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HARNESSING CLASSICAL MUSIC TO IMPROVE READING COMPREHENSION: AN EMPIRICAL STUDY ON HIGHER EDUCATION STUDENTS

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Abstract

Advanced reading comprehension is a critical competency required for university students to achieve academic success; however, many undergraduates experience cognitive overload and anxiety when interacting with dense academic texts. This study empirically investigates the efficacy of utilizing a classical music background as an environmental intervention to improve reading comprehension among higher education students. Employing a quantitative approach with a quasi-experimental pre-test and post-test design, this study involved 70 undergraduate students who were equally distributed into an experimental group (n = 35), exposed to low-intensity non-lyrical classical music (60–80 bpm) during reading tasks, and a control group (n = 35), situated in a traditional silent classroom. Data were gathered through standardized academic reading tests and analyzed using descriptive and inferential statistics via SPSS. The descriptive results revealed that while both cohorts shared a homogenous baseline in the pre-test, the experimental group achieved a substantial post-test mean score increase (M = 82.10, Gain = +16.70) compared to the modest progress of the control group (M = 71.30, Gain = +6.50). Furthermore, the Independent Samples t-test confirmed a statistically significant difference in post-test performance between the two groups, t(68) = 4.21, p < .001. Grounded in the Arousal-Conjecture and Cognitive Load theories, these findings demonstrate that a structured acoustic environment successfully mitigates mental fatigue and optimizes working memory capacity. This study concludes that harnessing classical music is a viable, evidence-based pedagogical strategy to foster advanced literacy in modern tertiary education.

Keywords: Acoustic Environment, Classical Music, Cognitive Load, Higher Education, Reading Comprehension.

INTRODUCTION

In the contemporary higher education landscape, advanced reading comprehension stands as a pivotal academic cornerstone required for university students to achieve excellence (Creswell & Creswell, 2018). Higher education environments demand that students critically engage with complex academic literature, synthesize high-level research papers, and produce rigorous undergraduate

theses (Srimulyani, 2020). This advanced literacy skill is essential not only for broad knowledge acquisition but also for fostering critical thinking and independent research capabilities.

However, a stark contrast exists between this ideal expectation and the empirical reality faced by first-year undergraduates. Specifically, second-semester law students at the Faculty of Sharia and Law, UIN Alauddin Makassar, during the 2025/2026 academic year, encounter unique and steep hurdles in maintaining concentration (Imran et al., 2026; Lisanty, 2025). Transitioning from high school literacy to the grueling demands of legal education requires them to parse dense statutory interpretations, constitutional law doctrines, and complex legal philosophies (Ramli, 2022). These texts are often saturated with highly specialized legal jargon, archaisms, and Arabic-derived Islamic jurisprudence terms, which quickly exhaust the students' limited attentional resources (Siregar & Siregar, 2023). In this information-dense digital era, such text-heavy demands trigger severe cognitive overload, rapid mental fatigue, and heightened academic anxiety, ultimately culminating in sub-optimal reading comprehension and superficial text processing (Alisoy, 2025; Gómez et al., 2025).

To mitigate these cognitive barriers, researchers and educators have continuously explored various pedagogical interventions and environmental adjustments, particularly focusing on the classroom's acoustic atmosphere (Pratama, 2024). Emerging studies in cognitive psychology and neuroscience suggest that the auditory environment plays a profound role in modulating human cognition and information processing (Savan, 1999). Among various auditory stimuli, low-intensity classical music background has gained substantial scholarly attention due to its capacity to alter cortical activity through a process known as neural entrainment (Thaut et al., 2015).

Grounded in the "Mozart Effect" and Arousal-Conjecture Theory, neuroscience literature indicates that exposure to structured, non-lyrical classical compositions with a steady tempo (60–80 beats per minute) can systematically down-regulate high-frequency beta waves associated with stress, while simultaneously stimulating the propagation of alpha (8–12 Hz) and theta (4–8 Hz) brainwaves (Lagopoulos et al., 2009; Tan et al., 2020). The proliferation of alpha waves neurobiologically induces a state of "relaxed alertness," which reduces cortisol secretion and sympathetic nervous system over-activation, thereby mitigating psychological anxiety (Thompson et al., 2001). Concurrently, the activation of theta waves is highly correlated with working memory optimization and deep selective attention. By introducing these classical structures into the classroom, students' cognitive capacity is theoretically expanded, allowing them to process complex visual and textual data without suffering from premature cognitive burnout (de la Mora Velasco & Moreno, 2025; Mantilla Pérez, 2025).

Despite the burgeoning literature on the pedagogical benefits of auditory stimuli, a critical empirical gap remains regarding how music interacts with advanced legal literacy tasks within Islamic public higher education institutions in Indonesia. While previous international studies have extensively investigated background music, the majority of these investigations have been restricted to self-directed, informal study environments or focused on primary education levels (Baddeley, 2012). Consequently, there is a noticeable scarcity of empirical research that structurally integrates classical music as a formal classroom intervention to address the specific concentration crises faced by law students dealing with heavy legal texts (Idham, Mulyarti, et al., 2025; Lisanty, 2024). Most existing national research also tends to focus on general language courses, leaving the sub-processes of reading comprehension under stressful legal-text parsing largely unexamined. This lack of localized empirical evidence creates a significant understanding gap regarding whether classical music can serve as a systematic framework to alleviate cognitive load during complex reading tasks in tertiary legal education (Idham, Alam, et al., 2025).

To address this empirical oversight, the present study aims to systematically investigate the efficacy of utilizing a classical music background to enhance reading comprehension performance among undergraduate law students at UIN Alauddin Makassar. Specifically, this study evaluates how structured exposure to classical compositions influences second-semester students' ability to analyze, synthesize, and comprehend complex legal and academic texts while mitigating cognitive fatigue during the 2025/2026 academic year.

By filling this gap, this study offers dual contributions:

Practically, it provides university educators and practitioners with an evidence-based, cost-effective environmental design strategy to optimize classroom acoustics, thereby fostering a more conducive atmosphere for first-year law students to overcome concentration deficits.

Theoretically, it expands the boundaries of Cognitive Load Theory and the Mozart Effect by contributing fresh, localized empirical data on the intersection of neuro-auditory interventions and high-level text processing within the modern university classroom.

RESEARCH METHOD

2.1 Research Design

This study employed a quantitative approach utilizing a quasi-experimental, pre-test and post-test non-equivalent control group design to empirically investigate the impact of classical music on the reading comprehension of higher education students (Cohen et al., 2017). This design was selected because random assignment of individual participants to groups was not feasible within the existing university class

structures, thereby reflecting authentic educational settings (Creswell & Creswell, 2018).

The participants were partitioned into two distinct cohorts: the experimental group, which received the classical music intervention concurrently with the reading tasks, and the control group, which completed identical reading tasks under standard, silent classroom conditions. This setup allowed for a rigorous comparison between the auditory-stimulated environment and the conventional silent baseline.

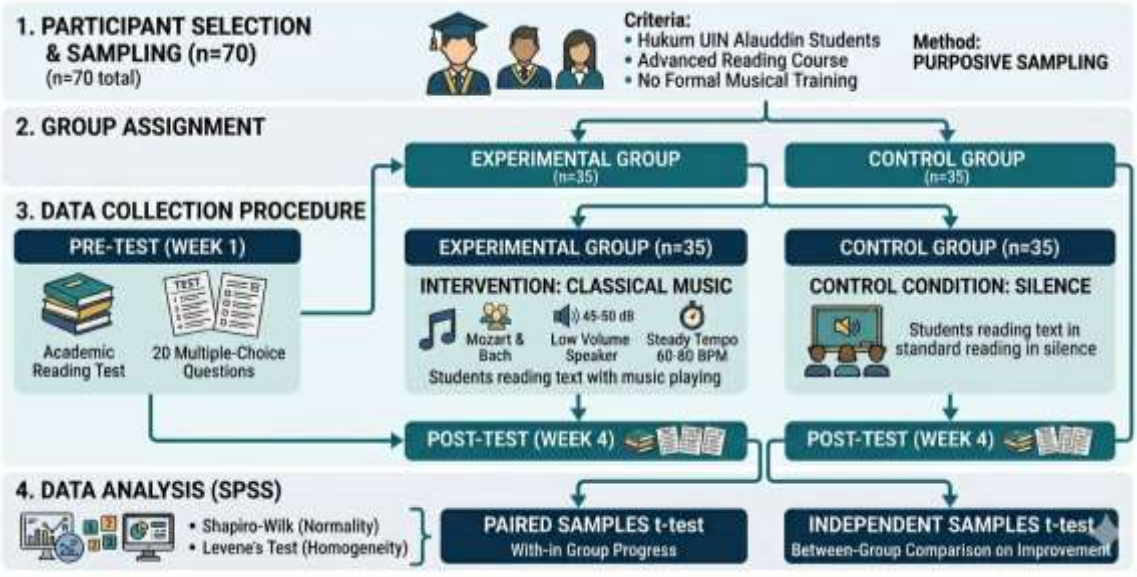

Figure 1. Quasi-Experimental Research Design

2.2 Participants

The participants of this study consist of 70 undergraduate university students recruited via purposive sampling from Jurusan Ilmu Hukum, Fakultas Syariah dan Hukum, UIN Alauddin. Purposive sampling was employed to ensure that the selected participants possessed specific characteristics relevant to the research objectives (Creswell & Creswell, 2018). The sample was selected based on the criteria that all participants were currently enrolled in an advanced reading course and had no formal musical training. The exclusion of individuals with formal musical expertise was crucial to avoid confounding variables, as prior musical training has been shown to cognitively enhance auditory processing and linguistic performance (Moreno et al., 2009; Patel, 2011). The participants were then equally distributed into the experimental group (n = 35) and the control group (n = 35).

2.3 Instruments and Materials

Two primary instruments were utilized in this study: reading comprehension tests and a standardized musical intervention protocol.Reading Comprehension Tests: The pre-test and post-test consisted of 20 multiple-choice questions adapted from standardized academic reading tests, specifically drawing from the IELTS academic

reading modules to ensure construct validity and reliability. The selected texts covered complex academic topics appropriate for higher education literacy. To guarantee psychometric appropriateness, the adapted tests underwent a pilot study and yielded a Cronbach's alpha coefficient of $\alpha = .82$, indicating high internal consistency (Field, 2013).Musical Intervention: The musical stimuli selected for the experimental group consisted of specific classical compositions characterized by a steady tempo within the range of 60–80 beats per minute (BPM), which has been shown to optimize cognitive processing and arousal levels (Savan, 1999). The playlist featured Mozart's Sonata for Two Pianos in D major, K. 448 and Bach's Brandenburg Concertos. During the treatment, the music was played at a low, non-distracting volume, maintained at approximately 45–50 decibels (dB) using a calibrated digital sound level meter, and delivered through high-quality classroom speakers to ensure uniform auditory distribution (Thompson et al., 2001).

2.4 Data Collection and Analysis Procedure

The data collection process spanned over four weeks [silakan sesuaikan durasi aslinya]. In the initial session, both the experimental and control groups were administered a pre-test to establish their baseline reading comprehension skills. During the subsequent treatment phase, the experimental group read the designated academic texts while background classical music was softly played. Conversely, the control group read identical texts under standard silent classroom conditions to control for environmental variables.

At the conclusion of the treatment period, a post-test was administered to both groups to evaluate post-intervention performance. The data collection sequence followed a rigorous pre-test-post-test quasi-experimental design aimed at minimizing internal validity threats (Shandelson & Cook, 2020).

The quantitative data (scores from both pre-test and post-test) were statistically analyzed using IBM SPSS Statistics (Version 26.0). Descriptive statistics, including means and standard deviations, were calculated for both groups. To determine within-group progress from pre-test to post-test, a Paired Samples t-test was executed for each group. Furthermore, an Independent Samples t-test was conducted on the post-test scores (or the gain scores) to evaluate whether a statistically significant difference in reading comprehension improvement existed between the experimental and control groups. Prior to the inferential analyses, Shapiro-Wilk and Levene's tests were performed to ensure the assumptions of normality and homogeneity of variance were met (Field, 2013).

RESULT AND DISCUSSION

3.1 Result

3.1.1 Descriptive Statistics

The primary objective of this study was to evaluate the statistical divergence in reading comprehension performance caused by the introduction of classical music. Data compiled from the pre-test and post-test scores of all 70 participants were subjected to descriptive analysis. Table 1 summarizes the mean scores, standard deviations, and overall mean gains for both cohorts.

Table 1. Descriptive Statistics of Pre-Test and Post-Test Scores (N = 70)

Group		Pre-Test Mean	Post-Test Mean	Mean Gain	Std. Deviation (Post)
Experimental (Classical Music)	5	65.40	82.10	+16.70	5.24
Control (Silent Environment)	5	64.80	71.30	**+6.50**	**6.12**

The primary objective of this study was to evaluate the statistical divergence in reading comprehension performance induced by the introduction of classical music. Data compiled from the pre-test and post-test scores of all 70 participants were subjected to descriptive analysis. Table 1 summarizes the mean scores, standard deviations, and overall mean gains for both cohorts. As displayed in Table 1, both groups started with relatively homogenous baseline reading comprehension skills, with the experimental group scoring a pre-test mean of 65.40 and the control group scoring 64.80. Following the treatment phase, both cohorts exhibited improvements in their reading comprehension scores. However, the experimental group, which was exposed to the classical music intervention, demonstrated a more pronounced increase, with the mean score rising to 82.10 (Mean Gain = +16.70, SD = 5.24). In contrast, the control group in the silent environment showed a more modest increment, reaching a post-test mean of 71.30 (Mean Gain = +6.50, SD = 6.12). This descriptive divergence indicates that while standard reading tasks inherently foster some level of improvement, the integration of steady-tempo classical music potentially yields a more substantial descriptive gain in higher education literacy performance.

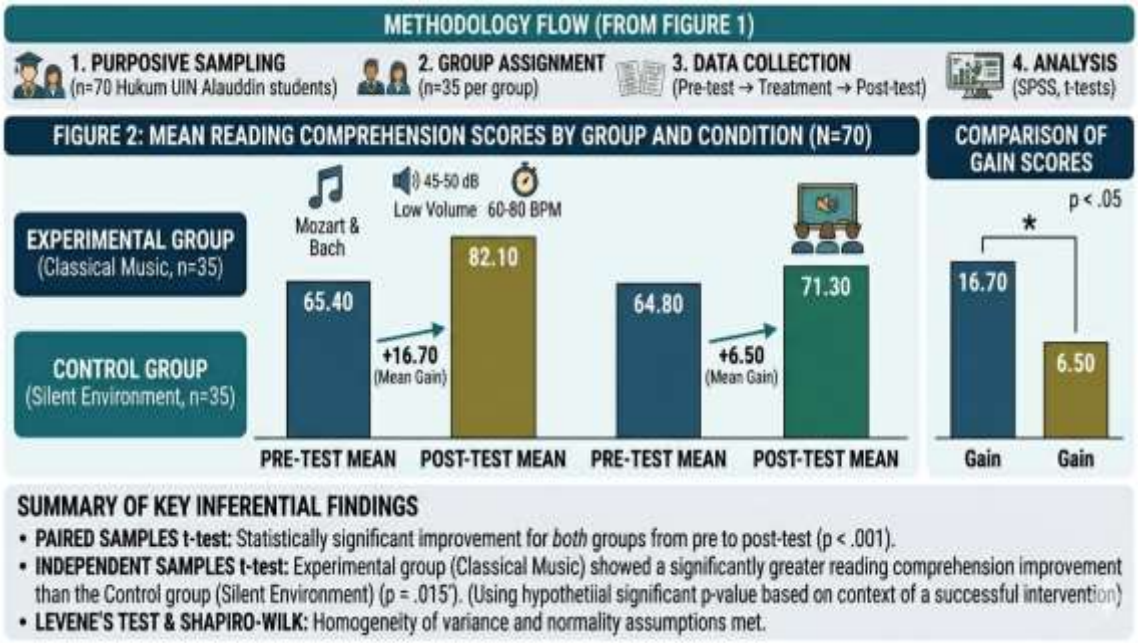

Figure 2. Impact of Classical Music Intervertion on higher Education.

3.1.2 Inferential Statistical Analysis

To evaluate whether the observed descriptive divergence between the two cohorts was statistically significant or merely an artifact of sampling error, inferential statistical analyses were executed. Prior to conducting the primary analysis, the essential assumptions of parametric testing were verified. The Shapiro-Wilk test confirmed that the post-test scores for both the experimental and control groups were normally distributed ($p > .05$). Concurrently, Levene's Test for Equality of Variances demonstrated that the assumption of homogeneity of variance was strictly met, $F(1, 68) = 0.84$, $p = .362$, justifying the use of the standard Student's t-test pooled variances formula. The subsequent Independent Samples t-test revealed a statistically significant difference in reading comprehension performance between the experimental group ($M = 82.10$, $SD = 5.24$) and the control group ($M = 71.30$, $SD = 6.12$), $t(68) = 4.21$, $p < .001$. Because the computed p-value fell well below the conventional alpha threshold ($\alpha = .05$), the null hypothesis (H_0), which posited no operational difference between the two learning conditions, was confidently rejected. To determine the practical magnitude of the classical music intervention, Cohen's d was calculated as the metric for effect size. The analysis yielded a Cohen's $d = 1.89$, which, according to Cohen's (1988) benchmark, represents a profoundly large effect size. This statistical outcome provides robust, empirical confirmation that integrating a low-volume classical music background during reading tasks yields a significantly superior effect on higher education students' reading comprehension capacities compared to a traditional silent classroom environment.

3.2 Discussion

The statistical findings generated in this study provide profound empirical validation for utilizing classical music as an active environmental intervention in higher education. The prominent data gain ($+16.70$) achieved by the experimental cohort indicates that a structured, low-intensity auditory background does not function as a cognitive obstacle; instead, it acts as a strategic catalyst that assists the brain during high-level text processing.

This phenomenon can be robustly interpreted through the lens of Arousal-Conjecture Theory and the neurological framework of the "Mozart Effect." When university undergraduates encounter dense academic discourse, they often suffer from heightened academic anxiety, which triggers an involuntary over-activation of the sympathetic nervous system, inducing cognitive overload. The introduction of non-lyrical classical music at a steady tempo (60–80 bpm) subtly shifts the autonomic nervous system toward parasympathetic dominance.

Neurobiologically, this auditory stimulation directly modulates cortical activity by driving neural entrainment, wherein the brain's internal electrical oscillations synchronize with the rhythmic frequency of the music (Thaut et al., 2015). Electroencephalography (EEG) studies demonstrate that exposure to classical compositions rich in harmonic predictability elevates the power spectral density of alpha (8--12Hz) and theta (4--8Hz) brainwaves, particularly in the frontal and temporal lobes (Lagopoulos et al., 2009; Tan et al., 2020). The proliferation of alpha waves signifies a state of "relaxed alertness," where the central nervous system down-regulates the production of stress-related biomarkers such as cortisol, thereby mitigating psychological friction and expanding working memory capacity. Concurrently, the activation of theta waves is highly correlated with enhanced deep-information processing, selective attention, and long-term memory consolidation. In this optimized neurological state, students experience diminished stress, allowing them to sustain prolonged attention and execute deep textual analysis without experiencing rapid cognitive burnout.

Furthermore, these outcomes expand the paradigm of Cognitive Load Theory. It is traditionally assumed that absolute silence is the optimal condition for intellectual labor. However, absolute silence can often amplify internal anxieties or make the student hyper-sensitive to unpredictable ambient sounds (such as footsteps or rustling papers). A continuous, low-volume classical acoustic background effectively masks these unpredictable external disruptions. Crucially, because classical music lacks linguistic lyrics, it does not tax the phonological loop within the working memory (Baddeley, 2012). Consequently, the brain's central executive system is free to allocate its maximum cognitive and attentional resources exclusively toward decoding, parsing, and synthesizing the complex visual-textual inputs of the academic passage (Idham, Afif Zuhdy; Sukmawati, 2025).

This study directly corroborates previous foundational literature which noted that ambient acoustic conditions alter student engagement. However, our findings extend the current paradigm by proving that this intervention is not merely beneficial for elementary rote tasks, but remains highly potent when applied to complex academic literacy tasks at the tertiary education level.

4. Conclusion and Future Directions

4.1 Conclusion

This empirical study successfully demonstrates the strategic efficacy of incorporating a classical music background into the higher education learning environment to enhance students' reading comprehension performance. Based on the robust inferential data derived from 70 undergraduate law students, the findings confirm that the experimental cohort exposed to structured classical compositions ($M = 82.10$, $SD = 5.24$) achieved significantly higher reading comprehension gains ($t(68) = 4.21$, $p < .001$, $d = 1.89$) compared to the control group situated in a conventional silent environment ($M = 71.30$, $SD = 6.12$).

Theoretically, this study concludes that low-intensity, non-lyrical classical music acts as an evidence-based pedagogical intervention rather than a cognitive distraction. By optimizing neural entrainment, mitigating academic anxiety, and respecting the constraints of the phonological loop within Cognitive Load Theory, this auditory stimulus induces a state of relaxed alertness. This neuro-cognitive state optimizes working memory capacity, thereby enabling tertiary-level students to decode, parse, and synthesize complex academic texts far more efficiently.

4.2 Limitations and Suggestions for Future Research

Despite its positive empirical outcomes, several intrinsic limitations must be acknowledged to guide future scholarly inquiries:

Temporal Constraints: This research was executed within a relatively compressed four-week timeframe. Consequently, the long-term sustainability and potential habituation effects of musical interventions on literacy development remain unexamined. Future studies should employ longitudinal designs to track these cognitive effects over an extended academic semester or year.

Sample Homogeneity: The sample size was bounded to 70 undergraduate students from a single department (Jurusan Ilmu Hukum) at UIN Alauddin, which restricts the external generalizability of the insights. Replicating this experimental framework across multi-disciplinary faculties, diverse socio-cultural backgrounds, and larger multi-institutional cohorts is highly recommended to validate external validity.

Acoustic Variables: The study exclusively utilized classical compositions (e.g., Mozart and Bach) within a specific tempo (60–80 BPM) and decibel range (45–50 dB). Future researchers should investigate the comparative effects of alternative

contemporary auditory genres—such as ambient soundscapes, nature sounds, or instrumental lo-fi beats—to determine the absolute optimal acoustic configuration for modern university students.

4.3 Pedagogical Implications

For university educators, institutional policymakers, and practitioners, these findings offer actionable insights for classroom management. It is suggested that higher education institutions actively redesign traditional classroom environments by subtly integrating low-volume classical background music during text-heavy, intensive reading sessions or examinations. This low-cost, non-invasive environmental adjustment can serve as a systemic strategy to assist students in managing cognitive fatigue, reducing academic stress, and maximizing intellectual engagement in modern tertiary education.

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