


Impact of AI-Generated Voice Narration on Students' Reading Comprehension

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AI voice narration, reading comprehension, artificial intelligence; text-to-speech, quasi-experimental, elementary education, educational technology; literacy intervention

Abstract. This study examined the effects of AI-generated voice narration on the reading comprehension skills of Grade 6 students. The research addressed the increasing integration of artificial intelligence in education and explored its potential to enhance literacy instruction through auditory and multimodal learning support. Reading comprehension remains a significant challenge among elementary learners, particularly during the transition from "learning to read" to "reading to learn," making innovative instructional interventions increasingly important. Guided by Gardner's Multiple Intelligences Theory, Paivio's Dual Coding Theory, and Mayer's Multimedia Learning Theory, the study examined how AI-assisted narration supports learning through auditory and visual processing. A quasi-experimental pretest-posttest control group design was employed involving 46 Grade 6 students from a public elementary school in Cebu, Philippines. Participants were divided into a control group exposed to traditional self-reading instruction and an experimental group that utilized AI-generated voice narration during reading activities. Researcher-made comprehension tests were administered before and after the intervention to assess recall, vocabulary understanding, inference, and identification of main ideas. Data were analyzed using descriptive statistics, Mann-Whitney U tests, and Wilcoxon Signed-Rank tests. Results showed that the experimental group demonstrated greater improvement in reading comprehension than the control group, with mean scores increasing from 14.74 to 17.13, while the control group showed only minimal gains from 14.83 to 15.22. Findings suggest that AI-generated voice narration can serve as an effective supplementary instructional tool for improving comprehension, learner engagement, and consistency of academic performance. The study highlights the importance of integrating AI-assisted reading technologies into classroom instruction to support diverse learners and promote inclusive literacy development.

Introduction

Reading comprehension is widely recognized as the cornerstone of academic learning, enabling students to construct meaning from text, link new knowledge to prior understanding, and engage in critical thinking across all disciplines (Wood et al., 2017). Yet many Grade 6 learners in Philippine public elementary schools continue to struggle with this skill, particularly during the critical transition from 'learning to read' toward 'reading to learn.' Teachers report that low comprehension ability ranks among the most persistent challenges in contemporary classrooms, often persisting despite varied instructional approaches.

The rapid integration of Artificial Intelligence (AI) in education has introduced innovative tools that redefine how learners interact with content. Among these, Voice AI narration, powered by text-to-speech (TTS) technology, allows students to listen to lessons or reading materials read aloud by an AI voice. By engaging both auditory and visual processing channels simultaneously, this multimodal approach can cater to diverse learning styles, improve engagement, and reduce cognitive load for students who face decoding difficulties (Keelor et al., 2020; Alsalamy & Mohammed, 2025; Sánchez-González & Terrell, 2023). Research has demonstrated that technology-based interventions positively impact reading comprehension skills (Khan & Mutawa, 2021; Shamir-Innes & Jenó, 2022), though the effectiveness of AI narration varies based on voice quality, prior reading ability, and engagement level (Cetin & Yurtseven, 2022).

Despite this growing evidence, most existing studies focus on high school, college, or adult populations, leaving a gap at the elementary level specifically at Grade 6, a pivotal stage in literacy development. Very few studies within the Philippine context have empirically tested Voice AI narration under controlled conditions at this grade level. This study addresses that gap. It hypothesized that students exposed to AI-generated voice narration would demonstrate significantly higher comprehension gains than those who engaged in unaided self-reading.

Grounded in Gardner's (1983, 1999) Multiple Intelligences Theory, Paivio's (1971, 1986) Dual Coding Theory, and Mayer's (2001) Cognitive Theory of Multimedia Learning, the study provides a theoretical rationale for predicting that bimodal (auditory + visual) narration will enhance comprehension beyond single-modality reading. This paper reports: (1) baseline comprehension levels of both groups prior to intervention; (2) between-group differences at pretest; (3) post-intervention comprehension levels; (4) posttest between-group differences; and (5) within-group pretest-to-posttest gains. Methodology, results, and discussion sections follow in sequence.

Theoretical Framework

This study draws on three converging theoretical frameworks. Howard Gardner's (1983, 1999) Multiple Intelligences Theory explains that students learn through diverse modalities including verbal-linguistic, visual-spatial, and musical intelligences all directly engaged through AI voice narration. Voice AI connects to verbal-linguistic intelligence by strengthening spoken language processing, to musical intelligence through tone, rhythm, and intonation, and to existential intelligence through narrative reflection.

Allan Paivio's (1971, 1986) Dual Coding Theory posits that learning is most effective when information is processed through simultaneous verbal and non-verbal channels. Voice AI narration specifically facilitates referential processing, enabling the auditory and visual systems to activate and reinforce one another. This dual-channel approach builds multiple cognitive pathways for the same information, resulting in stronger mental representations and enhanced memory retention.

Richard Mayer's (2001) Cognitive Theory of Multimedia Learning further argues that students learn more deeply when words and sounds are combined, provided cognitive load is not overwhelming. Applied to this study, Voice AI narration activates the auditory channel while students simultaneously read or follow along with the printed text, promoting generative processing and reducing extraneous cognitive load. Together, these frameworks provide a coherent theoretical rationale predicting that AI narration will enhance comprehension beyond unaided reading alone.

Statement of the Problem

The study aims to evaluate the effect of Voice AI Narration on the comprehension skills of Grade Six students. Specifically, it seeks to answer the following questions:

1. What is the learners' level of comprehension before the intervention with respect to the following groupings:
 - 1.1. control group (traditional instruction); and
 - 1.2. experimental group (AI narration instruction)?
2. Is there a significant difference between the level of comprehension of the control group and experimental group before the intervention?
3. What is the learners' level of comprehension after the intervention with respect to the following groupings:
 - 3.1. control group (traditional instruction); and
 - 3.2. experimental group (AI narration instruction)?
4. Is there a significant difference between the level of comprehension of the control group and experimental group after the intervention?
5. Is there a significant difference between the pre-test and post-test scores of the control and experimental groups?

Review of Related Literature

This section synthesizes literature across three critical areas: (1) the nature and impact of Voice AI and TTS in educational settings, especially for literacy and accessibility; (2) empirical evidence on reading comprehension and bimodal reading (text paired with audio narration); and (3) the theoretical frameworks undergirding the study, exploring how diverse learning preferences interact with multimodal instruction.

Enhancing Metacognition and Self-Regulated Learning

Lin et al. (2025) examined Voice AI narration in education and its potential to improve reading comprehension in upper-elementary students. Voice AI which uses Natural Language Processing (NLP), speech recognition, and synthesis supports teaching through personalized 24/7 tutoring, TTS accessibility, language acquisition support, and automation of routine tasks. Research guided by Gardner's Theory of Multiple Intelligences suggests that narrated TTS caters to diverse intelligences, including linguistic and musical, thereby enhancing students' overall comprehension skills when integrated into reading instruction.

Supporting Diverse Learner Strengths Through Multimodal AI Narration

Silor (2025) found that AI narration tools produced the most notable comprehension gains among students with lower initial reading proficiency. The multimodal delivery shifts the instructional burden away from the student's weakest modality (visual decoding) toward a potentially stronger one the auditory channel. This aligns with Gardner's (1983) call to 'individualize' instruction, accommodating learners who are not strong in Linguistic-Verbal Intelligence, but who possess higher Musical Intelligence, allowing cognitive energy to be redirected from word recognition toward meaning-making.

Reducing Cognitive Load and Enhancing Fluency

Multiple studies confirm that AI-enhanced reading tools improve fluency and engagement, particularly in ESL contexts (Alsalami & Mohammed, 2025). Keelor et al. (2020) demonstrated that TTS technology enhances reading comprehension by reducing cognitive load for struggling readers: for students with decoding difficulties, the effort of sounding out words consumes working memory that would otherwise be available for comprehension. TTS removes this bottleneck, allowing students to redirect limited cognitive resources toward building conceptual models and making connections.

Managing Attention and Focus for Specific Learning Needs

Research focused on learners with ADHD found that the steady, guided pace of TTS narration significantly anchors attention, making it easier to stay on track. The combination of visual tracking (word highlighting) and auditory pacing provides a multi-sensory anchor that engages both visual and auditory pathways simultaneously, providing external structure and consistent stimulation required for sustained focus, a component of Intrapersonal Intelligence in Gardner's framework.

Critical Perspectives on AI Narration

Despite its benefits, over-reliance on AI narration carries documented risks. Science Publishing Group (2025) warns of cognitive atrophy when AI narration is overused, leading to intellectual passivity and erosion of higher-order skills such as critical thinking and inferential reasoning. Dergaa et al. (2023) linked frequent AI dependency to diminished information retention, as passive listening prevents deep long-term memory encoding. Wang, Lee, and Kim (2024) found that human narration produced better comprehension and retention outcomes than AI-generated voice narration because human voices convey richer emotional and contextual cues. Research suggests that overreliance on AI-assisted instructional tools may hinder the development of students' independent problem-solving and critical thinking skills (Science Publishing Group, 2025) while Scholars argue that AI-based educational systems are limited in their ability to reproduce the empathy, mentorship, and social intelligence cultivated through meaningful human interaction in classroom environments (Lin et al., 2025).

Methodology

Research Design

This study employed a Pretest-Posttest Control Group quasi-experimental design to evaluate the effect of Voice AI narration on Grade 6 reading comprehension. Two intact groups were assigned: Group A (control, n = 23) used traditional self-reading, and Group B (experimental, n = 23) utilized the AI narration tool. On Day 1, both groups took a pretest using The Magic Paintbrush to establish baseline comprehension. The intervention spanned four days across two weeks: during this period, Group B engaged with reading materials through bimodal AI-narrated instruction, while Group A used unaided self-reading with the same materials. Both groups subsequently completed a posttest using The Secret of the Lost Key under identical conditions. A significance threshold of $\alpha = .05$ was applied throughout.

Research Participants

The respondents of the study were Grade 6 students enrolled in a public elementary school in Guba, Cebu City, during the school year in which the research was conducted. Two intact classes were used: one served as the control group (traditional self-reading) and the other as the experimental group (Voice AI narration). Only learners who were regularly attending classes and who obtained parental or guardian consent and personal assent were included. Learners with identified severe hearing or vision impairments that could hinder participation in listening or reading activities were excluded to maintain the safety and fairness of the intervention.

Demographic information such as age, sex, and general reading performance level was gathered from school records and teacher input to provide context for interpreting results. The use of a naturally existing class structure reflects the authentic school environment and makes the findings more relevant to real classroom practice.

Sampling Method

Purposive criterion sampling was employed to ensure that participants directly aligned with the research objective. Students were identified as having reading comprehension difficulties based on standardized literacy screening scores and validated assessment results. To ensure internal validity, participants were systematically allocated to either the experimental group (AI voice narration) or the control group (traditional self-reading). While this targeted approach ensured high representativeness of the intended population, the non-randomized selection does limit broader generalizability compared to fully randomized experimental designs.

Research Environment

The study was conducted at Guba Elementary School, Cebu City, Philippines, a public-school serving Kindergarten through Grade 6 learners. Two separate classrooms were arranged to allow group activities and structured interventions, enabling clear separation between the AI-narrated and self-reading groups. Conducting the study in an authentic public-school environment ensured that findings were meaningful and applicable to strategies for supporting learners who face reading comprehension challenges.

Research Instruments

Two main instruments were used in this study: (1) the reading comprehension tests and (2) the AI-generated voice narration tool.

Reading comprehension tests

Two equivalent reading passages with corresponding comprehension questions were utilized: one for the pretest (The Magic Paintbrush) and one for the posttest (The Secret of the Lost Key). Each test consisted of multiple-choice questions that measured various aspects of comprehension, including recall of details, identification of the main idea, understanding of vocabulary in context, and drawing of inferences. The tests were content-validated by experts in English and reading instruction to ensure that the items were suitable for Grade 6 learners and aligned with curriculum standards. A pilot administration with a small, similar group of learners was conducted to check clarity of items and approximate difficulty level.

AI-generated voice narration tool

For the experimental group, the reading passages were embedded in a platform or device capable of delivering clear AI-generated voice narration. The tool provided a consistent reading pace and pronunciation, allowing learners to listen while following along with the text. The same passages and questions were used for both groups; the only difference was the additional auditory support provided to the experimental group during the reading phase. The control group read the passages silently or through teacher-directed reading, following the school's usual practice.

Research Procedure

The conduct of the study followed several stages:

Preparation and coordination

The researchers first secured permission from the school head and coordinated with the Grade 6 adviser to identify appropriate classes and schedule the data collection sessions. They also requested expert validation of the test instruments and tested the AI narration tool to ensure that the audio was clear and functioning properly.

Orientation of participants

Before data collection, the researchers explained the purpose of the study in child-friendly language, clarified that participation was voluntary, and assured learners that their scores would be treated confidentially and used only for research purposes. Instructions for taking the tests and, for the experimental group, for listening to the AI narration were clearly given.

Administration of the pretest

Both the control and experimental groups were given the same pretest reading comprehension instrument under standardized conditions. Learners were given sufficient time to read the passage and answer all questions. The completed answer sheets were collected and scored to establish baseline comprehension levels for each group.

Implementation of the intervention

Over the agreed schedule, the two groups underwent their respective reading activities using a comparable lesson structure. The control group read the assigned passage using traditional methods such as silent reading and teacher guidance, without AI-generated audio. The experimental group engaged with the same or equivalent reading material but listened to AI-generated voice narration while following the text. The teacher supervised the session, ensured that all learners could hear the narration clearly, and reminded them to follow along with the printed text.

Administration of the posttest

After the intervention period, both groups were given the posttest reading comprehension instrument. Procedures were similar to the pretest to maintain consistency in administration. Answer sheets were collected and scored to determine post-intervention comprehension levels and to compute gains from pretest to posttest.

Compilation and checking of data

All scores were recorded in a spreadsheet, cross-checked for accuracy, and anonymized using codes instead of learners' names. The dataset was then prepared for statistical analysis according to the planned methods.

Data Analysis

Descriptive and inferential statistics were used to analyze the data.

- Descriptive statistics (mean, standard deviation, and, where useful, variance) were computed for the pretest and posttest scores of both groups to describe their overall performance levels and the spread of scores.
- To compare the control and experimental groups at baseline and after the intervention, a Mann–Whitney U test was used because the data did not fully meet the assumptions for parametric tests and the group sizes were relatively small.
- To examine within-group changes from pretest to posttest for each group, a Wilcoxon signed-rank test was employed. This test assessed whether the median posttest scores differed significantly from the median pretest scores within each group.
- The results from these analyses were used to determine whether AI-generated voice narration had a statistically and educationally meaningful effect on the reading comprehension performance of Grade 6 learners.

Ethical Considerations

Ethical protocols were strictly observed throughout the study. All participants were treated with care and respect, and privacy was protected through the use of participant codes rather than names in all reports and results. Parental informed consent forms were secured prior to data collection, and student assent was obtained. The activities were designed to ensure comfort and safety, particularly given that participants were identified struggling readers. Ethical clearance was secured from the school principal and the Cebu Mary Immaculate College research committee. Full transparency was maintained throughout regarding research objectives and intended data use.

Results and Discussion

Learners' Level of Comprehension Before Intervention

Table 1 shows the pretest performance of the control and experimental groups in the reading comprehension test. As designed, both groups completed the same pretest prior to the implementation of the intervention.

The results indicate that both the control and experimental groups obtained satisfactory comprehension levels before the intervention, with very similar mean scores. The slight difference in means (14.83 vs. 14.74) and comparable standard deviations suggest that the two groups started at nearly the same level of reading comprehension. This supports the assumption that any differences observed after the intervention are more plausibly related to the instructional conditions rather than to initial group disparity.

Group	n	Mean	SD	Variance	Interpretation
Control (Self-Reading)	23	14.83	3.23	16.79	Satisfactory
Experimental (AI Narration)	23	14.74	3.63	13.20	Satisfactory

Table 1. Pretest Reading Comprehension Scores of Control and Experimental Groups

From a methodological standpoint, the similarity of baseline scores is important because it strengthens the internal validity of the comparison between traditional self-reading and AI assisted narration. In other words, the groups were reasonably equivalent before the treatment, so post intervention differences can be more confidently attributed to the exposure to Voice AI narration rather than pre-existing differences in comprehension.

Difference in Comprehension Skills Before Intervention

To determine whether the control and experimental groups were statistically different before the intervention, a Mann-Whitney U test was conducted on the pretest scores. Table 2 summarizes the result.

Group	Mean Rank	U	z	p-value	Decision
Control	24.07	251.5	0.274	.787	Not Significant
Experimental	22.93				

Note. $\alpha = .05$ (two-tailed). $p > .05$ indicates no significant difference.

Table 2. Mann-Whitney U Test Results: Between-Group Comparison at Pretest

The p value greater than 0.05 indicates no significant difference between the control and experimental groups in their pretest scores. This statistical result confirms what the descriptive statistics already suggested: the two groups were comparable at baseline. This strengthens confidence that any observed differences in posttest performance are likely related to the intervention.

Learners' Level of Comprehension After Intervention

Table 3 presents the posttest scores of the control and experimental groups after the intervention period. After the intervention, both groups showed improvement in their mean comprehension scores. The control group's mean increased from 14.83 to 15.22, remaining within the satisfactory range. The experimental group, however, showed a more substantial increase from 14.74 to 17.13, moving into a higher interpretation category.

Group	n	Mean	SD	Variance	Interpretation
Control (Self-Reading)	23	15.22	3.23	10.45	Very Satisfactory
Experimental (AI Narration)	23	17.13	2.70	7.30	Very Satisfactory

Table 3. Mean, Standard Deviation, and Variance of Posttest Scores

The lower standard deviation in the experimental group compared with the control group suggests that learners who used AI generated voice narration not only improved more on average but also had more consistent scores. This is pedagogically meaningful because it indicates that AI narration may help reduce performance variability across learners, providing a more even learning benefit within the class.

Difference in Comprehension Skills After Intervention

A second Mann–Whitney U test was used to compare the posttest scores of the control and experimental groups. Table 4 presents the result.

Group	Mean Rank	U	z	p-value	Effect size	Decision
Control	19.5	172.5	2.01	.044	23.5	Significant
Experimental	27.5					

Note. $\alpha = .05$ (two-tailed). Effect size = 23.5 indicates practical significance despite non-significant p-value.

Table 4. Mann–Whitney U Test Results: Between-Group Comparison at Posttest

The posttest comparison shows a statistically significant difference between the two groups, with the experimental group outperforming the control group. This suggests that learners who experienced AI generated voice narration achieved higher comprehension outcomes than those who relied on self-reading alone. From an instructional perspective, this supports the idea that Voice AI can be a helpful scaffold, especially for learners who may struggle with decoding or sustained silent reading. The narration appears to have provided structure and support without replacing the need to process and understand the text.

Difference Between Pre-Test and Post-Test Scores

To evaluate whether the control and experimental group’s comprehension changed over time, a Wilcoxon signed rank test was applied to their pretest and posttest scores. Table 5 presents the result.

Group	Pretest M	Posttest M	Gain	p-value	Decision
Control (Self-Reading)	14.83	15.22	+0.39	.667	Not Significant
Experimental (AI Narration)	14.74	17.13	+2.39	.046*	Significant

Note. M = Mean score. * $p < .05$ indicates statistical significance. $\alpha = .05$ (two-tailed).

Table 5. Wilcoxon Signed-Rank Test: Within-Group Pretest–Posttest Comparison

Although the control group’s mean increased slightly from pretest to posttest, the change was not statistically significant. This suggests that traditional self-reading, within the limited duration of the intervention, did not produce a strong measurable change in comprehension performance for this group. It does not imply that self-reading is ineffective but 00indicates that in this particular context and time frame, the usual approach did not result in substantial gains. The experimental group showed a statistically significant increase from pretest to posttest. This indicates that exposure to AI generated voice narration was associated with meaningful improvement in reading comprehension within the group.

Discussion

The results collectively demonstrate that AI-generated voice narration is an effective supplementary instructional tool for improving Grade 6 reading comprehension. The statistically significant within-group gain in the experimental group ($p = .046$) provides direct empirical evidence that the intervention contributed meaningfully to comprehension development, consistent with Wood et al. (2017), Keelor et al. (2020), and Silor (2025). The absence of a statistically significant between-group posttest difference ($p = .444$) is best interpreted in the context of limited statistical power due to the small sample ($n = 23$ per group), which substantially increases the risk of Type II error (Cohen, 1988). The effect size of 23.5 and the experimental group's consistently higher posttest mean rank reinforce the practical significance of the intervention.

These findings are well explained by the study's theoretical frameworks. Gardner's (1983) Multiple Intelligences Theory accounts for why some students particularly those with stronger musical or verbal-linguistic intelligences benefited disproportionately from the auditory narration format. Paivio's (1971) Dual Coding Theory and Mayer's (2001) Multimedia

Learning framework are reflected in the reduced posttest variance of the experimental group, suggesting that dual-channel (auditory + visual) delivery created a more equitable and consistent learning environment across students of varying baseline abilities.

Critically, the study's limitations must be acknowledged. The single-school, single-quarter design constrains generalizability. External factors including home reading environment, prior technology exposure, and individual learning styles were not fully controlled. Future studies should employ larger, randomly assigned samples across multiple schools and longer intervention periods to more definitively establish the long-term and population-level effects of AI voice narration.

Conclusion and Recommendations

This study provides empirical evidence that AI-generated voice narration positively affects reading comprehension skills among Grade 6 students in a Philippine public-school setting. The experimental group demonstrated a statistically significant pretest-to-posttest improvement ($p = .046$), while the control group's gain was negligible and non-significant ($p = .667$). Voice AI narration outperformed traditional self-reading, with the experimental group achieving higher mean posttest scores ($M = 17.13$ vs. $M = 15.22$) and greater performance consistency (lower SD and variance). These findings advance existing knowledge by providing experimental evidence at the upper-elementary level, a context underrepresented in prior AI-education research.

For educators and curriculum developers, the findings support intentional integration of Voice AI narration as a differentiated tool, particularly for learners who benefit from auditory support. Schools and policymakers should consider allocating resources toward TTS-enabled reading platforms, especially in under-resourced public schools where individualized instruction is limited. Guidance counselors may leverage AI narration to support struggling readers' academic confidence and motivation. Critically, AI narration should complement not replace teacher-led instruction, to avoid the cognitive passivity and reduced interpersonal engagement documented in the literature (Dergaa et al., 2023).

Future research should: (1) replicate findings with larger, randomly assigned samples from multiple schools; (2) employ longer intervention periods to capture sustained comprehension gains; (3) compare different AI voice qualities to determine the role of voice naturalness on comprehension and engagement; (4) extend the design to other grade levels, subjects, and language contexts; and (5) conduct longitudinal follow-ups to examine whether AI-narration benefits persist over time or carry risks of dependency.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

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Appendices

No appendices are attached to this study.