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Research Article

Synthesis of Music and Education: Analyzing the Effectiveness of Lo-Fi and Slowed-Reverb Lyrical Music on Reading Comprehension

John Harry S. Caballo¹  | Claire Silagan Otero^{2*}  | April Joyce Del Corro Carreon³  | John Lloyd Bonito Lampedario⁴ 

¹⁻⁴ Faculty, University of Mindanao, Davao City, Philippines

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Abstract

The central aim of this quasi-experimental study was to examine the effectiveness of Lo-Fi (low-fidelity) and slowed-reverb lyrical music in enhancing the reading comprehension of college students at the University of Mindanao, Davao City, Philippines. The study involved 30 participants, divided equally into one control group and two experimental groups. Reading comprehension was measured using a standardized pretest-posttest design. Data were analyzed using descriptive statistics, t-tests, Kruskal-Wallis, and Wilcoxon signed-rank tests. Results indicated that while all groups began with comparable reading comprehension levels, only the group exposed to Lo-Fi instrumental music showed a statistically significant improvement. The control group exhibited minimal gains, whereas the slowed-reverb lyrical music group showed no significant improvement. The study highlights pedagogical implications and limitations concerning the integration of music in educational settings.

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³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

Introduction

Reading comprehension is a foundational skill that plays a crucial role in students' academic success and lifelong learning. It is a prerequisite skill that students need to advance to the next level (Caballo, 2025). According to Chi (2023), the Philippines ranked among the bottom six countries in reading comprehension, based on the 2022 Program for International Student Assessment (PISA). Results showed that at least 24% of students in the Philippines can identify the main idea in a text of moderate length, with a minimum ability to reflect on the purpose and meaning of what they are reading. This indicates that the Philippines' performance in reading comprehension is significantly low.

In 2024, a report from the National Association of Colleges and Employers (NACE) highlighted that the essential qualities that college graduates should possess and aim to achieve are strong writing and reading skills (Gray, 2024). The report states that employers' biggest consideration in hiring college graduates is their ability to read and comprehend.

Espinosa et al. (2023) and Lei et al. (2010) reported that numerous college students exhibit weak reading comprehension skills. Several factors contribute to this issue, including low cognitive development due to poverty, which leads to a lack of attention (Meron, 2018), difficulty focusing in class (Watts, 2022), low self-esteem (Alghamdi et al., 2023), and limited prior knowledge (Joshi & Aaron, 2012). Additionally, a lack of interest and difficulty in finding answers due to limited vocabulary (Hasibuan et al., 2022; Ulfa, 2012) can result in the inability to use complex language during the learning process (Entong et al., 2024). This

affirms that various factors affect the reading proficiency of students as they engage in activities, resulting in lower efficacy and lower comprehension. Moreover, Reutebuch et al. (2019) suggest that continuous reading activities are necessary for improving the reading proficiency of college students.

Accordingly, reading often takes place in environments with distracting noises that hinder comprehension (Clark et al., 2006). In a survey conducted by Pan et al. (2020) at Georgia Highlands College, it was found that college students spend 100% of their classroom time listening to music, and 75% listen to music while studying to relieve stress and avoid stressors (Whittinghill et al., 2021). Suggestopedia, as described by Colliander & Fejes (2020), promotes a creative atmosphere that enhances students' learning capacity through a supportive environment, where learning feels more relaxed and comfortable (Lusnig et al., 2023). Buchborn et al. (2022) explained that the incorporation of musical elements plays a significant role in enhancing cognitive tasks such as reading.

In a study by Blanco & Nartea (2020) conducted at the Polytechnic University of the Philippines, it was found that listening to music enhanced students' motivation in reading comprehension tasks. Similarly, Que et al. (2023) emphasized that music can improve students' productivity and academic efficacy. Georgi Lozanov's theory of Suggestopedia posits that a positive learning environment that responds to students' needs promotes productive learning by fostering a relaxed and supportive atmosphere.

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

Suggestopedia highlights that a creative and supportive atmosphere enhances students' capacity to internalize learning materials—whether written or verbal—by fostering deeper comprehension. It also proposes that the integration of music into instruction can have aural effects that either boost or diminish student motivation. Therefore, incorporating music as a strategy in reading instruction may be beneficial in increasing students' reading engagement.

Elizaga et al. (2023) posit that listening to modern instrumental music, such as Low-Fidelity (Lo-Fi) music, positively influences reading comprehension, enhances memory retention (Casumbal et al., 2019), and promotes overall learning engagement. Lo-Fi music, in particular, has been identified as an effective tool for integrating musical elements with text to support reading proficiency (Souza & Barbosa, 2023). In contrast, a comprehensive study by Kämpfe et al. (2010) and Cuario et al. (2024) showed that slow and soft lyrical music may negatively affect reading comprehension, contributing to reduced academic performance. The effects of music have primarily been explored in targeted populations, such as individuals with mental health conditions (Sesso & Sicca, 2020) and within the field of neuroscience (Michaelsen & Esch, 2021), with limited attention given to its role in education. Chan (2023) asserts that music can influence students' reading comprehension; however, there remains a lack of empirical evidence and formal conclusions regarding which types of music effectively support the development of cognitive skills and academic performance among college students (de la Mora Velasco & Hirumi, 2020). This gap in research highlights the need to investigate the educational potential of music more thoroughly. Therefore, this study aims to

examine the effectiveness of two specific music genres—Low-Fidelity (Lo-Fi) music and Slowed-Reverb Lyrical music—on students' reading engagement and comprehension.

The overall objective of this study is to explore the effectiveness of two different music genres on students' reading comprehension and to determine whether music can be considered beneficial in enhancing their reading performance. While some studies argue that music in the classroom promotes relaxation and motivation, others claim it may serve as a distraction, suggesting that its impact remains a topic of debate among experts.

Recognizing the relationship between music and education, this study seeks to identify a balanced approach and strategy to improve the learning experience of college students. By encouraging readers to engage deeply with written text and develop stronger comprehension skills, this study aims to contribute to their academic success both in school and in the workplace.

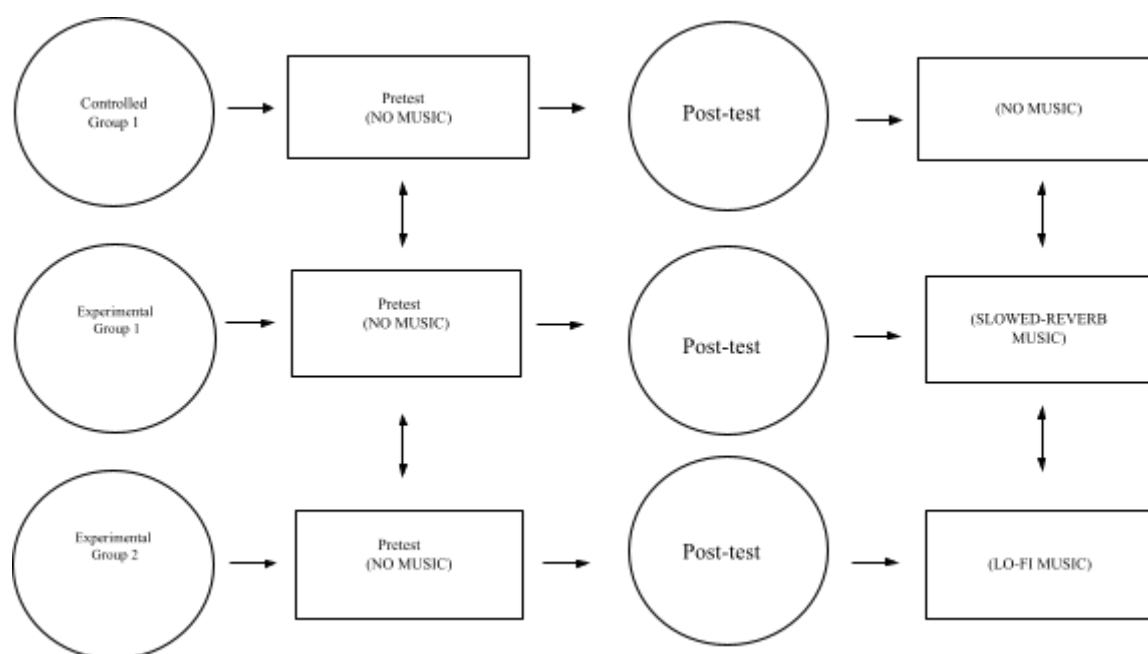
Aligned with the pursuit of Sustainable Development Goal #4 (Quality Education), the researchers are determined to explore possible resolutions that enhance college students' reading comprehension. Specifically, the study aims to: (1) Determine whether there is a significant difference in pretest reading comprehension scores among the Control Group, Experimental Group 1 (exposed to Slowed-Reverb Music), and Experimental Group 2 (exposed to Lo-Fi Music) before the intervention; (2) Examine the significant differences in posttest reading comprehension scores among the same groups after exposure to their respective auditory conditions; (3) Assess whether there is a statistically significant difference in pretest and posttest scores on reading comprehension performance across all

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

groups combined. Moreover, the study is guided by the following null hypotheses: (1) There is no significant difference in the pretest reading comprehension scores among the Control Group, Experimental Group 1 (Slowed-Reverb Music), and Experimental Group 2 (Lo-Fi Music) prior to the intervention; (2) There is no

significant difference in the posttest reading comprehension scores among the same groups following exposure to their respective auditory conditions; (3) There is no significant difference between the pretest and posttest reading comprehension scores of the students when all groups are considered as a combined sample.



Method

Research Participants

The participants in this study were 3rd-year college students enrolled in the Bachelor of Secondary Education major in English during the 2nd semester of Academic Year 2024–2025. A total of 30 students (10 per group) were purposely selected from 90 students who took

the pretest, ensuring comparable reading comprehension levels. Participants were chosen based on their Mean Percentage Score (MPS) in the pretest to maintain homogeneity across groups.

Research Instrument and Materials

The reading material used in the study was the short story *Genie in a Bottle*. The control group completed the pretest and posttest under silent conditions following the traditional method. Experimental Group 1 completed the pretest

under silent conditions and was exposed to Low-Fidelity (Lo-Fi) instrumental music during the posttest. Experimental Group 2 completed the pretest under silent conditions and was exposed to Slowed-Reverb lyrical music during

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

the posttest. Each session lasted for 30 minutes following a 15-minute orientation. The comprehension test contained 15 questions: 3 literal, 3 inferential, 4 critical, and 5 creative items. The grading scale was as follows: Very Satisfactory (13–15 correct), Satisfactory (9–12 correct), Not Satisfactory (0–8 correct).

The story underwent validation by three English instructors and a pilot test to ensure reliability using the Kuder-Richardson Formula 20 (KR-20). The reliability coefficient exceeded the minimum threshold of 0.50, confirming internal consistency. Prior research (Whitten et al., 2016; Al Falaq et al., 2021) supports the use of literary fiction in developing reading comprehension and engagement.

Research Design and Procedure

This study adopted a quasi-experimental pretest–posttest nonequivalent group design (Cook & Campbell, 1979). This design allowed for manipulation of the independent variable without random assignment. A total of 30 participants (10 per group) were assigned to one control and two experimental groups based on homogeneity testing (Cohen et al., 2007).

The experiment consisted of three sessions: (1) Control Group – pretest and posttest under silent conditions; (2) Experimental Group 1 – pretest under silent conditions; posttest with Lo-Fi instrumental music (Lo-Fi Girl 9:00 AM Session); (3) Experimental Group 2 – pretest

under silent conditions; posttest with Slowed-Reverb lyrical music (Ruth B.: Dandelions – Slowed Reverb Version). All sessions were conducted in a quiet discussion room to minimize external noise. Procedures, time allotments, and test difficulty were kept identical across pretest and posttest sessions.

Ethical standards were strictly observed. Participants signed informed consent forms detailing the study’s purpose, voluntary nature, and confidentiality of responses. No identifying information was attached to their data. The study complied with the University of Mindanao’s research ethics protocols and was reviewed by the department’s research committee. Tokens were provided as appreciation for voluntary participation.

Descriptive statistics were used to summarize data, while inferential statistics determined significant differences among and within groups. Specifically, the Kruskal–Wallis and Wilcoxon signed-rank tests were employed, as the small sample size ($n = 30$) and non-normal distribution of scores warranted nonparametric analysis despite reporting means for interpretive clarity (Davies et al., 2008). Standard deviation was used to examine score variability across groups. All statistical analyses were verified by a professional statistician to ensure reliability and confidentiality.

Results and Discussion

Pretest Scores Among Groups: Control Group and Experimental Groups

The table below presents the statistical results regarding the significance of the differences in the pretest mean scores among the Control Group, Experimental Group 1 (exposed to Slow-Reverb Lyrical Music), and Experimental Group 2 (exposed to Low-Fidelity (Lo-Fi) music). It also provides a descriptive

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

summary of the scores for each group, offering insight into their initial reading comprehension performance before the intervention.

Table 1. *Significance of the difference in pretest scores among groups*

Groups (Pretest)	N	Mean	Description	P-value
Control Group (Silent)	10	10.6	Satisfactory	0.467
Experimental Group 1 (Silent)	10	10.9	Satisfactory	
Experimental Group 2 (Silent)	10	10.7	Satisfactory	
Total	30	10.73	Satisfactory	

Table 1 presents the pretest mean scores of the Control Group and the two experimental groups. The Kruskal–Wallis test ($p = .467$) indicated no significant difference in reading comprehension levels before the intervention, confirming participant homogeneity. All groups performed at a Satisfactory level ($M = 10.60\text{--}10.90$), establishing a comparable baseline for posttest analysis. These results align with Herring and Scott (2018), who found that instrumental music had no significant effect on reading performance, and with Sun et al. (2024), who reported that

music's effect depends on listener preference and type.

Posttest Scores Among Groups: Control Group and Experimental Groups

The table below presents the statistical results regarding the significance of the differences in the posttest mean scores on reading comprehension among the Control Group, Experimental Group 1 (Slowed-Reverb), and Experimental Group 2 (Lo-Fi). Table 2 summarizes the reading comprehension performance of each group after the respective interventions were applied

Table 2. *Significance of the difference in posttest scores among groups*

Groups (Posttest)	N	Mean	Description	P-value
Control Group (Silent)	10	10.8	Satisfactory	0
Experimental Group 1 (Slowed-Reverb)	10	9.6	Satisfactory	
Experimental Group 2 (Lo-Fi)	10	13.9	Very Satisfactory	

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

Total	30	11.43	Satisfactory
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Table 2 shows a statistically significant difference in posttest scores ($p < .000$). Experimental Group 2 (Lo-Fi instrumental music) achieved the highest mean score ($M = 13.90$, Very Satisfactory), followed by the Control Group ($M = 10.80$), while Experimental Group 1 (Slowed-Reverb lyrical music) obtained the lowest ($M = 9.60$). These results suggest that Lo-Fi music enhanced comprehension, while lyrical slowed-reverb music hindered it.

The improvement in the Lo-Fi group supports the Yerkes–Dodson Law (1908), which explains that moderate arousal—neither too low nor too high—optimizes performance. Lo-Fi music may have created this balanced cognitive state, allowing students to focus effectively. In contrast, the decline in the Slowed-Reverb group aligns with Sweller’s Cognitive Load Theory (1988), which posits that lyrics add extraneous load, reducing working memory available for reading comprehension.

Pretest and Posttest Scores Across all Groups

Table 3 presents the statistical results regarding the significance of the difference in the pretest and posttest mean scores combined through the comparison of the general average scores before and after the intervention among the Control Group, Experimental Group 1 (exposed to Slow-Reverb Lyrical Music), and Experimental Group 2 (exposed to Low-Fidelity [Lo-Fi] Music) in terms of reading comprehension analyzed based on the p-value.

This comparison aims to identify which auditory condition had a statistically significant impact on students’ reading comprehension performance. It further highlights the effectiveness of each auditory stimulus in facilitating or impeding cognitive processing during reading tasks.

Table 3. *Significance of the difference in pretest and posttest scores across all groups*

Comparison	N	Pretest	Posttest	Difference	P-value
All Groups Combined	30	10.73	11.43	0.7	0.077

Table 3 shows no statistically significant overall difference between pretest and posttest scores across all groups ($p = .077$). However, the slight increase from 10.73 to 11.43 suggests a positive but nonsignificant trend. The contrasting group effects—Lo-Fi’s improvement and Slowed-Reverb’s decline—may have balanced out, explaining the lack of overall significance.

The findings affirm that auditory conditions can meaningfully influence reading comprehension. The positive impact of Lo-Fi instrumental music demonstrates Lozanov’s Suggestopedia theory, which emphasizes relaxed yet stimulating environments that enhance learning receptivity. Lo-Fi music likely cultivated such an atmosphere, improving focus and information retention.

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

Furthermore, the results reinforce Cognitive Load Theory, as the lyrics in Slowed-Reverb music likely imposed additional cognitive demands, hindering comprehension. This aligns with Quan and Kuo (2022) and Thompson et al. (2012), who found that lyrical or fast-tempo music can impair reading by dividing attention.

The study's outcomes also support the Yerkes–Dodson Law, illustrating that Lo-Fi's steady rhythm and moderate tempo may induce optimal arousal, unlike lyrical music, which exceeded the ideal threshold. Supporting

research (Sofologi et al., 2022; Buchborn et al., 2022; Cogo-Moreira et al., 2013) indicates that instrumental background music enhances focus, engagement, and reading comprehension when used appropriately.

Overall, the findings suggest that instrumental Lo-Fi music can enhance comprehension by maintaining optimal arousal and reducing distractions, while Slowed-Reverb lyrical music may hinder comprehension due to cognitive overload. These results strengthen theoretical and practical evidence that music type and structure significantly shape learning performance.

Conclusion and Recommendation

This study investigated the effectiveness of Lo-Fi and Slowed-Reverb lyrical music on the reading comprehension of college students, analyzing pretest and posttest performance across literal, inferential, critical, and creative levels. Findings revealed that exposure to Lo-Fi instrumental music significantly enhanced reading comprehension, while Slowed-Reverb lyrical music negatively affected performance. These results support the theoretical frameworks of Suggestopedia and the Arousal Theory of Motivation, both of which explain how auditory stimuli can influence cognitive processing and learning outcomes. Lo-Fi music appears to enhance comprehension by maintaining optimal arousal and reducing cognitive load, whereas lyrical music divides attention, hindering comprehension.

Given these findings, teachers are encouraged to integrate Lo-Fi instrumental music during silent reading or independent learning sessions to promote focus and comprehension. Conversely, they should avoid using lyrical or slowed-reverb music during reading tasks, as it may interfere

with language processing. Practical applications may include playing soft Lo-Fi tracks during reading workshops or as background music in study areas to create a relaxed but attentive environment.

It is important to note that this study involved a small sample size ($n = 30$) and was conducted in a single university setting, which limits the generalizability of the findings. Future studies should examine the long-term and cross-genre effects of background music on reading comprehension among larger and more diverse populations.

Students are also encouraged to personalize their study environments, using instrumental music strategically to improve concentration and comprehension. Further research exploring the interaction between music tempo, familiarity, and task difficulty could deepen understanding of how sound environments influence academic performance.

³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

This study was limited by its small sample size and the absence of randomization, which may affect the generalizability of the findings. Moreover, since participants were drawn from a single university (University of Mindanao) and discipline (BSED-English), the results may not

represent broader educational contexts. Finally, students' prior familiarity with Lo-Fi and Slowed-Reverb music could have influenced their reading performance.

Supplementary Details

1. Supplementary Materials & Data Availability Statement

- **Supplementary Materials:** There are no supplementary files (figures, tables, videos, or raw datasets) beyond those included within the main manuscript.
- **Data Availability Statement:** The data presented in this study are available upon reasonable request from the corresponding author.

2. Author Contributions (CRediT Taxonomy)

Following the CRediT taxonomy, the authors' contributions are specified below:

- **Author 1 (Lead Author) – LAMPEDARIO, JOHN LLOYD B.:** Conceptualization, Methodology, Data Curation, Formal Analysis, Writing—Original Draft Preparation, Visualization, Project Administration.
- **Author 2 – OTERO, CLAIRE S.:** Investigation, Resources, Data Curation, Writing—Review & Editing.
- **Author 3 – CARREON, APRIL JOYCE D.:** Methodology, Resources, Validation.
- **Author 4 (Adviser) – CABALLO, JOHN HARRY S.:** Supervision, Funding Acquisition, Review & Editing.

3. Funding Information

This research received no external funding.

4. Institutional Review Board (IRB) Statement

- **IRB Statement:** Not applicable.

5. Informed Consent Statement

- **Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study. Participants were asked to participate voluntarily and were assured of the confidentiality of their responses, with no identifying information attached to their data.

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³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

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7. Conflicts of Interest

The authors declare no conflict of interest.

8. Disclosure Statement (Use of AI Tools)

The authors confirm that no large-language models (LLMs) or generative AI tools were used to produce the academic content, analysis, or results presented in this manuscript. However, the final draft underwent review using AI-powered software tools, specifically Grammarly and an academic similarity checker (Turnitin), to ensure adherence to academic writing standards, grammar, and originality. The authors have reviewed, edited, and validated all content and take full responsibility for the published work.

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³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph

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³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph



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³Corresponding Author: Claire Silagan Otero

*Corresponding Email: c.otero.524192@umindanao.edu.ph