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Cloud Literacy Platform for Improving Reading Comprehension and Reading-Aloud Ability among Grade 1 Students

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Abstract

This study examined the effectiveness of a Cloud Literacy Platform in improving oral reading fluency and reading comprehension among Grade 1 students. A quasi-experimental pre-test–post-test control group design involved 60 students at SDN Karihkil 02, Bogor Regency, Indonesia, with 30 students in each group. Over eight weeks, the experimental group used the Cloud Literacy Platform, while the control group received conventional printed-book instruction. Oral reading fluency and reading comprehension were assessed using an Oral Reading Fluency Rubric and a Reading Comprehension Test. Data were analyzed using paired and independent samples t-tests after checking statistical assumptions. Both groups showed significant pre-test to post-test improvements in oral reading fluency and reading comprehension. Baseline scores did not differ significantly between groups. For oral reading fluency, the experimental group had a slightly higher mean gain than the control group, but the difference was not statistically significant, $t(58) = 0.831$, $p = .410$, Cohen's $d = 0.21$. For reading comprehension, the experimental group achieved significantly greater gains, $t(58) = 6.809$, $p < .001$, Cohen's $d = 1.76$. These findings indicate that the Cloud Literacy Platform offers a significant comparative benefit for reading comprehension, but not for oral reading fluency, and may complement conventional early literacy instruction.

KEYWORDS

cloud literacy platform; early literacy; oral reading fluency; reading comprehension; quasi-experimental design.

Introduction

Early literacy development plays an important role in children's language development and academic learning. (Mol & Bus, 2011) found that exposure to reading materials was positively associated with reading comprehension and other literacy skills across different stages of educational development. During the early years of primary education, students develop foundational reading skills that enable them to recognize written words and understand the meaning of texts. Two essential components of reading development are oral reading fluency and reading comprehension. Oral reading fluency involves accurate word recognition, appropriate reading speed, and expressive reading, which support students in reading texts smoothly (Marzuki, 2024; Zuraini et al., 2024). Meanwhile, reading comprehension involves integrating word recognition, language comprehension, and cognitive processes to construct meaning from written texts (Duke & Cartwright, 2021). (Verhoeven & van Leeuwe, 2008) demonstrated that word decoding, vocabulary knowledge, and listening comprehension contribute to the development of reading comprehension during elementary education.

Despite the importance of these foundational literacy skills, literacy instruction in many elementary schools continues to rely predominantly on printed textbooks and teacher-centered instructional approaches. Such conventional practices provide limited opportunities for individualized feedback and differentiated instruction, making it difficult to accommodate students with varying reading abilities. Consequently, struggling readers often receive insufficient instructional support, resulting in slower

progress in both reading fluency and reading comprehension, particularly in schools with large class sizes and limited instructional time (*PISA 2022 Results (Volume I)*, 2023).

Recent advances in educational technology have introduced cloud-based learning environments capable of supporting personalized literacy instruction. Biancarosa & Griffiths (2012) highlighted the potential of digital technologies to support reading instruction by providing additional opportunities for individualized learning and literacy practice.

Cloud Literacy Platforms integrate interactive digital books, audio narration, pronunciation guidance, progress monitoring, and immediate feedback, allowing students to practice reading independently both inside and outside the classroom. Previous studies have demonstrated that digital literacy technologies improve reading motivation, vocabulary acquisition, phonological awareness, reading engagement, and comprehension through multimodal learning experiences (Neumann, 2020). Furthermore, digital-assisted repeated reading supported by pronunciation models has been shown to enhance oral reading fluency (Fuchs et al., 2001).

However, important research gaps remain. Most previous studies have investigated either oral reading fluency or reading comprehension separately rather than examining both outcomes simultaneously. In addition, many investigations have been conducted in urban schools or technologically advanced settings, while empirical evidence regarding cloud-based literacy platforms in Indonesian public elementary schools, particularly in suburban or rural contexts, remains limited. Consequently, further research is needed to evaluate whether cloud-supported literacy instruction can simultaneously improve both oral reading fluency and reading comprehension among early-grade learners.

This study is grounded in the Cognitive Theory of Multimedia Learning (Mayer, 2009). which proposes that meaningful learning is enhanced through the integration of visual and auditory information, and Vygotsky's Social Constructivist Theory, which emphasizes the importance of instructional scaffolding during children's learning processes. Accordingly, the integration of narrated digital texts, pronunciation support, interactive learning activities, and immediate feedback provided by the Cloud Literacy Platform is expected to facilitate improvements in both reading fluency and reading comprehension.

Accordingly, this study aims to investigate the effectiveness of a Cloud Literacy Platform in improving oral reading fluency and reading comprehension among Grade 1 students at SDN Karihkil 02, Bogor Regency, Indonesia. Specifically, the study addresses the following research questions:

1. Does the implementation of the Cloud Literacy Platform significantly improve Grade 1 students' oral reading fluency?
2. Does the implementation of the Cloud Literacy Platform significantly improve Grade 1 students' reading comprehension?

The novelty of this study lies in its simultaneous evaluation of oral reading fluency and reading comprehension within a single cloud-based literacy intervention among Grade 1 students in an Indonesian public elementary school. The findings are expected to contribute empirical evidence regarding the effectiveness of cloud-supported literacy instruction and provide practical recommendations for integrating digital technologies into early literacy education.

Methods

This study employed a quantitative approach using a quasi-experimental pre-test–post-test control group design. Two intact Grade 1 classrooms at SDN Karihkil 02, Bogor Regency, were selected because the school did not permit the redistribution of students into new classes. Consequently, Class A was assigned as the experimental group and Class B as the control group. Each group consisted of 30 students, resulting in a total sample of 60 participants.

Prior to the intervention, all participants completed pre-tests measuring oral reading fluency and reading comprehension. Baseline equivalence between the experimental and control groups was examined using an Independent Samples t-test. The analysis indicated that there was no statistically significant difference between the two groups before the intervention ($p > .05$), demonstrating that both groups possessed comparable initial literacy abilities.

The experimental group participated in reading instruction using the Cloud Literacy Platform, while the control group received conventional reading instruction using printed storybooks and teacher-guided classroom activities. Both groups studied the same reading materials, followed the same learning objectives, received equal instructional time (30 minutes per session, three sessions per week), and completed the intervention over an eight-week period. The only difference between the groups was the instructional media used during learning.

The Cloud Literacy Platform provided interactive digital storybooks, synchronized audio narration, automatic pronunciation guidance, embedded comprehension quizzes, and a cloud-based dashboard that recorded students' learning progress. Students could practice reading aloud independently while receiving immediate feedback and teachers monitored learning progress through the online dashboard.

To ensure treatment fidelity, the researcher prepared a standardized instructional protocol that was implemented consistently throughout the intervention. Classroom observations were conducted regularly using an observation checklist to verify that the duration of instruction, learning procedures, platform utilization, and teacher guidance were implemented consistently across all intervention sessions.

Permission to conduct this study was obtained from the Principal of SDN Karihkil 02, Bogor Regency, before the research was initiated. Written informed consent was obtained from the parents or legal guardians of all participating Grade 1 students. Before each assessment and learning activity, the researcher explained the procedures to the children using age-appropriate language and confirmed their willingness to participate. Students were informed that participation was voluntary and that they could stop participating at any time without any academic consequences. These procedures are consistent with ethical guidance for research involving children, which emphasizes parental or guardian permission together with children's age-appropriate assent, voluntariness, and the right to withdraw from participation (Mary Ann Powell, n.d.)

To protect participants' privacy, each student was assigned an anonymous identification code. Audio recordings collected during the oral reading assessments and learning data generated through the Cloud Literacy Platform were used solely for research purposes. All digital files were stored on password-protected devices accessible only to the research team. No personally identifiable information was included in the published findings, and all identifiable audio recordings and digital data were permanently deleted after the completion of data verification and analysis. These procedures are consistent with ethical principles emphasizing the protection of participants' privacy, confidentiality, and personal information in research (Mills et al., 2026)

The sampling technique employed was purposive sampling. The selection criteria were based on the equivalence of students' foundational reading competencies derived from their baseline report cards, the uniformity of the curriculum implemented by the school, and the similarity of the students' socio-economic family backgrounds. Purposive sampling involves deliberately selecting participants according to

predefined characteristics or criteria that are relevant to the research objectives.(Campbell et al., 2020).

1. Independent Variable: The implementation of the Cloud Literacy Platform as a digital learning medium that provides interactive reading materials to support students' reading activities, oral reading skills, and reading comprehension (Nisa & Nuroh, 2025).
2. Dependent Variables:
   - Read-Aloud Ability: Operationalized through indicators of phoneme pronunciation accuracy, vocal fluency, word recognition, and voice intonation modulation according to punctuation marks.
   - Reading Comprehension: Operationalized through the children's cognitive ability to recall factual text details, identify the main idea of the story, and answer simple contextual questions (Coiro, 2021)

Two primary instruments were used to collect data in this study: the Oral Reading Fluency Rubric (ORFR) and the Reading Comprehension Test. The Oral Reading Fluency Rubric (ORFR) was adapted from established early literacy assessment frameworks to evaluate students' oral reading performance. The rubric assessed four aspects of oral reading: pronunciation accuracy, reading fluency, word recognition, and reading expression, which correspond to key dimensions commonly considered in oral reading fluency assessment.(Hudson et al., 2005) Student performance was scored on a scale of 0–100, with higher scores indicating better oral reading fluency. The rubric was aligned with the Grade 1 learning objectives and the reading competencies assessed in this study. During the assessment, each student individually read a grade-level passage aloud in a quiet classroom environment under the same testing conditions for both the pre-test and post-test. Standardized administration conditions and consistent scoring procedures were used to reduce variation in assessment conditions, as consistency in oral reading fluency assessment is important when evaluating young learners (van der Velde et al., 2024). The researcher administered and scored all oral reading assessments using the same assessment procedures and scoring criteria. The scoring procedures were standardized before data collection to promote consistency across participants. Because the oral reading assessments were administered and scored by a single researcher, no second assessor was involved and formal inter-rater reliability could not be established. No separate assessor-training procedure was conducted because the researcher personally administered and scored all assessments. The absence of formal expert validation and inter-rater reliability is acknowledged as a measurement limitation.

Reading comprehension was measured using a 10-item Reading Comprehension Test developed according to the Grade 1 Indonesian language curriculum. The test consisted of short reading passages followed by comprehension questions designed to measure students' ability to identify explicit information, understand vocabulary in context, determine the main idea, and make simple inferences. Each correct answer received one point, producing a raw score ranging from 0 to 10, which was then converted into a percentage score (0–100). The test content was reviewed by elementary education experts to establish content validity. Parallel forms of the pre-test and post-test were prepared using reading passages with comparable length, vocabulary level, and difficulty to measure the same reading competencies while minimizing testing effects.

The data collection procedure was structured into three systematic phases with a total duration of eight weeks:

- Phase 1: Pre-Implementation (Week 1): Administration of read-aloud and comprehension pre-tests to both groups to establish baseline values, followed by technology orientation for the experimental group.
- Phase 2: Treatment Implementation (Weeks 2–7): The experimental group read digital stories through the cloud platform for 30 minutes per session, three times a week, while listening to audio guidance and recording their voices.(Rukayah et al., 2025)

  The control group performed reading activities with the same duration and frequency, but used physical books guided via teacher-led lectures.
- Phase 3: Post-Implementation (Week 8): Administration of post-tests using equivalent parallel instruments to evaluate the final outcomes of the intervention.

The collected data were analyzed using descriptive and inferential statistics. Descriptive statistics were calculated to summarize the mean and standard deviation (SD) of oral reading fluency and reading comprehension scores for the experimental and control groups at the pre-test and post-test stages. Gain scores were calculated for each student by subtracting the pre-test score from the corresponding post-test score. Before conducting the inferential analyses, the assumptions of normality and homogeneity of variance were examined. The Shapiro–Wilk test was used to assess the normality of the outcome and gain-score distributions, while Levene's test was used to examine the homogeneity of variance between the experimental and control groups. Baseline equivalence between the experimental and control groups was examined using Independent Samples *t*-tests on the pre-test scores for oral reading fluency and reading comprehension. Within-group changes from pre-test to post-test were examined separately for each group using Paired Samples *t*-tests for both outcome variables.

To evaluate the comparative effect of the Cloud Literacy Platform, gain scores were compared between the experimental and control groups using Independent Samples *t*-tests. For each between-group gain comparison, the mean gain difference, 95% confidence interval (CI) of the mean difference, *t* statistic, degrees of freedom (df), and *p* value were reported. Cohen's *d* was calculated as the standardized effect size for the between-group gain comparison, with positive values indicating greater improvement in the experimental group. Statistical significance was evaluated using a two-tailed alpha level of 0.05.

Result and Discussion

A total of 60 Grade 1 students participated in this study, comprising 30 students in the experimental group and 30 students in the control group. Table 1 presents the descriptive statistics for oral reading fluency and reading comprehension before and after the intervention.

The descriptive statistics presented in Table 1 indicate that the experimental and control groups had comparable oral reading fluency and reading comprehension scores at the pre-test. Following the eight-week intervention, both groups demonstrated improvements in both literacy outcomes. The experimental group showed greater mean gains than the control group for both oral reading fluency and reading comprehension, although the magnitude of the between-group difference differed across the two outcomes.

Assumption Testing

Prior to hypothesis testing, the assumptions of normality and homogeneity of variance were examined using the Shapiro–Wilk test and Levene's test, respectively. As presented in Table 3, the Shapiro–Wilk tests were not statistically significant for the pre-test, post-test, and gain-score distributions of oral reading fluency and reading comprehension in both groups (all $p > .05$).

Table 1. Descriptive Statistics of Oral Reading Fluency and Reading Comprehension

Variable	Group	Pre-test Mean ± SD	Post-test Mean ± SD	Gain Mean ± SD
Oral Reading Fluency	Experimental	76.83 ± 1.64	81.10 ± 3.15	4.27 ± 2.24
Oral Reading Fluency	Control	76.75 ± 1.57	80.47 ± 2.73	3.72 ± 2.82
Reading Comprehension	Experimental	75.17 ± 3.38	82.94 ± 2.94	7.77 ± 2.87
Reading Comprehension	Control	75.17 ± 3.38	78.58 ± 2.81	3.41 ± 2.02

Table 2. Results of Inferential Statistical Analyses

Analysis	Variable	t	df	p
Independent Samples *t*-test (Pre-test)	Oral Reading Fluency	0.201	58	.841
Independent Samples *t*-test (Pre-test)	Reading Comprehension	0.000	58	1.000
Paired Samples *t*-test (Experimental)	Oral Reading Fluency	10.420	29	< .001
Paired Samples *t*-test (Experimental)	Reading Comprehension	14.845	29	< .001
Paired Samples *t*-test (Control)	Oral Reading Fluency	7.229	29	< .001
Paired Samples *t*-test (Control)	Reading Comprehension	9.274	29	< .001
Independent Samples *t*-test (Gain Score)	Oral Reading Fluency	0.831	58	.410
Independent Samples *t*-test (Gain Score)	Reading Comprehension	6.809	58	< .001

Table 3. Tests of Normality and Homogeneity of Variance

Variable	Score	Shapiro–Wilk Experimental W	p	Shapiro–Wilk Control W	p	Levene's F	p
Oral Reading Fluency	Pre-test	0.938	.080	0.936	.071	0.262	.611
Oral Reading Fluency	Post-test	0.965	.420	0.977	.755	0.561	.457
Oral Reading Fluency	Gain	0.976	.713	0.944	.120	0.364	.549
Reading Comprehension	Pre-test	0.946	.135	0.946	.135	0.000	1.000
Reading Comprehension	Post-test	0.959	.291	0.969	.518	0.021	.884
Reading Comprehension	Gain	0.985	.930	0.960	.316	2.337	.132

For oral reading fluency, the Shapiro–Wilk statistics ranged from $W = 0.938$ to $W = 0.977$, with p values ranging from .071 to .755. For reading comprehension, the statistics ranged from $W = 0.946$ to $W = 0.985$, with p values ranging from .135 to .930. Levene's tests also indicated homogeneous variances between the experimental and control groups for all corresponding scores, with p values ranging from .132 to 1.000. Therefore, the assumptions required for the subsequent parametric analyses were satisfied.

Baseline Equivalence

Independent Samples *t*-tests were conducted to compare the pre-test scores of the experimental and control groups (Table 2). The analyses revealed no statistically significant difference in oral reading fluency between the experimental and control groups, $t(58) = 0.201$, $p = .841$. Similarly, no statistically significant difference was found in reading comprehension, $t(58) = 0.000$, $p = 1.000$. These results indicate that the two groups had comparable literacy performance before the intervention.

Within-Group Comparison

Paired Samples *t*-tests were performed separately for the experimental and control groups to examine changes from pre-test to post-test. The experimental group demonstrated statistically significant improvements in both oral reading fluency, $t(29) = 10.420$, $p < .001$, and reading comprehension, $t(29) = 14.845$, $p < .001$, following the implementation of the Cloud Literacy Platform. The control group also demonstrated statistically significant improvements in oral reading fluency, $t(29) = 7.229$, $p < .001$, and reading comprehension, $t(29) = 9.274$, $p < .001$, following conventional reading instruction. Thus, both instructional approaches were associated with significant within-group improvements in the two literacy outcomes.

Between-Group Comparison

Gain scores were calculated by subtracting the pre-test scores from the post-test scores for each participant and were compared between the experimental and control groups using Independent Samples *t*-tests. For oral reading fluency, the experimental group showed a slightly greater mean gain (M = 4.27, SD = 2.24) than the control group (M = 3.72, SD = 2.82). However, the between-group difference was not statistically significant, with a mean difference of 0.55 points, 95% CI [-0.77, 1.86], $t(58) = 0.831$, $p = .410$, and Cohen's $d = 0.21$. This finding indicates that although both groups improved in oral reading fluency, the Cloud Literacy Platform did not produce a statistically significant advantage over conventional instruction for this outcome.

For reading comprehension, the experimental group achieved a substantially greater mean gain (M = 7.77, SD = 2.87) than the control group (M = 3.41, SD = 2.02). The mean difference was 4.36 points, with a 95% CI of [3.08, 5.64]. The between-group difference was statistically significant, $t(58) = 6.809$, $p < .001$, with a large effect size (Cohen's $d = 1.76$). These findings indicate that the Cloud Literacy Platform produced significantly greater improvements in reading comprehension than conventional printed-book instruction.

Overall, the findings indicate that both instructional approaches significantly improved students' oral reading fluency and reading comprehension from pre-test to post-test. However, the between-group comparison revealed a statistically significant comparative advantage of the Cloud Literacy Platform only for reading comprehension. Although the experimental group showed a slightly greater gain in oral reading fluency than the control group, this difference was not statistically significant. In contrast, the substantially greater gain in reading comprehension in the experimental group was statistically significant and associated with a large effect size.

The present study examined the effectiveness of a Cloud Literacy Platform in improving Grade 1 students' oral reading

fluency and reading comprehension. The results showed that both the experimental and control groups made statistically significant gains in both outcomes after the eight-week intervention. However, the between-group analysis showed a different pattern across the two outcomes. The experimental group demonstrated a slightly greater gain in oral reading fluency than the control group, but the difference was not statistically significant, with a small effect size (Cohen's d = 0.21). In contrast, the experimental group demonstrated a substantially greater gain in reading comprehension, with a large effect size (Cohen's d = 1.76). These findings suggest that the comparative advantage of the Cloud Literacy Platform was more evident for reading comprehension than for oral reading fluency.

The significant improvement in reading comprehension is consistent with previous research indicating that technology-supported literacy instruction can strengthen comprehension when digital environments provide interactive and instructional support, (Bus et al., 2015) found that multimedia features in technology-enhanced storybooks can support children's story comprehension and expressive vocabulary development, although interactive features unrelated to the story may distract learners.

Takacs et al. (2015) found that multimedia features in technology-enhanced storybooks can support children's story comprehension and expressive vocabulary development, although interactive features unrelated to the story may distract learners. Lysenko & and Abrami (2014), for example, found that web-based literacy applications were more effective than regular instruction in improving reading comprehension among early elementary students (Sogen, 2023; Suherman et al., 2019). Their findings suggest that technology can be beneficial when digital tools are embedded in authentic classroom instruction rather than being used simply as electronic replacements for printed materials. Similarly, reported that highly interactive electronic storybooks produced better story comprehension outcomes than less interactive versions, particularly when the digital environment incorporated guidance, prompting, and feedback. Kao et al (2016) The present findings extend this evidence to Grade 1 students in an Indonesian public elementary school by showing a large between-group effect for reading comprehension after an eight-week cloud-supported intervention. (Korat, 2010) also found that electronic storybooks supported the development of word meaning and word reading among kindergarten and first-grade students, providing further evidence of the potential benefits of digital reading materials for early literacy development.

The stronger effect for reading comprehension may be related to the specific functions incorporated into the Cloud Literacy Platform. The platform combined digital storybooks, synchronized narration, pronunciation guidance, embedded comprehension questions, and progress monitoring. These features provided support not only for reading the text but also for processing and interpreting its meaning. In particular, the embedded comprehension activities required students to respond to information presented in the stories, while the audio and visual supports could reduce the amount of attention required for basic word recognition. The combination of these features may have allowed students to allocate more attention to understanding the content of the text. This interpretation is consistent with the finding of that interactive functions such as guidance, prompting, and feedback can contribute to improved story comprehension.

The finding for oral reading fluency was different. Although the experimental group improved significantly from pre-test to post-test, its gain was not significantly greater than that of the control group. This result is important because it indicates that improvement within the experimental group should not be interpreted as evidence that the Cloud Literacy Platform was superior to conventional instruction for oral reading fluency. The small between-group effect (Cohen's d = 0.21) suggests only a limited comparative advantage. This finding is consistent with the broader literature showing that digital technology can support reading fluency, but that many digital fluency interventions essentially enhance established instructional practices such as explicit instruction, drill, practice, and repeated reading rather than replacing them with fundamentally different learning processes. scoping review of 86 studies found that digital technologies for reading fluency were predominantly used as enhancements to common non-digital fluency strategies, with relatively little research focused on general classroom instruction.

The lack of a significant between-group difference in oral reading fluency may also be explained by the similarity of reading practice provided to the two groups. Both groups received the same instructional duration, three sessions per week for eight weeks, and both participated in guided reading activities. Oral reading fluency develops through repeated opportunities to decode and read text accurately and smoothly. Evidence from online repeated-reading research also indicates that structured repeated reading can improve oral reading fluency when students receive repeated opportunities to read and corrective feedback, for example, found positive effects of a repeated-reading intervention delivered synchronously online for upper elementary students(Hermansyah et al., 2024; Suwanto & Lestari, 2024). Thus, the control group's regular teacher-guided reading practice could reasonably have produced gains similar to those achieved through the digital platform, reducing the comparative advantage of the technology.

The difference between the two outcomes may therefore reflect the instructional exposure required for each skill. Reading comprehension benefited from the platform's interactive features that directly supported meaning construction, whereas oral reading fluency may have depended more heavily on repeated oral practice and feedback, which were available in both groups. The eight-week duration may also have been sufficient to produce measurable comprehension gains but not long enough for the additional digital support to generate a statistically detectable advantage in oral reading fluency. This interpretation should be treated cautiously because the study did not manipulate intervention duration or instructional exposure separately, and therefore the mechanism cannot be established definitively.

The overall pattern is also consistent with the broader evidence base. (Hall et al., 2023) reported a small but significant overall effect of technology-delivered literacy instruction for elementary students (g = 0.24), while noting substantial variation across studies and no conclusive moderators identifying which technology-based approaches are most effective under particular conditions. The present study similarly indicates that the effect of technology should not be assumed to be uniform across literacy outcomes. In this study, the evidence for a comparative benefit was strong for reading comprehension but limited for oral reading fluency.

From a practical perspective, the findings support the use of the Cloud Literacy Platform as a complementary instructional resource, particularly for reading comprehension. (Cheung & Slavin, 2013) found that educational technology applications had small positive effects on reading outcomes among struggling readers, supporting the potential value of digital tools as supplementary resources in reading instruction.

The results do not support replacing conventional reading instruction with the platform for oral reading fluency. Instead, teachers may use the platform to supplement classroom reading activities with interactive comprehension tasks, narrated texts, and additional opportunities for guided practice, while continuing to provide direct oral reading practice and teacher feedback.

Several limitations should be acknowledged. First, the

study involved 60 Grade 1 students from a single elementary school, which limits the generalizability of the findings. Second, the intervention lasted eight weeks, so longer-term effects on oral reading fluency could not be determined.

Suggate, (2016) highlighted that the long-term effects of reading interventions may differ according to the literacy skills targeted and the characteristics of the intervention. Therefore, further research with extended follow-up periods is needed to determine whether the improvements observed in the present study can be sustained over time.

Third, the oral reading assessment was administered and scored by a single researcher, and formal inter-rater reliability was not established. In addition, the ORFR had not undergone formal expert validation before the study. These measurement limitations may introduce potential scoring bias and should be considered when interpreting the oral reading fluency findings. Future research should use larger and more diverse samples, longer intervention periods, formally validated assessment instruments, and multiple trained assessors with reported inter-rater reliability.

Conclusion

This study examined the effectiveness of the Cloud Literacy Platform in improving Grade 1 students' oral reading fluency and reading comprehension using a quasi-experimental pre-test–post-test control group design. The findings demonstrated that both the Cloud Literacy Platform and conventional printed-book instruction significantly improved students' literacy performance after the eight-week intervention. Comparison of the gain scores indicated that the Cloud Literacy Platform provided a statistically significant comparative advantage only for reading comprehension. Although students in the experimental group also demonstrated greater improvements in oral reading fluency, the difference between the experimental and control groups was not statistically significant. These findings suggest that the Cloud Literacy Platform is particularly effective in supporting reading comprehension, while oral reading fluency can be improved through both digital and conventional instructional approaches.

From a practical perspective, the Cloud Literacy Platform may serve as a valuable complementary instructional resource for primary school teachers by providing interactive digital reading experiences, immediate feedback, and opportunities for independent learning. Rather than replacing conventional classroom instruction, the platform can strengthen existing literacy practices, particularly for developing reading comprehension in technology-supported learning environments.

The present study contributes empirical evidence regarding the use of cloud-based literacy technology in Indonesian primary education. Future research should involve larger and more diverse samples, extend the intervention period, and examine additional literacy outcomes, such as vocabulary development, reading motivation, digital literacy skills, and long-term reading achievement, to provide a more comprehensive understanding of the effectiveness of cloud-supported literacy instruction.

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