and 37% for noticing effective, little traffic, and no traffic noise respectively. Generally singles are more sensitive to

noise, so they had higher level for noticing effective traffic noise, and lower level for noticing little non effective traffic noise. Married persons may want noises specially when they have children or when they get some family scimmage. Results are shown in figure (5).

Results based on residence area type

Results of residence area type: urban and rural were 23, and 32 %, 31, 50 %, and 46, and 18 % for noticing effective, lower little non effective, and no traffic noise respectively. Results as shown in figure (5) showed that students from urban residence area are lower sensitive to traffic noise because of their family to the traffic noise, while the rural area has quit some adjective.

Results based on classroom elevation

Results based on classroom elevation; ground, and first floor were 23, and 3 %, 29, and 16 %, and 48, and 81 % for effective, little non effective, and no traffic noise. Classrooms at ground floor had higher level of traffic noise than at first floor. Results shown in figure (6).

Results based on seat position

Results based on seat position; front, middle, and rear rows were 1, 18, and 55 %, 12, 48, and 45 %, and 87, 34, and 0 % for effective, little non effective, and no traffic noise. Classrooms at ground floor had higher level of traffic noise than at first floor. The front rows are nearest to the teacher so it had lower level of traffic noise effect. Results shown in figure (7). Results based on seat position; beside and non beside windows were 44, and 6 %, 45, and 25 %, and 11, and 69 % for effective, little non effective, and no traffic noise. Seat beside windows had higher level of traffic

noise effect than non beside windows. Results shown in figure (8).

Sources and type of traffic noise

Two sources of traffic noise are found; vehicle and pedestrian. Results showed that vehicles and pedestrian had 3, and 97 % respectively as source of traffic noise. It's clear that pedestrian is the main source of noise. Vehicle had low level as source of noise that is due to the right planning of buildings positions and road network. The reason of its low level is maintenance operations. Results shown in figure (9).

There are two types of traffic noise for each source of traffic noise. Movement, and honing were generated from vehicle activities, and walking and speaking were generated from pedestrian activities. Their results were 2, 1, 44, and 53 % respectively. It's clear that pedestrian speaking then walking are the main types of noise. Figure (10) shows the results.

Traffic noise mischief

Results of traffic noise mischief were 4, 20, 8, and 68 % for non wanted and non understanding lesson, non hearing teacher voice, and annoyance respectively. Higher level was for annoyance, the problem is not in annoyance level alone, but in the reflections of annoyance non understanding, and non wanted lesson may generated from increasing annoyance level that depends on the exposure extent to the noise. Figure (11) shows the results.

Traffic noise measuring

Traffic noise that generated from vehicles and pedestrian were measured inside classrooms, results of maximum value for each type of traffic noise: vehicle movement, and honing, pedestrian walking, and speaking were

0, 0, 43, and 56 dB respectively. As in survey results, pedestrian speaking, then pedestrian walking had higher value, while vehicle movement, and honing were zero. More detailed analysis showed that scientific colleges had lower level of traffic noise than other colleges, approximately as shown in survey results. Maximum values of traffic noise at engineering, science, Islamic religion, law, and economy and Management College were 46, 54, 57, 60, and 67 dB for pedestrian speaking, and 42, 43, 38, 45, and 47 dB for pedestrian walking respectively. The reason of high traffic noise level for pedestrian speaking is using mobiles, especially when used from males, and for pedestrian walking is using some kinds of shoes, that often used by females. Islamic religion college had lower level of pedestrian walking noise because all its students are males and because of its studying nature. Engineering college had low traffic noise level for each pedestrian walking, and speaking noise, while management and Economy College had the higher level for each pedestrian walking, and speaking noise, that is due to the nature of its study and its educational level. Figure (12) shows results. Traffic noise levels were measured at some places inside Tikrit University campus; main, secondary, and local roads. Results were 87, 73, and 60 dB respectively. It is clear that main road had higher level of traffic noise that is due to multi traffic and vehicles high speed. Results shown in figure (13).

Summary and Conclusions

The study assessed the traffic noise effect on the efficiency of teaching and studying classroom. The study based on a survey of 300 students of different socio demographic characteristics, also study based on a measuring of generated traffic noise from traffic

sources. The study found that pedestrian generating effective level of traffic noise in the universities, pedestrian noise level was exceeding the criteria, which effect the efficiency of the teaching and studying classrooms. The main types of pedestrians traffic noise are their speaking then walking. Males generating higher level of speaking noise. female, single, student at final stages, and rural residence area population are more sensitive to noise. Generated traffic noise from pedestrian source at religion and scientific colleges is lower than at other colleges. Level of generated pedestrian noise appeared to be directly proportional to educational level, age and number of years since joining university (studying stage), and inversely proportional to classrooms elevation. Seats beside windows and in rear rows are exposure to higher level of traffic noise. Traffic noise at main roads is higher than at other roads. The main mischief of Traffic noise are annoyance. Another mischief may result with the increasing of the exposure extent to traffic noise.

Recommendation

It is recommended that authorities devoted special effort to improve students general behavior, especially in choosing shoes type, and in their way of speaking and in using mobiles; so as to mitigation the generated noise from their activities: walking and speaking, especially near classrooms. It is important to enjoining late students from entering classroom, and making all lessons beginning and ending at the same time. Using traffic signs to remind drivers not to use hard breaking, honing, and high speed, and students to mitigation the generated noise from their activities near classrooms.

Keep classrooms away from roads, car parking, traffic ways, libraries, and cafeterias. Give more interest for road network, and parking planning so as to accommodate with vehicles and students increasing. Using asphalt for roads paving, and noise barriers and vegetation to reduce traffic noise. Choose suitable time for maintenance doing, like time after finishing study, and holidays. Managing traffic and Decreasing traffic volume inside the university by encouragement and supporting using buses, reducing speed limits, truck can be prohibited during daylight hours, and taking fee from entered vehicles. Improving the sonic insulating performance of classrooms by sealed windows, filled cracks and other openings, using carpets for classrooms ways, curtains for windows, and using insulating and noise absorbing materials in walls and roofs.

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Traffic Noise Survey Form

Part 1) Demographic and socioeconomic characteristics:

Age: _____ Gender: _____ marital status: _____

College: _____ Studying stage: _____

Classrooms position (ground, or first floor): _____

Seats position (beside window, or non beside window, and front, or rear rows): _____

Area type of residence (urban, or rural): _____

Parts 2) please circle the most correct answer:

Do you notice traffic noise when you inside the classroom

(a) Effective (b) Little non effective (c) No

What is the source of the found traffic noise

- (a) Vehicle (b) Pedestrian

What is the type of traffic noise that generated from vehicles

- (a) Vehicle honring (b) vehicle movement

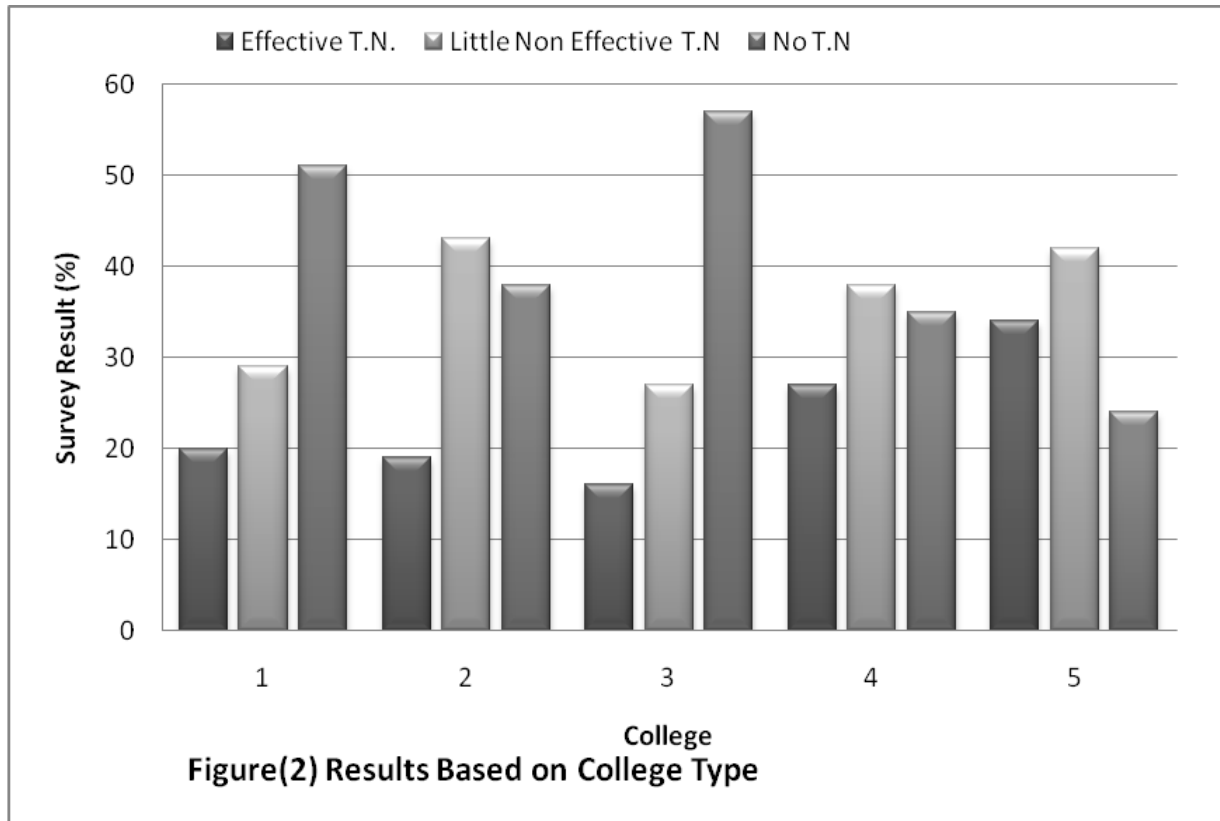
What is the type of traffic noise that generated from pedestrian

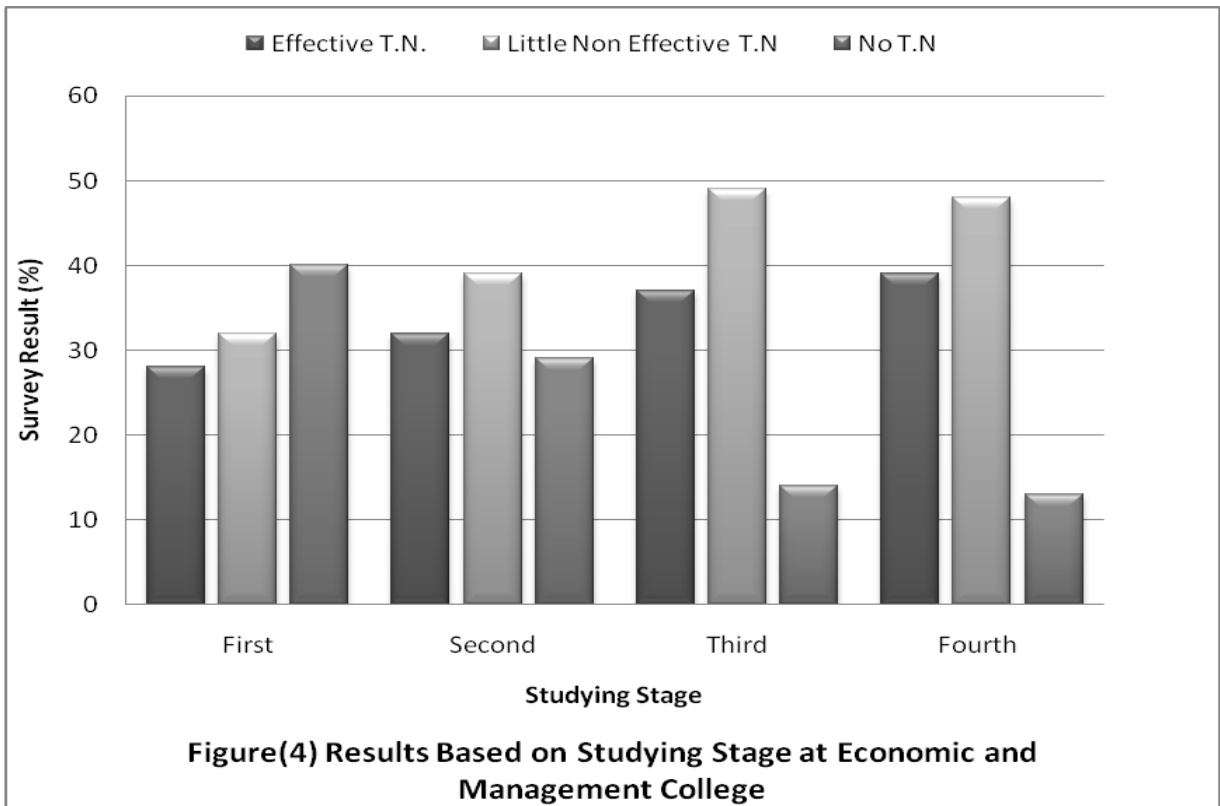
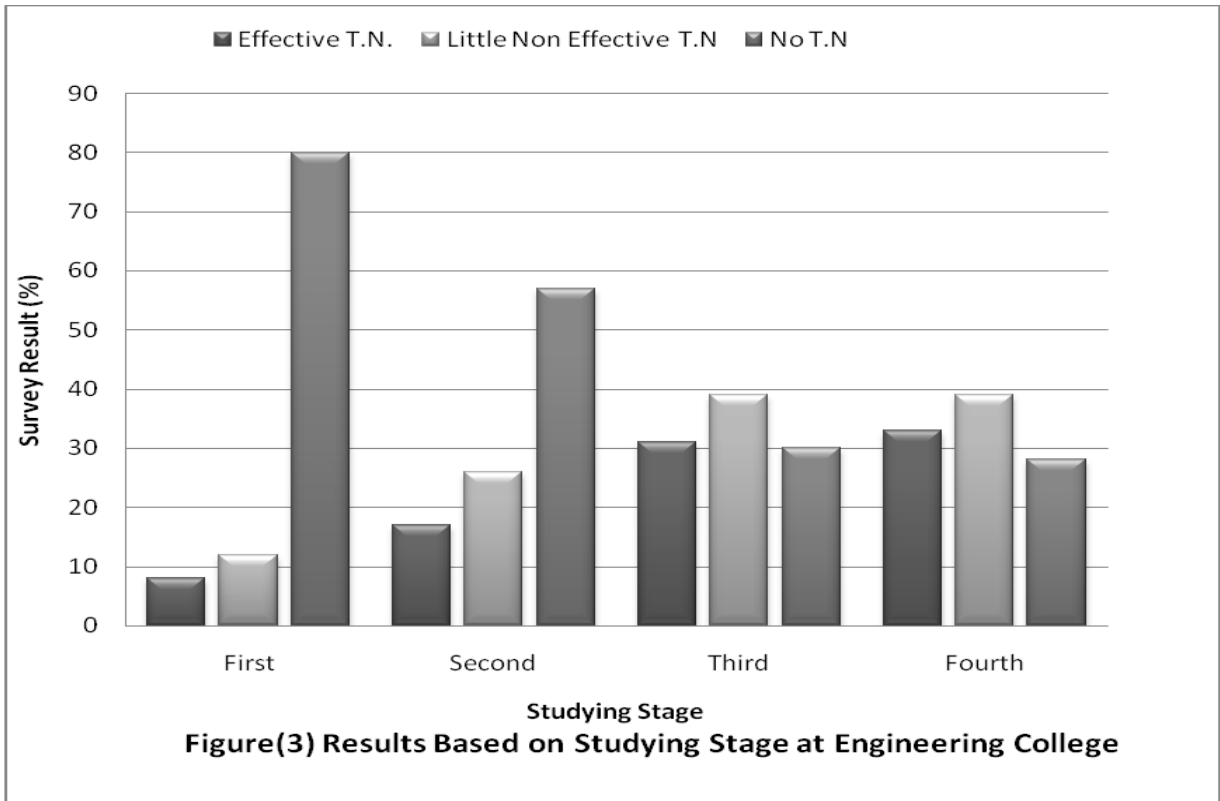
- (a) Pedestrian speaking (b) Pedestrian walking

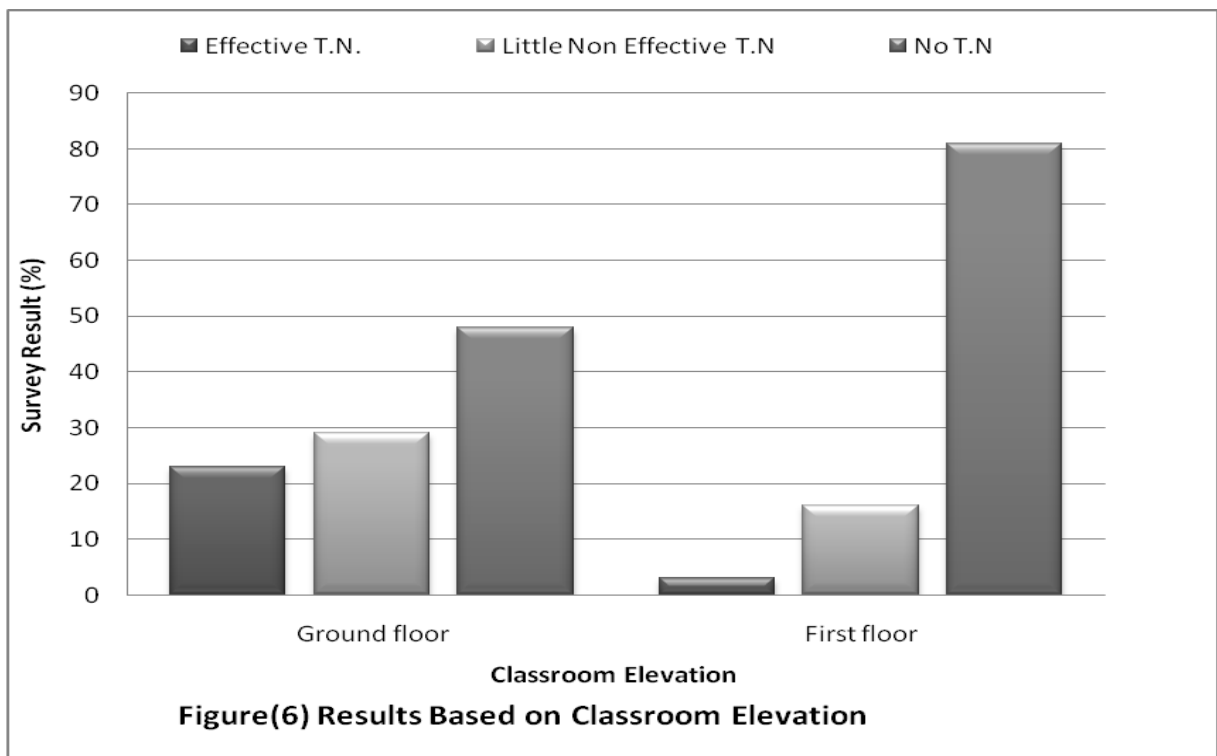
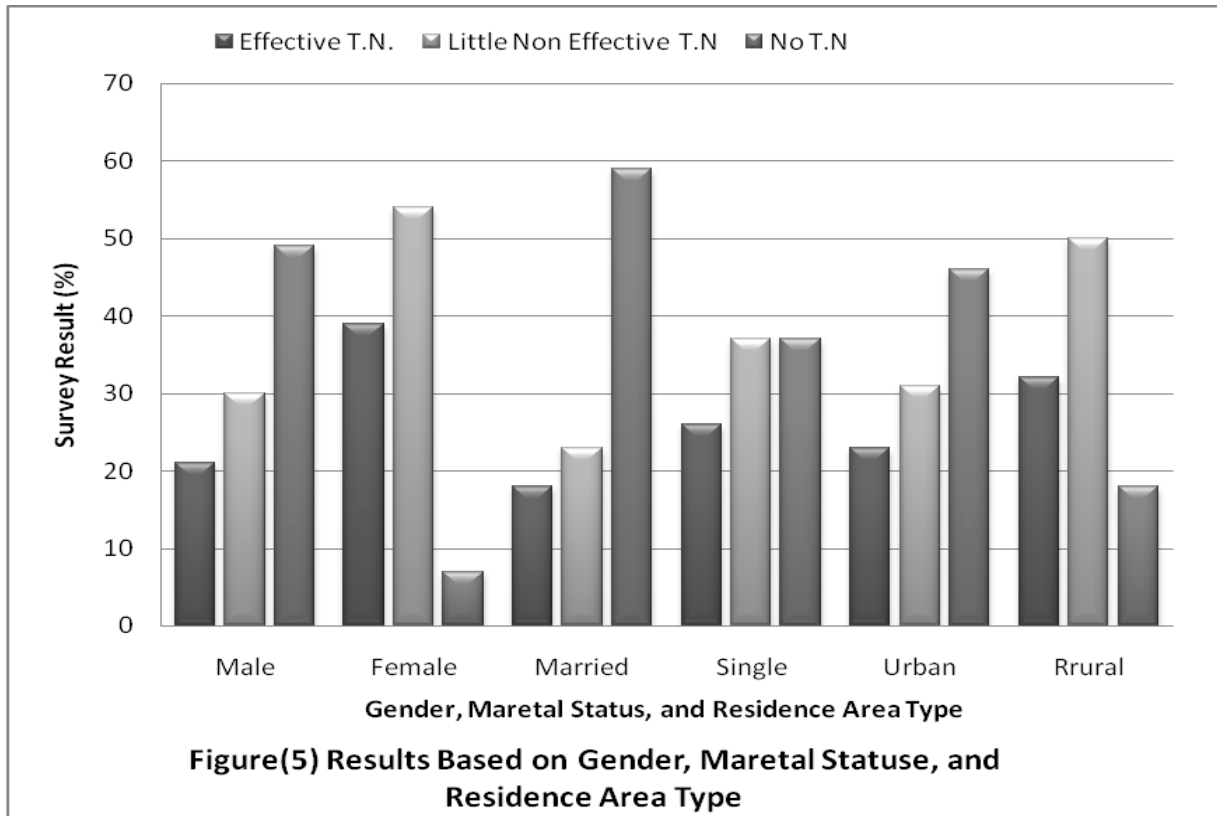
What are the mischiefs of the found traffic noise?

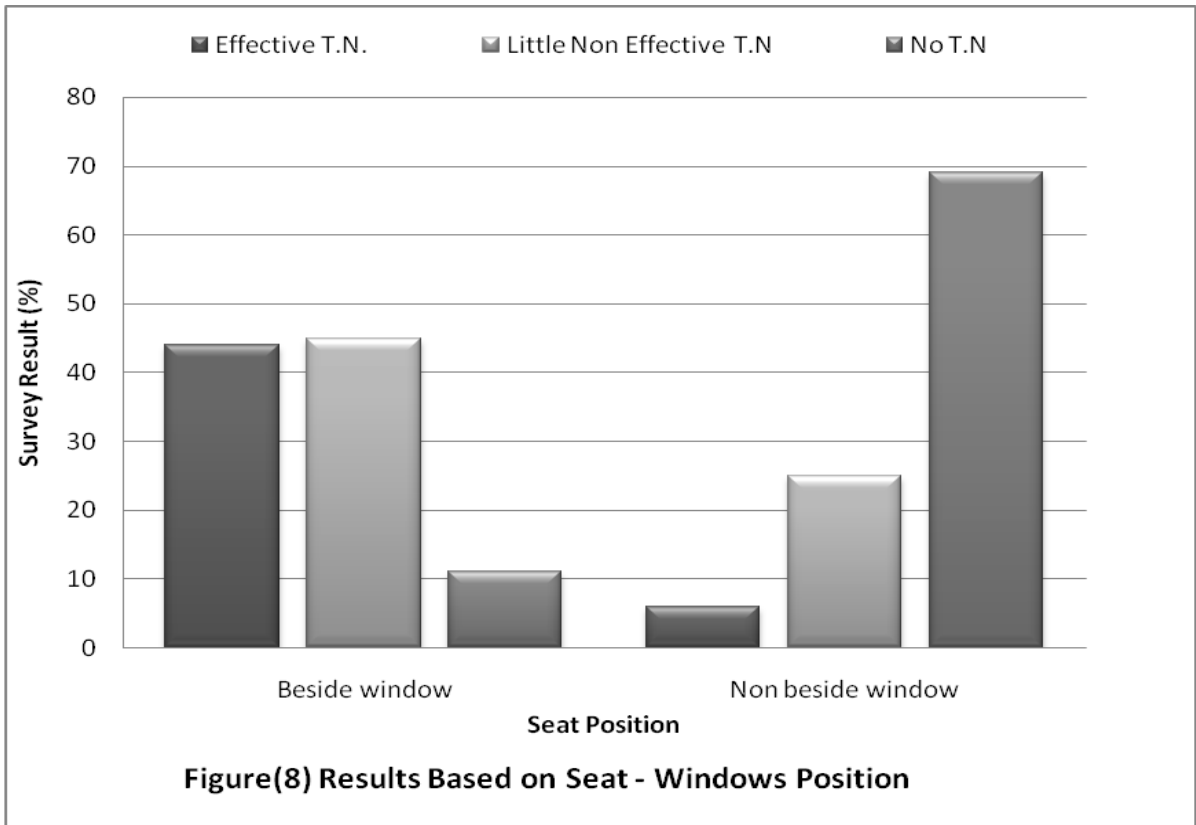
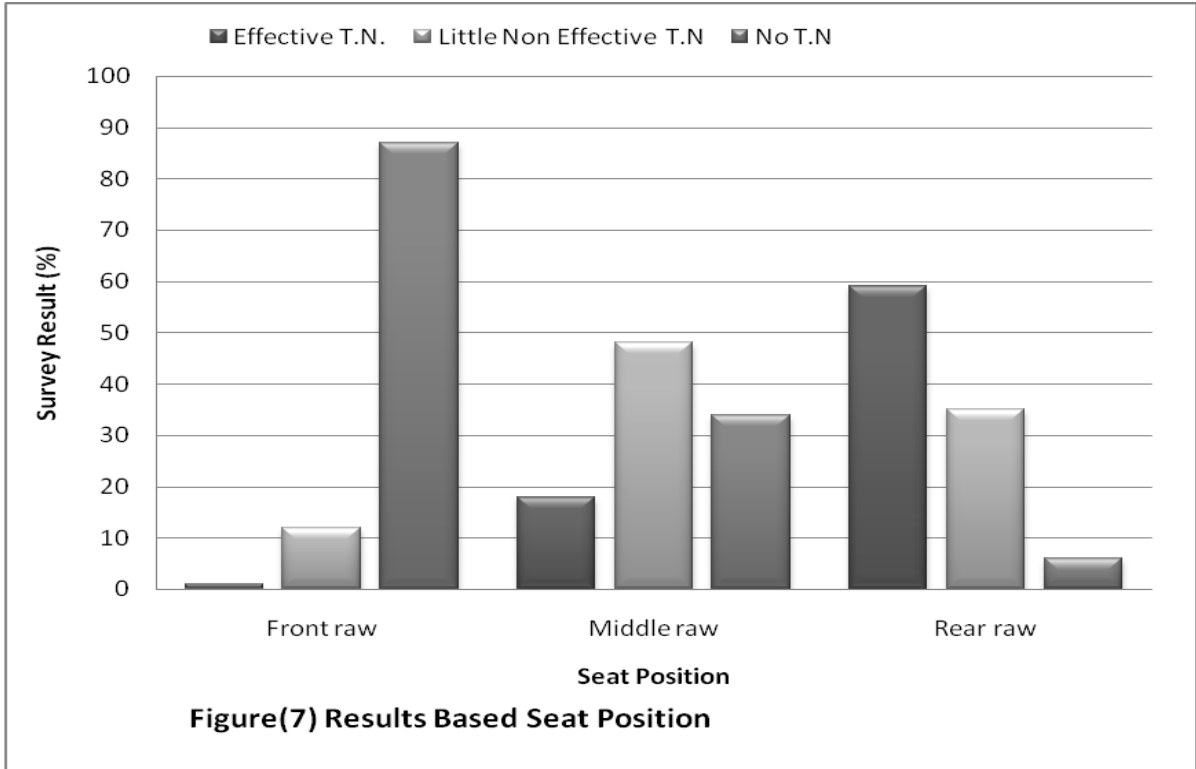
- (a) Non wanted lesson (b) Non understanding lesson
 (c) Non hearing teacher voice (d) Annoyance

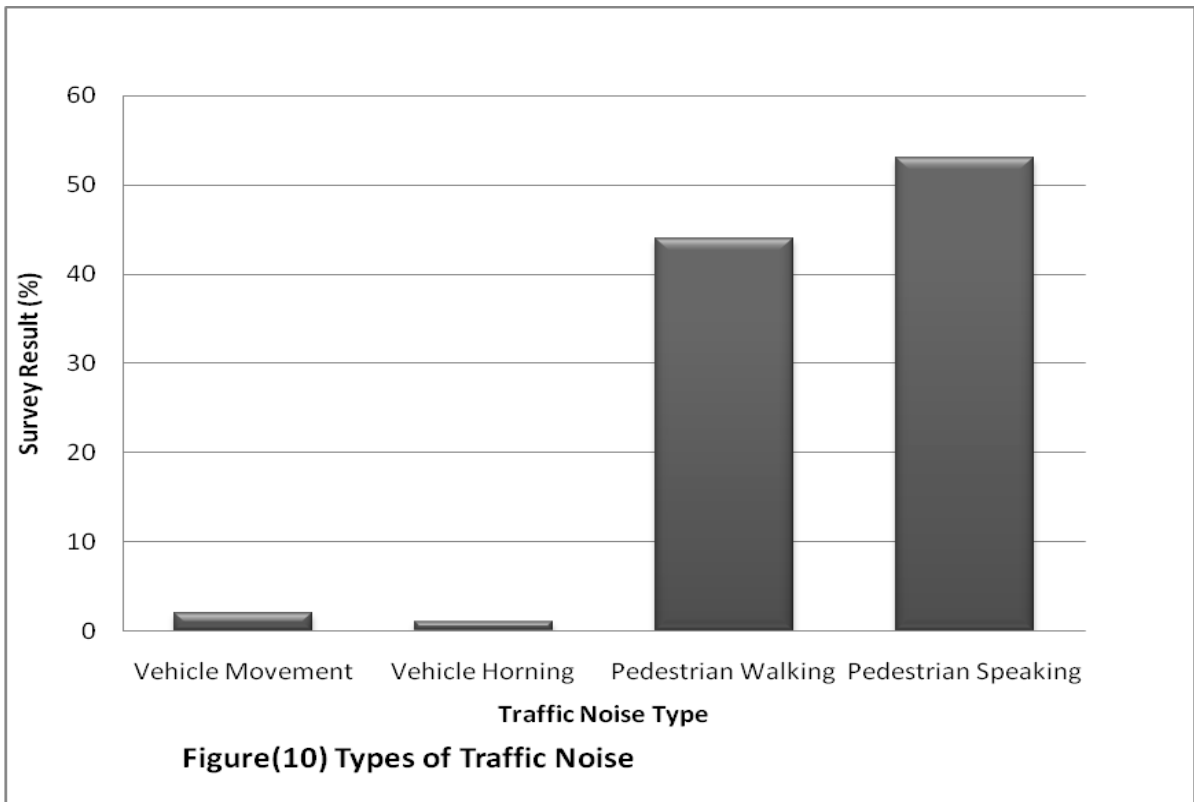
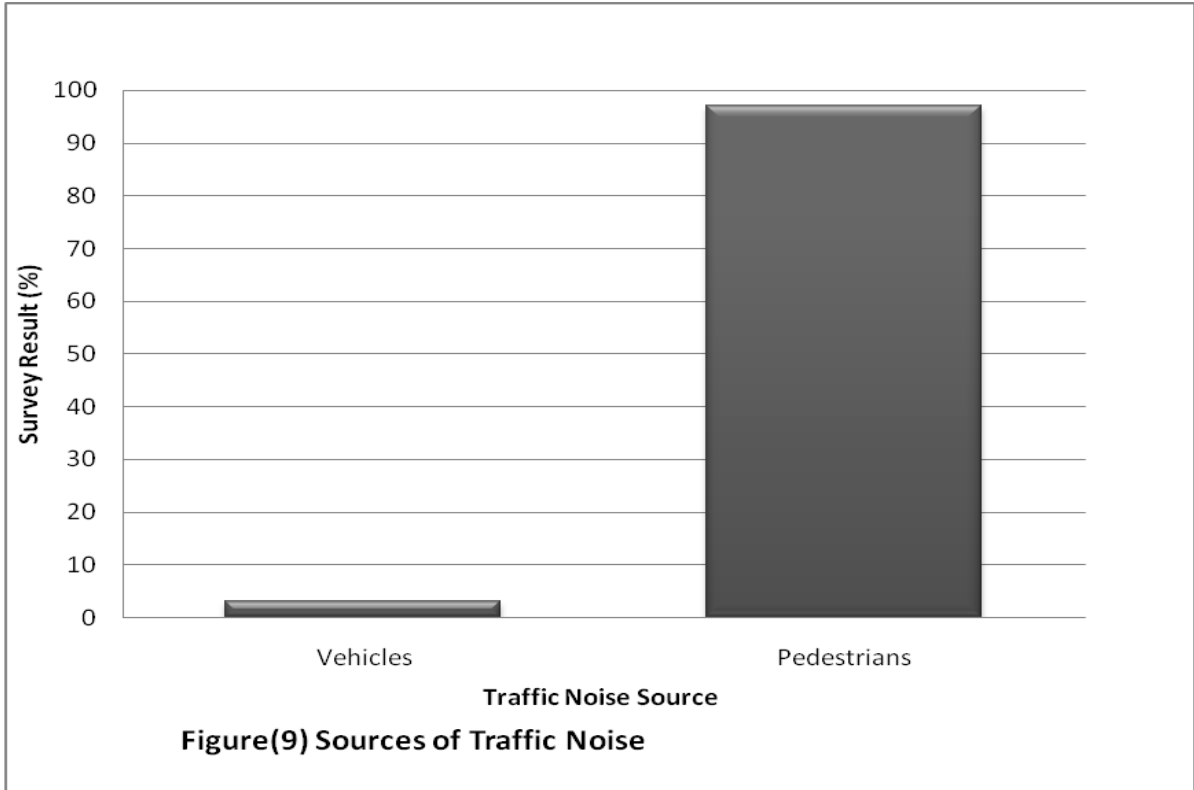
Figure (1) Traffic Noise Survey Form

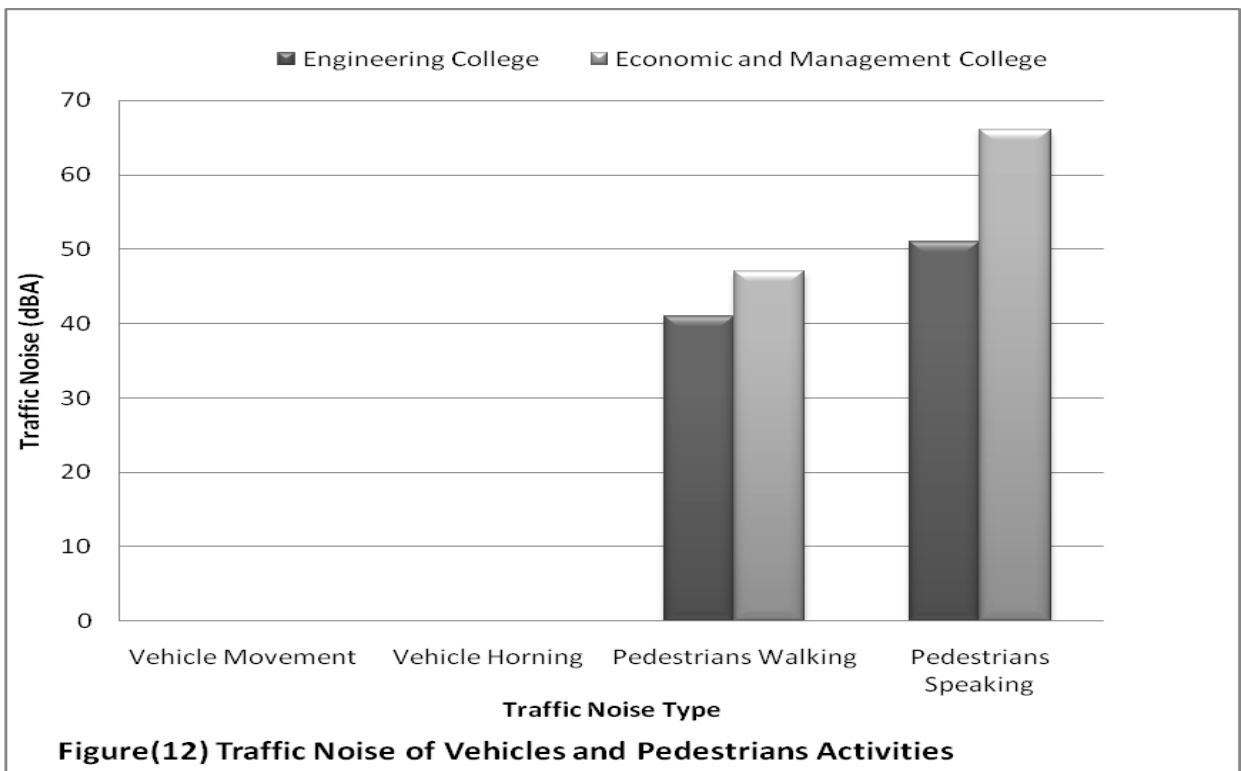
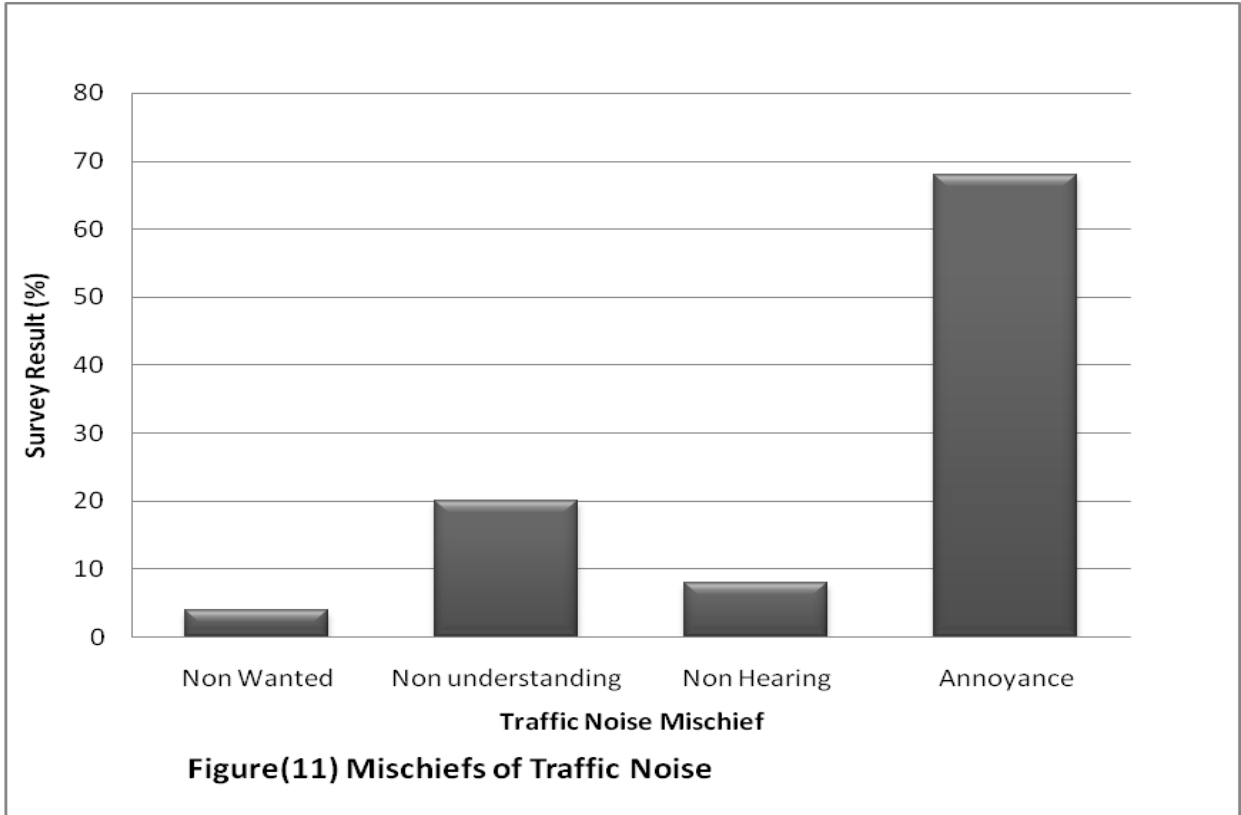


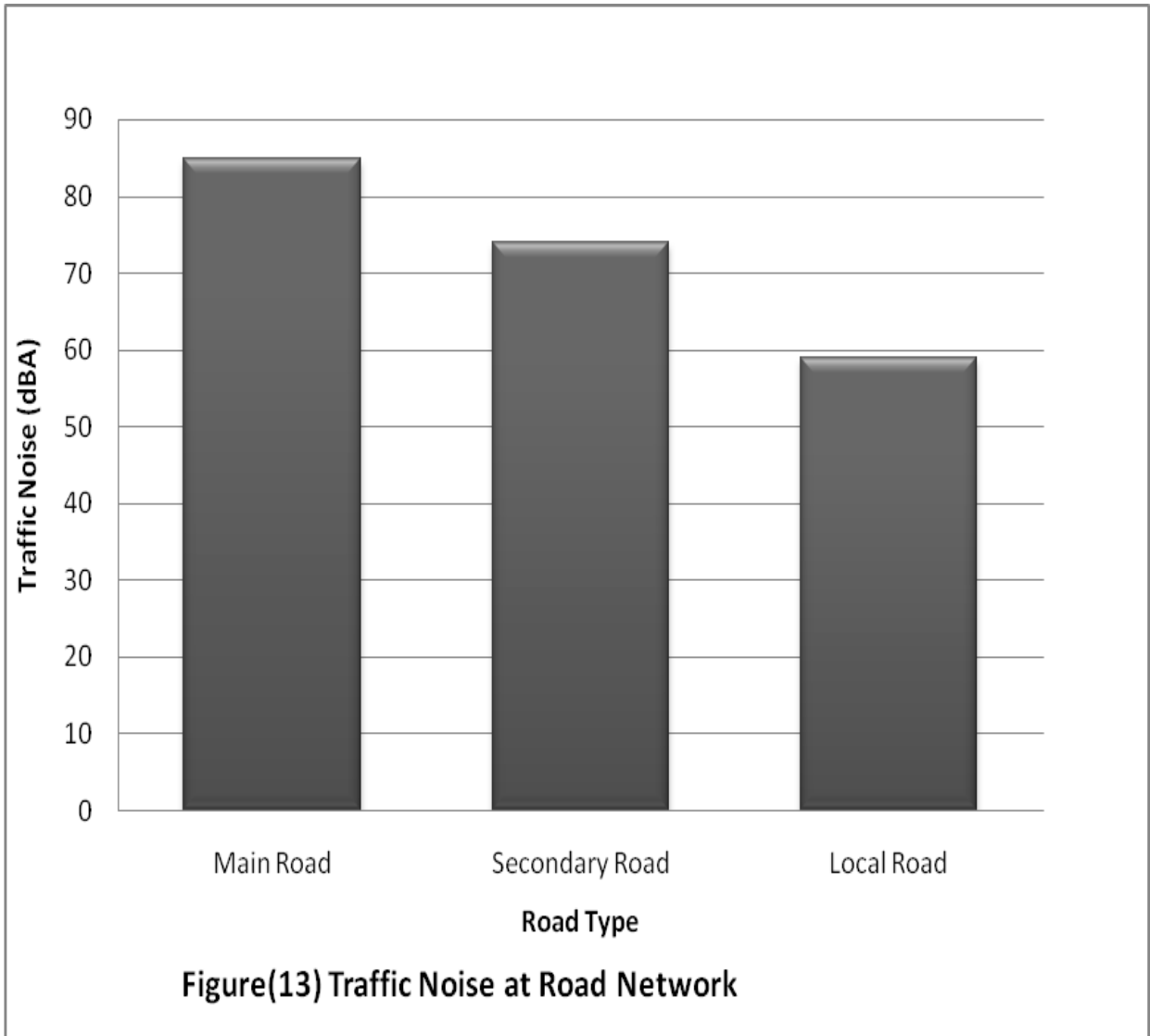












تأثير الضوضاء المروري على كفاءة التدريس في القاعات الدراسية

خاد حمود ماضي عدي عبدالله اسماعيل

جامعة تكريت – كلية الهندسة

الخلاصة:

الضوضاء المروري هو عبارة عن الأصوات المزعجة والمتولدة عن فعاليات المركبات والسابلة. إن تأثير الضوضاء المروري على كفاءة القاعات الدراسية يتزايد باستمرار. إن هذا التزايد هو نتيجة للنمو السكاني, تزايد مالكي السيارات, التطور العلمي, و عملية التمدن مما يسبب تنوعا في مصادر الضوضاء المروري و ازديادا في معدل الضوضاء المتولد. آراء الطلبة في خمسة عشر الدراسية. خصائص قاعة دراسية استخدمت لتحري تأثير الضوضاء المروري على كفاءة القاعات مختلفة للطلبة, استبيان مع أسئلة ذات الإجابة القصيرة و متعددة الخيارات تم اختيارها لهذا الغرض. مستوى الضوضاء المروري المتولد من كل من المركبات و السابلة تم قياسه داخل بعض القاعات الدراسية لغرض دراسة العلاقة بينه وبين بعض الخصائص العائدة إلى المركبات والسابلة. أيضا فإن هذه الدراسة تضمنت بعض وسائل المعالجة المناسبة لغرض تقليل الضوضاء المروري و لغرض رفع كفاءة القاعات الدراسية.