



The Influence of Smart Wheel Learning Media on Beginning Reading Skills in Indonesian Language Subjects in Grade I of Elementary School

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Abstract

This study aims to determine the effect of using the Roda Pinter (Smart Wheel) media on the early reading ability of first-grade students at Elementary School (SD Negeri 5 Damar). The background of this research lies in the low level of students' initial reading skills, as some students still struggle to recognize letters, combine syllables, and read simple words. The study employed a quantitative approach with an experimental method using a One Group Pretest-Posttest design. The sample consisted of 21 class IA students selected through purposive sampling. Data were collected through pretest and posttest of early reading, observation, and documentation, and were then analyzed using descriptive statistics, normality tests, and a Paired Sample t-test. The results showed an increase in the average score from 41.43 in the pretest to 71.76 in the posttest. The statistical package for the Social Sciences (SPSS 26) normality test indicated a pretest value of $0.086 > 0.05$ and a posttest value of $0.077 > 0.05$, suggesting that both data sets were normally distributed. Furthermore, hypothesis testing with SPSS 26 revealed a Sig. (2-tailed) The value of $0.000 < 0.05$, indicating that the alternative hypothesis (H_a) was accepted. Similarly, manual calculation of the hypothesis test showed a t-value of -8.376 compared to the t-table value of 2.086, which also led to the rejection of the null hypothesis (H_0) and the acceptance of H_a . These findings demonstrated that the Roda Pinter media significantly improved students' early reading ability in Indonesian language learning for first-grade students at Elementary School (SD Negeri 5 Damar).

Keywords: *Smart Wheel; Early Reading; Indonesian Language*

Introduction

Early reading skills are an essential literacy foundation that underpins successful learning across subjects in elementary school. Mastery of these skills extends beyond spelling to encompass a range of critical competencies, including phonemic awareness, letter-sound association, and basic literal comprehension (Sukma & Puspita, 2023; Anggarini, Sumarno, & Subekti, 2019). Failure in this initial phase risks creating barriers to tiered learning in subsequent grades, given that reading skills are a prerequisite for understanding other learning materials, such as story problems in mathematics or informative texts in science and social studies (Akbar, Faisal, & Pada, 2024). Therefore, effective learning interventions are crucial to addressing the heterogeneity of students' literacy readiness upon

entering elementary school, which is influenced by factors such as literacy exposure at home and varying rates of language acquisition (Ariyanti, Marleni, & Prasrihamni, 2022).

Previous research maps show several key trends in addressing early reading challenges. The first group emphasizes the effectiveness of concrete media and interactive multimedia in increasing attention and providing meaningful practice opportunities for students (Setyaningsih, 2023; Auliah et al., 2021). The second group focuses on visual-auditory-kinesthetic educational games, which have been shown to increase student motivation and retention of syllable patterns (Anggarini, Sumarno, & Subekti, 2019; Agustin, Asri, & Retno, 2024). More specifically, the third group highlights the use of rotating media such as syllable wheels, which have been empirically proven to improve syllable recognition accuracy and simple reading fluency through repetitive yet varied practice (Simbolon, 2019; Laurina & Alfiansyah, 2023; Pati, Ita, & Meka, 2024; Dalimunthe, Ahkas, & Aufa, 2024). However, although numerous studies have confirmed the potential of this media, the majority of reports in the local context are still descriptive or product development studies (Jaya, 2020), and have not systematically tested the magnitude of its effects through measurable experimental designs (Sirulhaq et al., 2023; Sujarweni, 2018). An aspect that has not been widely studied is proving the effectiveness of the "smart wheel" media quantitatively with valid and reliable pre-post procedures in the context of elementary schools in the Bangka Belitung Islands. Learning media is a tool to assist the teaching and learning process and serves to clarify the meaning of the intended message (Kustandi & Sutjipto, 2011, cited in Sodikin, Suryadin, & Arafatun, 2020:1368).

Addressing this research gap, this study specifically aims to fill the gap in empirical evidence by quantitatively examining the effect of using smart wheels on first-grade students' early reading skills. This study is designed to go beyond existing descriptive reports by implementing a systematic One Group Pretest-Posttest design. Thus, this study will present measurable findings regarding the statistical significance and magnitude of reading improvement after the intervention, a contribution that has not been widely reported in similar geographic and demographic contexts.

Based on the arguments and objectives that have been described, the hypothesis to be tested in this quantitative research is: There is a positive and significant influence from the use of smart wheel learning media on improving initial reading abilities (including letter recognition, letter pronunciation, syllable formation, and reading simple sentences) in class I students at Elementary School (SD Negeri 5 Damar).

Method

The subjects of this research analysis were first-grade students at Damar 5 Elementary School, as individuals who received the learning intervention. The required information included each student's initial reading ability scores at two measurement points (pre- and post-measures), which reflect their mastery of the basic components of early literacy (letter recognition, letter pronunciation, syllable sequencing, word reading, and simple sentence reading). The socio-institutional context (classroom, teacher, lesson schedule) was recorded as a background so that the interpretation of the results was not separated from the real learning situation. Inclusion criteria: registered as active first-grade students at the time of the study, present at both measurements, and participating in a series of learning activities using the smart wheel media. Permission for the study from the school and parental/guardian consent were obtained prior to implementation, in line with ethical practices in educational research on children.

The study used a quantitative approach with a One Group Pretest–Posttest design to assess changes in early reading ability before–after the implementation of the smart wheel media (independent variable), so that differences in scores can be attributed to the treatment with procedural internal control (Sugiyono, 2024; Widiyanto, 2013). The operationalization of the design was carried out by: (1) pretest measurement on the letter–syllable–word indicators; (2) implementation of learning using the smart wheel according to the RPP/topic of Indonesian Language for grade I (steps, time, and materials were documented); (3)

posttest measurement with equivalent devices after treatment. This design was chosen because it is suitable for early grades that are homogeneous in the curriculum and minimizes administrative disruptions in scheduling between classes; while providing the pre–post quantitative evidence needed to answer the media effectiveness hypothesis (Sujarweni, 2018; Jaya, 2020).

The primary data source was student respondents (test scores), with the class teacher acting as the instrument content validator and implementation observer. The initial reading test instrument was compiled from the Grade I competency grid (letters–syllables–words) into 5 indicators/ leveled readings. Content validity was obtained through expert/teacher assessment (item clarity, appropriateness of difficulty level, usability in early grades), then item validity and internal reliability were tested on trial/initial wave data (e.g., Cronbach's α) to ensure measurement consistency (Widiyanto, 2013; Sujarweni, 2018). Data collection procedures included: curriculum & material desk-review; observation of learning implementation (student engagement, adherence to steps, obstacles); individual pretest; smart wheel treatment (in pairs/small groups as directed by the teacher); and individual posttest. Photo documentation/field notes were used for the audit trail.

The analysis was carried out in stages: (1) descriptive statistics (mean, median, SD, range) for pretest – posttest; (2) normality prerequisite test (e.g. Shapiro–Wilk) on the difference in scores or each measurement point; (3) paired difference test: paired sample t-test if the normality assumption is met, or Wilcoxon signed-rank test if it is not met (Sugiyono, 2024; Widiyanto, 2013; Jaya, 2020). Processing using statistical software (e.g. SPSS 26) with $\alpha = 0.05$. All test decisions are accompanied by interpretative narratives so that the findings are easily replicated and adopted in similar class I contexts.

Results and Discussion

The main findings in this study conclusively show that the use of smart wheel media has a very significant impact on improving the initial reading skills of first grade students at Elementary School (SD Negeri 5 Damar). The main evidence of this finding is a substantial increase in the average score of students' reading abilities between before treatment (pretest) and after treatment (posttest). This increase was not only observed in aggregate, but also consistently across most individual students, indicating that the intervention provided was successful in reaching and stimulating the development of reading skills effectively.

Quantitatively, descriptive statistics show a striking difference between the two measurements. Before the intervention, the class mean score on the pretest was 41.43. This figure reflects the initial conditions where the majority of students were still at the letter recognition stage and had difficulty composing syllables. After the learning period using the smart wheel media, the average score on the posttest jumped dramatically to 71.76. This average increase of 30.33 points is the first indicator of the media's success.

Further analysis of the data distribution revealed widespread improvement. On the pretest, the lowest score achieved by a student was 25, while the highest was only 75. This wide range of scores indicates significant heterogeneity in ability within the class. However, after the intervention, the lowest score on the posttest rose to 35 and the highest score reached 100. This shift indicates that even students with the lowest abilities made progress, while students who were already quite good were able to reach optimal levels of mastery.

Table 1. Descriptive Statistics of Beginning Reading Ability

Measurement	N	Average (Mean)	Standard Deviation	Min Value	Max Value
Pretest	21	41.43	13.81	25	75
Posttest	21	71.76	21.78	35	100

Source: Data SPSS Statistics 26

The data in Table 1 above briefly presents numerical evidence of the improvements that occurred. The increase in standard deviations from 13.81 to 21.78 on the posttest is interesting to note, suggesting that while all students improved, the rate of improvement varied. Some students showed significant leaps in ability, while others improved more gradually, according to their individual learning rates.

Table 2. Results Test Normality Pretest- Posttest

Tests of Normality			
Shapiro-Wilk			
	Statistic	df	Sig.
Pre Test membaca permulaan	.920	21	.086
Post Test membaca permulaan	.917	21	.077

a. Lilliefors Significance Correction

Sumber: Data SPSS Statistics 26

Before proceeding to hypothesis testing, a prerequisite analysis test was conducted to ensure the data met the required assumptions. Using the Shapiro-Wilk normality test, a significance value of 0.086 was obtained for the pretest data and 0.077 for the posttest data. Since both significance values are greater than 0.05 ($p > 0.05$), it can be concluded that the data from both measurements are normally distributed. The fulfillment of this assumption provides a strong foundation for using parametric statistics, namely the Paired Sample t-test, in hypothesis testing.

Table 3. Results Test Paired Sample T- Test

		Paired Samples Test					t	df	Sig. (2-tailed)
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Pair					Lower	Upper			
1	Pre Test membaca permulaan - Post Test membaca permulaan	-30.238	16.544	3.610	-37.769	-22.708	8.376	20	.000

Sumber: Data Diolah di SPSS Statistics 26

The culmination of quantitative analysis is hypothesis testing to answer the research questions. In Table 3 above, the results of the *Paired Sample t-test* show a significance value (Sig. 2-tailed) of 0.000. This value is far below the established significance level ($\alpha = 0.05$), which statistically proves that the difference between *pretest* and *posttest* scores is not due to chance.

Furthermore, the calculated t value obtained is 8.376. When this value is compared with the t table value at degrees of freedom ($df = 20$ ($n-1$)) and a significance level of 0.05, which is 2.086, it appears that the calculated t value is much larger ($|8.376| > 2.086$). Based on these two statistical evidences—a very low significance value and a calculated t value that exceeds the t table—the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. Thus, it can be stated validly that there is a positive and significant influence of the use of smart wheel media on students' initial reading abilities.

Discussion of these findings can begin with understanding why the smart wheel media works effectively. From the perspective of cognitive psychology and child development, this media is successful because it transforms abstract learning tasks (recognizing letter symbols and sounds) into concrete and kinesthetic activities. In accordance with the developmental stage of elementary school-aged children who are in the concrete operational phase according to Piaget, students learn best through direct interaction with

real objects. The activities of spinning the wheel, matching letters, and forming syllables physically provide a multisensory learning experience (visual, auditory, and kinesthetic) that strengthens neural connections related to literacy.

The game element inherent in the smart wheel media also plays a crucial role. Learning activities packaged in a game format can reduce anxiety and increase students' intrinsic motivation. This finding aligns with Agustin, Asri, & Retno (2024), who stated that educational games can increase student focus and engagement. When students feel happy and positively challenged, they tend to be more persistent in practicing, which is key to mastering early reading skills.

When compared with previous studies, the results of this study strengthen and confirm existing findings. Simbolon (2019) and Laurina & Alfiansyah (2023) previously reported that wheel-based media is effective in improving syllable recognition. This study adds weight to these findings by presenting strong inferential statistical evidence through a *pretest - posttest design*. This means the study not only states that the media is "useful" but also measures the "significant" extent of its impact.

The main difference between this research and previous studies, particularly those conducted in a local context, lies in its methodological rigor. Many previous reports tend to be descriptive-qualitative or focus on the product development stage (Pati, Ita, & Meka, 2024; Dalimunthe, Ahkas, & Aufa, 2024). This research, however, fills this gap by conducting quantitative hypothesis testing, complete with prerequisite tests and appropriate statistical analysis, resulting in more robust and reliable empirical evidence.

More broadly, these findings have important practical implications for elementary school educators. The results of this study demonstrate that addressing basic literacy challenges doesn't always require expensive and complex digital technology. Simple, inexpensive, and home-made learning media, such as smart wheels, can be highly effective solutions if designed to meet students' characteristics and learning needs. This empowers teachers to become innovators in their own classrooms.

Further implications apply to school policy development and teacher training. Schools can foster a culture of innovation by facilitating workshops for teachers on creating simple learning media. Encouraging teachers to share good practices in using such media can accelerate the dissemination of effective solutions to common learning challenges in early grades.

A key lesson learned from this research is the reaffirmation of a fundamental principle in education: the most effective learning is active, enjoyable, and meaningful for students. The success of the smart wheel lies not in its technological sophistication, but in its ability to humanize the learning process, transform cognitive load into a challenging game, and provide immediate feedback that builds students' confidence.

However, this study is not without limitations. The use of a *One Group Pretest-Posttest design* did not allow for control of external variables that might influence student performance improvement, such as maturity factors or learning outside of school. The absence of a control group requires caution in attributing performance improvement solely to the smart wheel. Furthermore, the study's sample size, limited to a single class in a single school, limits the generalizability of the findings to a broader population.

Therefore, future research is strongly encouraged to replicate this study using a more robust experimental design, such as a *quasi-experimental design* with a control group. Comparing the effectiveness of the smart wheel media with conventional learning methods or other media would provide more definitive causal evidence. Furthermore, *longitudinal research* examining the long-term impact of this media use on reading fluency and comprehension in subsequent grades would also be a valuable contribution to the literature.

Conclusion

The synthesis of the overall findings of this study clearly shows that the use of smart wheel media has a positive and statistically significant influence on the initial reading skills of first grade students of Elementary School (SD Negeri 5 Damar). This is in line with the research objective, namely to prove the effectiveness of the media in overcoming early reading difficulties. The main quantitative evidence is shown by a significant increase in students' average scores from 41.43 in *the pretest* to 71.76 in *the posttest*, with the results of the hypothesis test (*Paired Sample t-test*) producing a significance value of 0.000 (<0.05). These findings confirm that interventions through concrete, interactive, and gamified media have succeeded in becoming an effective solution to bridge the gap in basic literacy skills in students.

Theoretically, this study reinforces the relevance of cognitive and constructivist learning theories, which emphasize the importance of active and multisensory learning experiences for children at the concrete operational stage. These findings also contribute to the pedagogical literature by demonstrating that simple learning media can have a significant impact if designed according to child developmental principles. Practical implications: elementary school teachers are strongly recommended to adopt and develop similar innovative and contextual learning media. Schools are also advised to facilitate media development workshops for teachers as part of efforts to continuously improve the quality of learning.

This study has several limitations that need to be acknowledged. The use of a *One Group Pretest-Posttest design* without a control group makes it difficult to attribute reading improvement solely to the treatment, without considering other external factors such as student natural maturation. Furthermore, the limited sample size of one class in one school limits the generalizability of the findings. Therefore, further research is strongly recommended using a more robust experimental design, such as a *quasi-experimental design* with a control group, to strengthen the evidence of causality. Future research directions could also explore the effectiveness of the smart wheel media in more diverse populations and measure its *longitudinal impact* on more complex aspects of reading, such as fluency and comprehension.

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