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Noise Level in Kirkuk University Library

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Abstract

The study was conducted at Kirkuk University Library to investigate the noise levels. The researchers collected noise level readings at specific time points throughout the day, including morning, mid-day, and afternoon. The purpose of the study was to analyze the variations in noise levels and assess their impact. The findings of the study indicate that the average noise levels measured during the three-time points consistently exceeded the guideline limit set by the World Health Organization (WHO). The study provides valuable insights into the noise levels at Kirkuk University Library and emphasizes the need for interventions to address excessive noise. Implementing measures to reduce noise disturbances and promote a quieter environment can significantly enhance the library experience for users, allowing for improved concentration, better learning outcomes, and overall satisfaction. Taking proactive measures to address excessive noise levels in the Kirkuk University Library is crucial for creating an optimal learning environment. Reducing noise disturbances not only improves students' ability to understand and absorb information but also reduces stress levels and promotes calmness in the library.

Keywords: Noise, measurements, library, WHO, environment, Kirkuk

1. Introduction

Libraries traditionally aim to provide a quiet and conducive environment for studying, reading, and research. Maintaining a low noise level is generally a priority in library settings to ensure a peaceful atmosphere for concentration. However, it's important to note that noise levels can vary depending on the specific library and its policies [1]. The established acceptable noise level in libraries ranges between decibels [2].

In recent years, there have been discussions and efforts to address noise-related challenges within libraries. Some factors that may contribute to increased noise levels include the use of mobile devices, social interactions, group study sessions, technology usage, and other activities that

generate sound. Libraries have been exploring different strategies to manage and mitigate noise disturbances, such as designating quiet zones, implementing noise reduction measures, enforcing guidelines and policies, and utilizing technology to monitor and control noise levels [3].

It is worth mentioning that noise levels in libraries can vary significantly depending on the time of day, the library's location (academic, public, or specialized), and the specific demographics of the library's users. Additionally, some libraries have adapted their spaces to accommodate different needs and preferences, offering designated areas for collaborative work or interactive learning that may allow for higher noise levels [4]. The literature on noise in academic libraries has provided valuable insights into the challenges that libraries face in maintaining a conducive study environment [5]. Libraries may incorporate designated zones or rooms that cater to different needs, allowing users to choose the type of environment that suits their preferences and requirements [6]. Commuter students, in particular, often seek out study spaces on campus that can accommodate their desire for both social interaction and quiet concentration. In this regard, these students may view libraries as a valuable resource because they offer a range of spaces designed to meet different study preferences [7].

Libraries often designate specific areas or floors where they expect silence and minimize noise. These areas provide a space for individuals who require a quiet environment for concentration and study. Educational institutions must prioritize minimizing noise distractions, as doing so can support students' attention, memory, and problem-solving abilities and ultimately enhance their educational outcomes [8]. By creating a learning environment with minimal noise disruptions, educational institutions can support students' ability to sustain attention and focus on academic tasks. Noise interference allows students to concentrate more deeply, actively participate in class discussions, and absorb information more effectively [9].

Exposure to high levels of noise can have detrimental effects on students' attention, memory, and problem-solving abilities and ultimately impact their educational outcomes. Noise-related distractions can significantly hinder students' cognitive processes and impede their ability to learn and perform academically [10]. Excessive noise can impair students' memory processes. Noise disruptions can compromise the ability to encode, store, and retrieve information. Students may struggle to retain new concepts, facts, or details presented in a noisy environment, hindering their learning and retention of knowledge [11].

The cumulative impact of noise on attention, memory, and problem-solving can have long-term effects on students' educational outcomes. Persistent exposure to high noise levels may result in reduced academic performance, lower grades, decreased comprehension, and impaired overall learning achievements. To mitigate the negative impact of noise on students' educational outcomes, creating quiet and conducive learning environments is essential. This includes implementing noise reduction measures, establishing guidelines for noise management, and raising awareness among students and staff about the importance of minimizing noise disruptions. Designating quiet study areas, utilizing sound-absorbing materials, and scheduling noisy activities appropriately can contribute to creating a better learning environment for students [12].

The increasing use of digital devices in libraries has had an impact on noise levels. While digital

devices themselves do not generate audible noise, their usage can contribute to noise disturbances in library spaces. Typing on keyboards and clicking computer mice can produce audible sounds, especially in quiet library environments. While individual keystrokes may not be overly disruptive, the cumulative effect of numerous users typing simultaneously can create a noticeable noise level. Digital devices, particularly smartphones, often emit sounds from incoming calls, text messages, notifications, and other alerts. Even when users have their devices in silent mode, vibrations or the occasional user forgetting to mute their device can still cause disruptions. In library spaces, digital devices frequently facilitate group discussions and collaborative work. While these activities can be productive, they may involve conversation and interaction that contribute to noise levels, especially when multiple groups engage in similar activities simultaneously [13].

Libraries can establish specific guidelines regarding noise levels in different areas or zones within the library. For instance, libraries could designate specific areas as quiet zones, anticipating minimal noise, and other areas for collaborative work, allowing for moderate noise levels. Clearly defining the expected noise levels helps users understand how to avoid noise in each area [14]. Libraries should effectively communicate their noise policies to their users. Libraries can accomplish this by placing signage throughout the library, providing information on their website, and conducting orientation sessions for new users. Library staff can also remind patrons of the noise policies when necessary to ensure awareness and compliance [15].

Educating library users about the importance of maintaining a quiet environment and the impact of noise on other people's study experiences can contribute to a culture of respect and consideration. Information sessions, workshops, or educational campaigns that emphasize the importance of noise management in libraries can accomplish this [16]. By implementing clear noise policies, libraries can create an environment that respects the needs of different users, promotes focused study, and ensures that library spaces remain conducive to learning and research. These policies help maintain a balance between accommodating different study preferences while providing a quiet and productive atmosphere for those who require it [17].

The study was undertaken at Kirkuk University Library to examine and evaluate the levels of noise present within the library environment. By conducting this study, the researchers sought to gain a comprehensive understanding of the noise levels that students and library users are exposed to during their study sessions. The investigation aimed to shed light on the potential impact of noise on the learning experience and explore possible strategies to mitigate noise disturbances. Through systematic data collection and analysis, the study aimed to provide valuable insights into the current state of noise levels within the library and inform future decision-making regarding noise control measures and the creation of a conducive learning environment.

2. Materials and Methods

The study investigated the effect levels at Kirkuk University Library. A digital sound level meter (**Figure 1**) is an effective approach to accurately assessing and monitoring noise levels in libraries. Digital sound level meters are specialized instruments designed to measure

sound pressure levels and provide objective measurements of noise intensity. Microphones on these instruments capture ambient sound and transform it into electrical signals. The sound level meter then processes these signals and displays the corresponding sound pressure level in decibels (dB) [18]. We can compute the equivalent sound level (Leq) by integrating the sound pressure level over a specific duration, as follows:

$$L_{eq} = 10 \log [(1/T) \int (p_A / p_{ref})^2 \, dt] \quad (1)$$

where

L_{eq} = equivalent sound level (dB)

T = period (s)

p_A = sound pressure (Pa, N/m^2)

p_{ref} = reference sound pressure ($2\ 10^{-5}$ Pa, N/m^2)

Figure 1. Digital sound level.

The noise level readings in Kirkuk University Library, collected three times per day (morning, midday, and afternoon), provide valuable insights into the noise patterns and fluctuations within the library during its operating hours. We can obtain a clearer picture for the remaining days of the week by excluding the readings for Friday and Saturday. These readings offer a snapshot of the noise levels at specific time points, allowing for analysis of noise variations throughout the day. Gathering noise level readings three times per day (morning, midday, and afternoon) provides a snapshot of the noise levels at different times within the library.

The morning (8:30 a.m.) reading can provide insights into the noise levels when the library opens or during the early hours of operation. It can indicate the noise conditions at the start of the day and help assess if there are any significant noise disturbances during this time. This reading is particularly relevant for understanding the noise environment during the initial hours when library users arrive and settle into their study routines. Mid-day period (12:30 p.m.): The afternoon reading captures the noise levels during the mid-day period. This time often corresponds to a peak period of library usage, as students and researchers typically spend significant time in the library during this part of the day. Assessing the noise levels at 2:30 p.m.

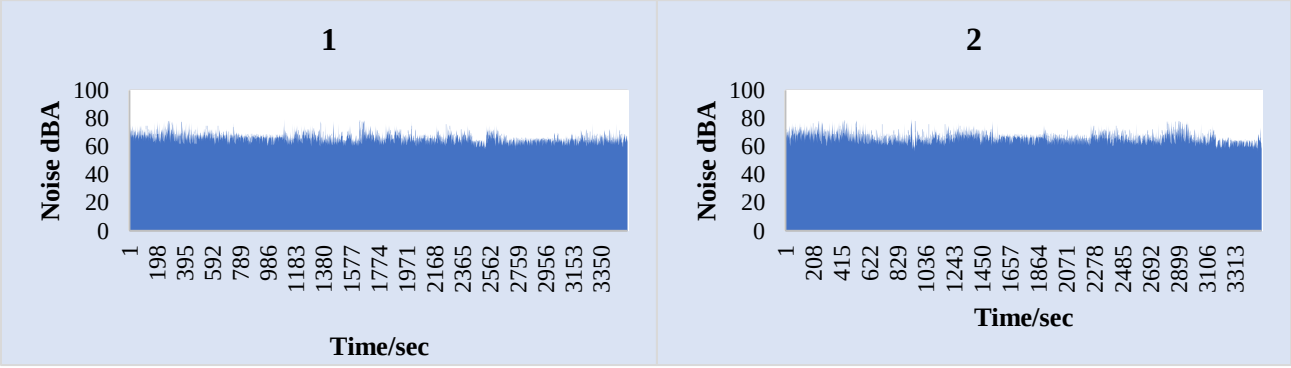
can provide insights into the noise intensity during busy hours and help identify any challenges in maintaining a quiet study environment during peak times.

The afternoon (2:30 p.m.) reading represents the noise levels later in the day, closer to the library's closing time. This reading is critical because it helps to gauge the noise conditions during the later hours when the number of library users may decrease, and the atmosphere tends to be quieter. However, it's worth noting that some libraries may have extended hours during certain days, so the evening reading at 2:30 p.m. may vary depending on the library's closing time. By gathering noise level readings at different times throughout the day, library administrators and staff can gain a comprehensive understanding of noise fluctuations and patterns over time.

3. Results

The average noise levels measured during the three-time points (morning, afternoon, and evening) consistently exceeded the World Health Organization (WHO) guideline limit (35–45 dBA), which indicates that the noise levels in the library are exceeding the recommended standards for a quiet environment. This can have implications for the overall study experience and may hinder library users' concentration and focus. Exceeding the WHO guideline limit suggests that the noise levels in the library are potentially high and could impact users' ability to effectively study, concentrate, and absorb information. Persistent exposure to high noise levels can lead to increased stress, fatigue, and decreased cognitive performance, ultimately hindering the learning experience. Regular monitoring of noise levels and implementing effective noise management strategies can help bring the noise levels within the library back within acceptable limits. This will create a more conducive environment for studying, enhance concentration, and improve the overall learning experience for library users.

Exceeding the World Health Organization's (WHO) guideline limit for noise levels in the library is a matter of concern as it indicates that the noisy environment may have a detrimental impact on users' ability to study, concentrate, and absorb information effectively. Noise is considered a form of environmental pollution, and prolonged exposure to high noise levels can have several negative consequences on individuals' well-being and cognitive functioning. These higher dB levels, as indicated in **Figures 2.**



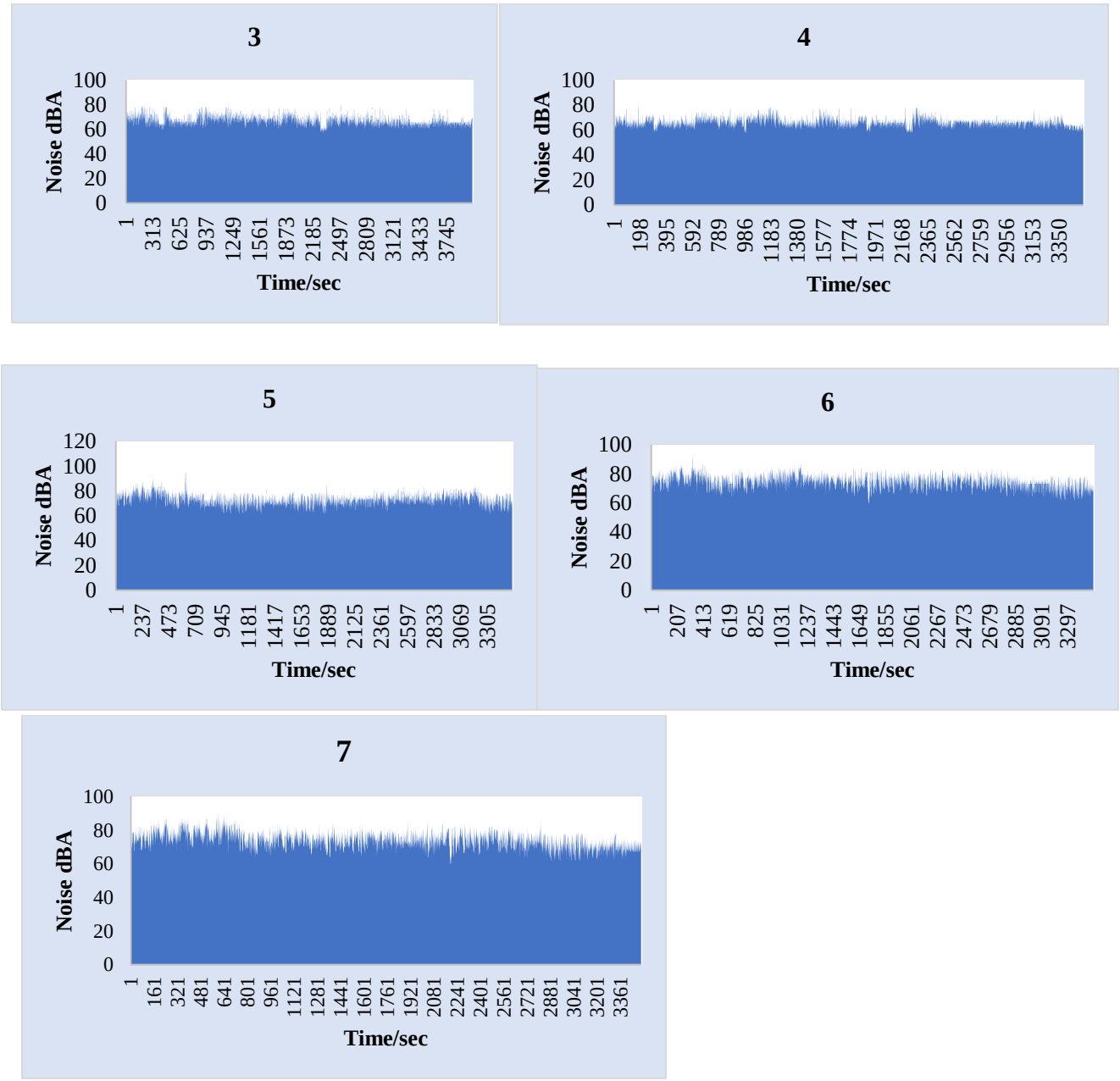


Figure 2. Depicts heightened levels of decibel measurements

The continuous flows of vehicles on roads generate various sources of noise, including engine sounds, tire noise, horn honking, and exhaust system noise. These factors, combined, contribute to the high noise levels associated with road traffic. The continuous flow of vehicles, along with the associated sounds of engines, tires, horns, and exhaust systems, can create high noise levels that interfere with the quiet and peaceful atmosphere that libraries strive to provide. The noise from road traffic can make it challenging for library users to focus, concentrate, and engage in effective learning activities.

The use of digital devices in libraries has contributed to an increase in noise levels. As more people bring their laptops, smartphones, and other electronic devices into libraries, there has

been a corresponding rise in noise due to their use. The act of typing on keyboards or using touchscreens can produce audible sounds, especially when individuals type quickly or with force. This continuous tapping or clicking noise can accumulate and contribute to the library's overall noise level. Digital devices often have built-in speakers or audio output capabilities. People use their devices to watch videos, listen to music, or engage in other multimedia activities, which can cause the sound to escape the headphones or speakers and disturb those nearby.

Mobile devices frequently emit notification sounds, such as incoming message tones or alarms. These sounds, if not set to silent mode, can be disruptive to others in the library, especially if they are loud or occur frequently. Digital devices also facilitate communication through voice or video calls, messaging apps, or online platforms. Engaging in conversations or discussions using these devices can result in increased talking or voice projection, further contributing to noise levels. By acknowledging the impact of digital device usage on noise levels and implementing appropriate strategies, libraries can work towards creating an environment that accommodates the needs of all users while minimizing noise disruptions.

4. Discussion

Table 1 shows samples of the study's results, which indicate the average noise levels measured in decibels (dB) during various periods within the library. These values represent the average sound levels measured during each respective period throughout the study. The data shows that the morning period had the highest average noise level of 76.7 dB, indicating potentially higher noise levels during the morning hours. The mid-day period is (12:30 p.m.) (70.5 dB) and the afternoon (2:30 p.m.) (70.18 dB) also had relatively higher average noise levels compared to other periods.

Table 1. Noise level measurement samples for different periods within the library

Noise level (dBA)	Morning (8:30 a.m.),	Mid-day period (12:30 p.m.)	The afternoon (2:30 p.m.)
Measurement 1	76.7	70.5	60.68
Measurement 2	69.8	66.2	68.28
Measurement 3	70.6	64	69.03
Measurement 4	72.3	63.5	61.04
Measurement 5	68.5	62.3	70.18
Measurement 6	72.3	62	68.91
Measurement 7	77.5	67.5	69.43

These elevated decibel levels during the specified periods, as shown in **Figure 3.,** suggest that there may be increased noise activity or sources of disturbance in the library during these hours. Here are some possible explanations for the higher decibel levels during these times.

The start of the library's operating hours or the peak arrival time of library users could be the cause of the higher decibel levels in the morning (8:30 a.m.). As students and researchers enter the library, there might be increased movement, conversations, or other activities that contribute to the overall noise levels. Understanding the variation in noise levels throughout the day can

help library administrators and staff develop strategies to manage and mitigate noise disruptions. This can include implementing quiet hours or designated quiet zones during peak noise periods, promoting awareness of noise etiquette, or employing noise reduction measures such as soundproofing materials or acoustic panels.

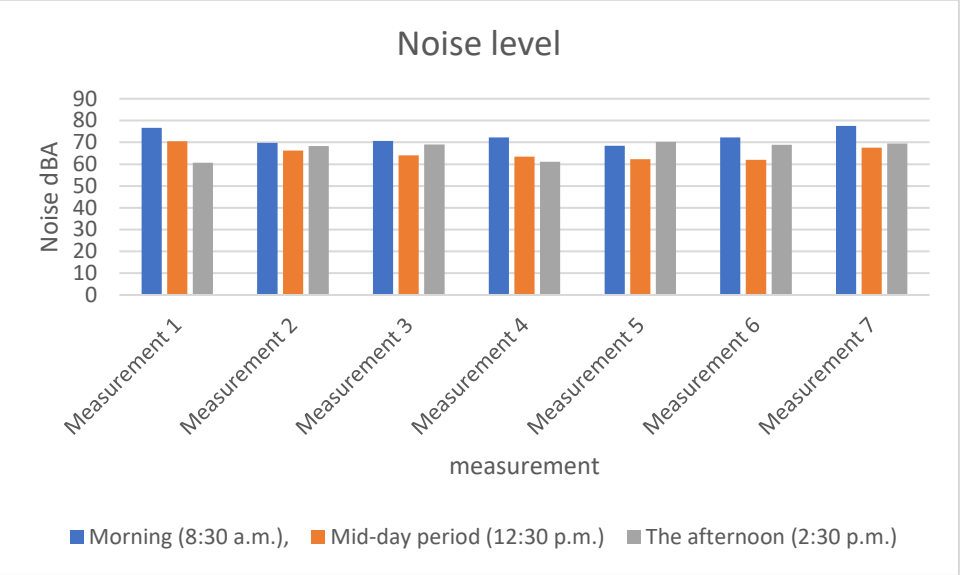


Figure 3. Noise level in selected periods.

5. Conclusion

The study conducted at Kirkuk University Library aimed to investigate the noise levels by collecting readings at specific time points throughout the day. The analysis focused on variations in noise levels and their impact. The findings revealed that the average noise levels measured during the three-time points consistently exceeded the guideline limit set by the World Health Organization (WHO). The study provides valuable insights into the noise levels at Kirkuk University Library, highlighting the need for interventions to address the excessive noise. Taking measures to reduce noise disturbances and create a quieter environment can have a significant positive impact on the library experience for users. This includes enhancing concentration, improving learning outcomes, and overall satisfaction.

By implementing strategies to minimize noise disruptions, such as soundproofing, enforcing noise policies, or offering designated quiet zones, the library can create a more conducive environment for studying and concentration. Additionally, raising awareness among library users about the importance of maintaining a quiet atmosphere can contribute to a more pleasant and productive experience for everyone. Overall, addressing the issue of excessive noise levels in Kirkuk University Library is crucial to creating an optimal learning environment that supports students' academic success and overall well-being.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

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