

# Students' Reading Comprehension in Digital and Printed Instructional Formats

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## Abstract

This research investigates the impact of instructional formats, specifically print and digital texts, on the reading comprehension of eighth-grade students. A paired samples t-test analyses the pretest and post-test scores of the control and experimental groups, revealing no statistically significant difference in reading comprehension levels between the two platforms. However, it indicates a slightly more substantial improvement in the experimental group, suggesting a potential advantage for digital texts. The study concludes that both formats demonstrate positive impacts, with the experimental group using digital texts exhibiting a marginally more substantial improvement. Thus, it is recommended to cautiously integrate digital texts into reading instruction, potentially emphasising digital formats as the primary reading material supported by print. This balanced approach is consistent with the study's findings and acknowledges the evolving role of technology in education.

**Keywords:** Digital text; printed text; reading comprehension; teaching reading.

## INTRODUCTION

The advancement of technology paved the way for numerous improvements in different fields. The various innovations facilitated the acquisition of knowledge and skills among students as compared to the pre-ICT (information and communication technologies) era. In the context of language teaching and learning, various technological tools have aided the learning of the different macro skills. For instance, students are exposed to a wide range of reading materials and access to information through various media platforms. This allows for a faster acquisition of the much-needed knowledge and skills. In response to the demand for technological integration, educators have to reevaluate and alter their teaching methods (Alda, et al. 2022). This change has pushed educators to incorporate ICT in their mode of delivery of lessons to enhance learning and allow students to develop the needed 21st-century skills. Digital advancements must therefore be included in the modern educational system; yet, this raises the question of which platform is ideal for reading.

Because reading is linked to literacy and progress, it is one of the most significant learning activities (Gementiza & Alda, 2023). To read with comprehension, one must be able to visually perceive words and letters, decode them into speech sounds, parse linguistic information, form a preliminary understanding of propositions based on the information provided, and integrate propositions into a precise and coherent mental representation. Reading comprehension is a fundamental skill that enables individuals to extract textual and subtextual meaning from text (Balnig et al., 2024) and make conclusions based on existing knowledge. Because most fields require excellent reading proficiency, it is considered the most important academic endeavor of every student (Painagan, et al., 2023). Furthermore, several outside factors influence reading and comprehension skills such as the reader's cognitive ability (visual processing, processing speed, logic & reasoning skills, etc.), prior knowledge, language fluency, and deductive reasoning (Goddies, 2023).

With the prevalence of varied learning platforms and formats, it is still not certain as to which of

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these is better to enhance students' reading comprehension skills. Initially, printed materials are preferred among students, however, there is also an increase in the interest of using digital format. Some prefer to physically flip through papers while others choose the convenience of scrolling provided by gadgets (Hoffman, 2022). However, major breakthroughs and trends are encouraging the integration of technology with learning or education. Research on comparing the reading proficiency between printed text and digital text have been conducted but results on the effects of the medium used vary and remain unsettled. There are those that conclude that reading comprehension is better on paper than on digital screens (Clinton, 2019; Stiegler-Balfour, 2023). Some studies inferred that these contradictory results could be attributed to the diverse participants and assessment tools used in the said studies.

Particularly, results from a meta-analysis revealed that screen reading is consistently associated with lower reading comprehension scores especially when given limited time and the reading material is an informational text or a mix between information and narrative. In addition, evidence showed the increasing advantages of print than those that require digital scrolling during the years the aforementioned studies were conducted (Delgado et al., 2018). A different study also showed that although comprehension was similar to both media, the reading on digital text was not as efficient in locating the events and temporality as in reading printed text. The researchers concluded that the reason for this could be attributed to minor kinaesthetic feedback from using digital devices (Mangen et al., 2019).

Nevertheless, digital-based reading is becoming an integral part of the educational realm as schools are adopting different Learning Management Systems (LMS) hence, it is impossible to avoid using digital devices in learning. In addition, most learners opt to use e-books because of convenience and accessibility. Students prefer this format as there are cases wherein, they cannot use the printed text because of the unavailability of the reference material. Furthermore, it is also important to note that online reading allows learners to develop the skill of quick perusal of information.

Because of the unavoidable integration of technology in learning, it was suggested that learners should be exposed to completing reading activities in digital format and understand how to maximize the affordances of digital learning environments. A different study that came to the same conclusion as the previous one emphasised the necessity of introducing strategies in the classroom to improve students' proficiency with digital reading (Ziegler, 2019).

Although a majority of published studies prefer paper over digital, a recent meta-analysis pointed out that studies conducted after 2010 favoured the use of digital reading though they also highlighted that the discrepancy is caused mainly by different factors such as the advancement level of technology, participant's familiarity with the use of such technology, participant's mastery of digital reading strategies and participant's perception of digital reading (Pardede, 2019). A study with participants who prefer digital sources also noted that there is a direct relationship between reading comprehension task accuracy and time (Bresó-Grancha, 2022). However, some studies encourage the use of both print and digital since there is no significant difference in the use of these media (Alisaari et al., 2018). Other articles and studies also suggested using both depending on the learning process and participants involved (Kucirkova, 2019; The Hechinger Report, 2019). The relationship between reading medium (printed vs. digital text) and reading comprehension has been the subject of conflicting study in the past, with some studies supporting the printed format (Stiegler-Balfour, 2023; Ziegler, 2019; Mangen et al., 2019; Solak, 2014) and others favouring reading digitally (Sidabutar, et al., 2022; Manalu, 2019; Kerr & Symons, 2006). The purpose of the current study was to add to the ongoing conversation by examining the relationship between students' reading comprehension and the use of various media. Thus, this study aims to determine which reading format affects students' reading comprehension levels. The findings of this study provide perspectives to reading teachers when incorporating varied reading formats in English language classrooms which ultimately promotes good reading habits and high reading competence among students.

## OBJECTIVES

This study aims to determine the effectiveness of digital and print text formats to students' reading comprehension levels. Specifically, this study aims to find out the following:

- Students' reading comprehension before the intervention within the experimental and control group;
- Students' reading comprehension after the intervention within groups;
- Significant difference in students' reading comprehension before and after the intervention within groups and;
- Comparison of the results between the control and experimental groups.

## RESEARCH METHODOLOGY

### Research Design

This research employed a two-group quasi-experimental design to determine the reading comprehension levels of Grade 8 students. The study comprised control and experimental groups, comparing the effectiveness of printed and digital text formats on students' reading comprehension. This design was deemed the most appropriate for the study as it allowed for a controlled examination of the effectiveness of different text formats while minimizing potential biases.

### Respondents and Locale

The study included a total of 52 participants, divided into two groups of 26 students each – one assigned to the control group and the other to the experimental group. These participants were selected from a reputable private institution in Metro Cebu, Philippines, recognized by the Department of Education (DepEd). The school employs a pedagogical approach that integrates both technological and traditional teaching methods. Notably, the Grade 8 level, for which this research was conducted, consists of only two sections. Consequently, the participants were allocated to the control and experimental groups based on their respective sections to ensure an equitable representation of the student body in the study.

### Research Instruments

This study utilized the Philippine Informal Reading Inventory (Phil-IRI), a tool developed and implemented by the Department of Education to assess and characterize students' reading

performance. The researchers employed pre-and post-tests to gauge potential significant differences in the respondents' reading comprehension following the utilization of digital and print reading formats during students' reading and literature classes. The adoption of the Phil-IRI tools ensures a standardized and reliable assessment of the participants' reading abilities, allowing for a comprehensive analysis of the impact of the intervention on their overall reading comprehension.

### Data Analysis

Students' pre-and post-test results were tabulated using the computation guide for reading comprehension in the Philippine Informal Reading Inventory (Phil-IRI). After, students' scores are interpreted based on their oral reading level as independent (97-100% word reading score and 80-100% comprehension score); instructional (90-96% word reading score and 59-79% comprehension score), and frustration level (89% and below word reading score and 58% and below comprehension score).

To assess the effectiveness of the intervention, the researchers employed the t-test as a statistical tool to compute three key aspects. Firstly, the t-test was utilised to analyse the students' reading comprehension within each group after the intervention; secondly, to examine whether there were significant differences in reading comprehension within each group before and after the intervention; and lastly, to provide a comparative analysis between the control and experimental groups.

## RESULTS AND DISCUSSION

### Students' reading comprehension before the intervention

Considering that the participants of the study are already in grade 8, they are expected to have at least reached a mastery level when it comes to reading proficiency. However, the results as shown in Table 1 revealed that students in both control and experimental groups have only reached Instructional Level. As per the Philippine Informal Reading Inventory, the description of 'instructional level' refers to the reading difficulty level at which students may read with a respectable level of accuracy and comprehension while still facing some difficulties. It is the level at which a student is provided with instructional

support and guidance to help them progress in their reading abilities.

If students in Grade 8 are still reading at an instructional level, it implies that they may be encountering challenges in various aspects of reading, such as fluency, accuracy, or

comprehension. If students persist at an instructional level, it may suggest the need for more intensive remediation, collaboration with specialists, or comprehensive assessments to identify and address specific challenges hindering their reading development.

**Table 1:** Pre-test scores of Experimental and Control groups (N = 26)

Ex/co group	Std. Deviation	Std. Error Mean	Mean	Description
Control	3.16	0.62	15.04	Instructional Reading Level
Experimental	3.39	0.67	14.65	Instructional Reading Level

For the control group whose scores range from 8 to 20, the average score (mean) is 15.038 with 14, 15, and 17 as the most occurring scores and a standard deviation (sd) of 3.156. For the experimental group whose scores also range from 8 to 20, the average score (mean) is 14.654 with 17 as the most occurring score and with a standard deviation (SD) of 3.393. With these results, before the intervention, the control group scored higher than the experimental group although both groups are still in the instructional level. This also suggests that the students profit most from teacher-directed instruction in reading (Flippo, 2014) which means that they mostly rely on guidance from the teacher to fully comprehend the reading passage. This is corroborated by Balnig et al. (2024), who discovered that reading texts to seventh graders can be difficult for them

as well and that some of them even require assistance from their teachers.

### Students' reading comprehension after the intervention within groups

Examination of students' reading comprehension following the intervention within distinct groups reveals a marginal variance in scores. Kerr and Symons' (2006) research demonstrated superior comprehension outcomes for digital reading over print reading. Notably, participants engaging with digital texts achieved higher comprehension scores compared to their counterparts reading printed texts. Although a similar pattern emerged in the post-test results of our two groups, the observed increase in the disparity of their scores, as presented in Table 2, did not reach statistical significance.

**Table 2:** Post-test scores of Experimental and Control groups (N=26)

Ex/co group	Std. Deviation	Std. Error Mean	Mean	Description
Control	3.27	0.64	16.34	Instructional Reading Level
Experimental	3.71	0.73	16.38	Instructional Reading Level

As reflected in Table 2, the average score (mean) of the control group in their post-test scores is 16.34 with a standard deviation (SD) of 3.27 with 17 and 16 as the most occurring scores. On the other hand, the experimental group got an average score (mean) of 16.38 with a standard deviation (SD) of 3.71 and 21, 19, and 17 as the most occurring scores. According to the tabulated data, the experimental group's scores exhibit a slight advantage over those of the control group. The post-test scores for the control group varied from 8 to 23, whereas the experimental group's scores ranged from 10 to 23. Despite an overall improvement in scores, it is crucial to highlight that students in both groups have retained a similar level of reading comprehension prior to the intervention. They still require the guidance of the teacher to fully comprehend the reading passage. Thus, there is a trend suggesting better

comprehension with digital reading, the observed differences in scores between the two groups in this study are not significant enough to draw firm conclusions based on statistical analysis

### Significant difference in students' reading comprehension before and after the intervention within groups

The paired samples t-test was utilized to evaluate the impact of an intervention or treatment, comparing mean scores between a pretest group and a post-test group. The negative t-statistic of -8.46, with 25 degrees of freedom and a p-value of 0.001, highlights a statistically significant difference between the two groups. The decision to reject the null hypothesis (Ho) is based on the p-value falling below the conventional threshold of 0.05, indicating that the mean score of the pretest group is significantly lower than that of the

post-test group. In practical terms, this suggests a positive effect of the intervention or treatment, resulting in a statistically significant increase in scores from the pretest to the post-test. The shift is evident in the most frequently occurring raw scores: during the pre-test for the control group, it ranged from 14-17, while in the post-test, it narrowed to 16-17. However, the marginal 1-point

score difference implies a limited impact of the intervention on the reading comprehension of the group using printed text. Additionally, the effect size of 0.404 (Cohen's d) indicates that the observed differences in scores are relatively small, making it challenging to ascertain a significant difference after the intervention in the control group.

**Table 4:** Students' reading comprehension before and after the intervention within the Control group

Group	Mean (sd)	Student's t <sup>a</sup>	df	p <sup>b</sup>	Decision
Pretest	15 (3.16)	-8.46	25	0.001	Reject Ho
Post-test	16.3 (3.27)				

*Significant at p < 0.05 level*

**Table 5:** Students' reading comprehension before and after the intervention within the Experimental group

Group	Mean (sd)	Student's t <sup>a</sup>	df	P <sup>b</sup>	Decision
Pretest	14.7 (3.39)	-10.7	25	0.001	Reject Ho
Post-test	16.4 (3.71)				

*Significant at p < 0.05 level*

Similarly, to determine if there was a significant difference between the experimental group's mean scores on the pretest and post-test evaluations, the paired samples t-test was utilized. The pretest mean score was 14.7, with a standard deviation of 3.39, while the post-test mean score was 16.4, with a standard deviation of 3.71. The calculated t-statistic was -10.7, with an associated p-value of 0.001, leading to the decision to reject the null hypothesis. This implies a statistically significant improvement or change in the measured variable from the pretest to the post-test in the experimental group, with the negative t-statistic indicating a positive direction of change.

These results provide clear evidence that the intervention or treatment implemented between the pretest and post-test had a substantial impact on the variable under investigation. Illustrated by the fact that the most frequently occurring raw score during the pre-test for the experimental group was 17, while during the post-test it expanded to 17-21, the approximately 4-point score difference indicates a notable positive effect on the reading comprehension of the group using digital text. However, it's important to note that the effect size of 0.478 (Cohen's d) suggests that the observed differences in scores, while significant, are of moderate size. This indicates that, despite the statistically significant impact, the practical significance of the intervention in the experimental group may not be extremely large.

The results from the control and experimental groups yield significant insights into the effectiveness of using print or digital reading texts to enhance students' reading comprehension. For the control group, the paired samples t-test indicated a statistically significant difference between pretest and post-test scores, supporting the idea that the intervention had a positive impact. However, the effect size (Cohen's d) of 0.404 suggests that while the difference is statistically significant, it may not be practically substantial. This implies that the use of printed texts led to a measurable improvement in reading comprehension, but the extent of this improvement is moderate.

On the other hand, the experimental group showed a more pronounced impact. The paired samples t-test revealed a significant difference between pretest and post-test scores, with a negative t-statistic indicating a positive direction of change. The effect size (Cohen's d) of 0.478, while still moderate, suggests a more substantial practical impact compared to the control group. This indicates that using digital reading texts led to a statistically significant and practically meaningful improvement in reading comprehension for the experimental group.

In summary, both print and digital reading interventions demonstrated positive effects on reading comprehension. However, the data suggests that the digital reading intervention had a slightly greater impact, both statistically and

practically. While many surveys indicate that students prefer print materials, some consider using electronic media to be more convenient and accessible (Alda, et al., 2024). For their academic readings, the majority of students still choose print over digital formats; yet, they value the accessibility and convenience of electronic sources (Zabukovec & Vilar, 2015). Therefore, when considering the implications for improving students' reading comprehension, incorporating digital reading texts may be a more effective strategy compared to relying solely on print texts.

## CONCLUSION

The study reveals that there is no statistically significant difference in the reading comprehension levels of grade 8 students when exposed to reading materials using either printed or digital text formats. The findings align with similar studies conducted beyond the Philippines, indicating that teaching reading using print or digital texts yields comparable results. This suggests that the choice of instructional method for teaching reading through literary works may not significantly impact outcomes.

Despite the comparable results, educators are encouraged to adopt a flexible approach, incorporating both digital and printed texts in their teaching methods. Given the rapid development and integration of computers, tablets, and smartphones into students' daily lives and academic tasks, it is anticipated that the observed differences between reading in print and digital may diminish in the future.

The intervention applied to both groups demonstrated a positive effect on students' reading comprehension. However, the marginal difference between pre-test and post-test scores suggests that both platforms are suitable for grade 8 students, making it challenging to definitively declare one as superior. Nonetheless, the post-test scores of the experimental group indicate a more substantial improvement compared to the control group. These results suggest that, when instructing students with both formats, digital text should be considered as the primary reading material, with printed text serving as supplementary support. Educators are encouraged to develop approaches or methods that effectively combine both formats, aiming to maximize students' reading comprehension based on the assigned literature or topic. This

nuanced approach can leverage the strengths of both printed and digital texts to enhance overall learning outcomes.

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