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An Analysis on Noise Level Management in Engineering Building at UPHSD - Calamba

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Abstract

This study endeavored to determine the impact of noise level to engineering students of University of Perpetual Help System Dalta (UPHSD) -Calamba, Laguna. The study was done by determining the sources of sound levels in engineering building and its effect to students in comparison to the standard noise criteria. Solutions and remedy to noise level in engineering building at UPHSD-Calamba was also considered.

This study relied on experimental and descriptive research method. Data were gathered through observation, interviews, selected readings and testing. The researchers chose the College of Engineering building as medium for testing sound level in comparison with the noise criteria standard.

The UPHSD – Calamba Engineering Building has an average noise level of 73.79dB. The classrooms were classified into tolerable within four (4) hours based on the Noise Mapping. Rooms at ground floors which are all laboratory rooms where the noise level were in the range of (45-85dB). Rooms located at the second floor from Room 6 to Room 9 are drafting rooms which were in the range of (50-76 dB) and Room 10 to Room 15 on the third floor are lecture rooms were in the range of (59-88dB). The highest noise brought on the ground floor was the noise of mechanical tools while on the second and third floor were caused by the students transferring to other classrooms. Classes from 7:00 a.m-8:30a.m. has a normal noise level while from 8:30 a.m. onwards has a tolerable range of four (4) hours. Some improvements are suggested to reduce the noise such as the reposition of windows, acoustic material to cover the classrooms' wall, as the barriers.

Index Terms: *Noise level, decibel, acoustics, effective noise level*

I. INTRODUCTION

Exposure to noise level over a long period of time will damage hearing gradually and painlessly that you may not notice the minor deterioration from one day to the next. The parts of the ear that process high frequency sounds are usually the first to be affected. The degree of loss depends on the loudness of the noise and level of exposure. The effects of noise on hearing vary among people. Some people's ears are more sensitive to loud sounds, especially at certain frequencies. (Frequency means how low or high a tone is.) But any sound that is loud enough and lasts long enough can damage hearing and lead to hearing loss. A sound's loudness is measured in decibels (dB). Normal conversation is about 60 dB, a lawn mower is about 90 dB, and a loud rock concert is about 120 dBs. In general, sounds above 85 are harmful, depending on how long and how often you are exposed to them and whether you wear hearing protection, such as earplugs or earmuffs.

Some people exposed to excessive noise develop tinnitus, which is described as a constant ringing sound. For most cases of noise-induced hearing loss, there is no cure.

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Hearing aids only amplify sounds, and can't replace normal hearing. Associated effects of constant noise apart from damage to hearing, exposure to constant and excessive noise can cause other health problems, including:

• Headache

• Elevated blood pressure

• Fatigue

• Irritability

• Digestive disorders

• Increased susceptibility to colds and other minor infections.

This excessive noise can be detrimental to students' class performance as high levels of background noise interfere with hearing and concentration in the classroom activities. These high noise levels can also be detrimental to teachers hearing where hearing loss and tinnitus are common.

Laboratory rooms using power tools and machinery used in teaching, for example in metal or wood-working workshops, noise in music rooms, and the noise from building services, maintenance and grounds-keeping are also of concern because of the potential impact of noise-induced hearing loss

II. METHODOLOGY

This chapter presents the methods and procedure in this study. It covers the research design, source of information and data gathering instrument.

3.1 Research Design Method

Sound level in engineering building and its effect can be determined by different methods. A systematic plan to identify sound level compared to the noise criteria standard; quantify the factors that contribute noise and its effect to individuals. Upon the completion of the causes of sound level in engineering building and its effect to individuals, recommendations to minimize the sound level in engineering building at UPHSD-Calamba will be summarized. Preliminary data and information were obtained using sound level meter and the COE department.

3.2 Data Gathering Instrument

Data gathering instrument is considered as one of the key success in determining the noise level and its effect to individuals. The researcher employed different data gathering instrument to ensure relevant inputs and better outcome of the study. The data-gathering instruments used by the researcher were based on clerical tools, mechanical tools and observations.

Clerical tools include the data with regards to noise level during peak hours in UPHSD engineering building. Data for the existing equipment using sound level meter and experiences is based on primary sources and mechanical device.

Observation method allows the researcher to determine and measure the noise level in different establishment such as laboratory rooms and facilities to acquire additional data needed in the study. Various materials were read and classified like books and magazine to gather necessary information in regards to of too much noise on laboratory rooms as well as the effect to individuals. It is an explicit method of examining, describing and interpreting the data for the purpose of gathering facts.

Research Paradigm

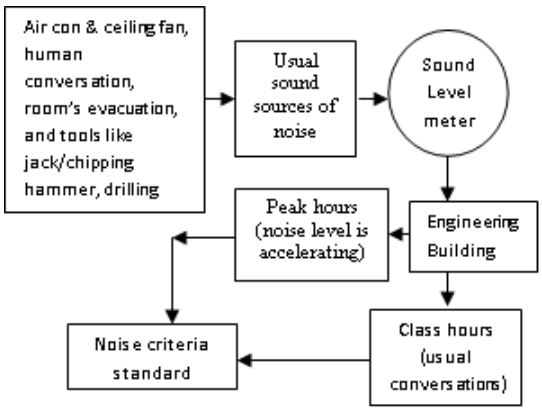

Figure I. Research Paradigm

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III. RESULTS AND DISCUSSION

Sound level in engineering building were compared to the noise criteria standard and quantify the factors that contribute noise. Preliminary data and information were obtained using sound level meter. The three floor level of the engineering building were observed

Sources of noise levels in Engineering Building at UPHSD - Calamba were aircon & ceiling fan, loud conversations, transferring of students from one class to the next room and power tools used in mechanical laboratory.

Table I: Noise measurement found in the ground floor rooms

TIME	RM 1	RM 2	RM 3	RM 4	RM 5	AVE.
7:00 - 8:30AM	47	44	47	45	45	45.66
8:30 - 10:00AM	**77**	**87**	**78**	**96**	**88**	**85.20**
10:00 – 11:30 AM	86	76	77	97	77	82.60
11:30-1:00 PM	78	48	89	93	88	79.20
1:00-2:30 PM	49	89	89	97	88	82.40
2:30 – 4:00 PM	86	88	88	79	77	83.60
4:00-5:30 PM	88	79	79	79	77	80.40
5:30-7:00 PM	87	88	78	79	76	81.60

It can be shown in Table I that during the first periods of class from 7:00am to 8:30 am, the noise level from the ground floor was 45.66dB which falls under normal conversation. This finding may be explained by the variables present in the school routine, such as type of activity performed and the number of students in the classroom.

The highest noise level recorded of 85.20dB was from the period of 8:30am – 10:00amwhich falls under loud conversation and transferring of students from one class to the other and the schedule of the Mechanical Laboratory where power tools were being used. This internal sources in the school were the main causes of noise pollution, and the study found that the sound energy between the walls of this school was not enough to isolate noise. This work emphasized the importance of future school proposals aiming to reduce noise and improve acoustics in order to improve education.

Table II. Engineering Building Noise Mapping

TIME	Ground Floor	Second Floor	Third Floor	AVE (dB)	Threshold of hearing
7:00 – 8:30 AM	45.66	50.67	59.60	51.98	Normal Hearing
8:30 - 10:00AM	85.20	75.00	84.60	81.60	Tolerable within 4hrs
10:00 – 11:30 AM	82.60	61.67	79.00	74.42	Tolerable within 4hrs
11:30-1:00 PM	79.20	51.00	77.60	69.27	Tolerable within 4hrs
1:00-2:30 PM	82.40	64.00	80.20	75.53	Tolerable within 4hrs
2:30 – 4:00 PM	83.60	76.00	87.80	82.47	Tolerable
4:00-5:30 PM	80.40	76	86.20	80.87	Tolerable within 4hrs
5:30-7:00 PM	81.60	52.67	88.20	74.16	Tolerable within 4hrs
AVE.	**77.58**	**63.37**	**80.40**	**73.79**	

As shown in Table II, that the noise level from 7:00 am to 8:30 am was normal hearing per standard criteria, however from 10:00 am to 7:00 pm showed a tolerable within four(4) hours. Among the sources that frequently caused high noise level was students transferring to their next class. Tools like mechanical jack, power drill only caused disturbance from 8:30 am to 2:30 pm. every Tuesdays and Thursdays.

The valuespresented in all floor levels exceed the recommended valuesfor noise level of schools should be between 40-50dB, however all measured values were found above the indicated levels. The noise impact on the perception of speech sound and understanding of the school activities .

IV. RECOMMENDATION

In the light of findings presented, conclusion and summary inferred, the researchers hereby presents the following recommendations.

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1.) Students must be taught to speak in low tones and well-modulated voice.

2.) Instructors must make an effort to be in their classes ahead of their students.

3.) Scheduling the noisy work for times when, as few students and employees as possible are present during semester break.

4.) Isolating the noisy machinery from many students and employees as possible to reduce the number at risk.

5.) Quieter process instead of a noisy one (such as pressing rather than hammering or metal to metal contact)

6.) By enclosing it or portioning it off from quieter areas by using sound - absorbing materials to reduce the build - up of noise.

7.) The use of curtains is indicated for the windows. And if the classroom is equipped with fans and/or air conditioners, it is advisable to monitor the noise generated by these devices.

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