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Article

# Effectiveness of Concrete Operational Instructional Materials for Enhancing Early Reading Skills in Preschoolers

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Abstract: This study investigates the impact of specialized teaching materials aligned with concrete operational concepts on the reading skills of preschool-aged children. Employing a quasi-experimental design, the research compared an experimental group receiving the intervention with a control group following the standard curriculum. Pretest and posttest assessments revealed that the experimental group showed substantial improvement in their reading abilities, while the control group's progress was more modest. Statistical analysis confirmed the significant difference in mean gain between the two groups, underscoring the effectiveness of the teaching materials. These findings emphasize the importance of age-appropriate instructional resources tailored to children's cognitive development stages and their potential to enhance early reading skills. This research contributes valuable insights into educational strategies for fostering reading proficiency in young learners, which is crucial for their academic development.

Keywords: Concrete operational instructional materials, early reading skills, preschoolers

## Introduction

The The formative years of a child's childhood are the most important in determining the course of their cognitive development and laying the groundwork for their later academic success (Paulicj et al., 2021). Within the context of this developmental panorama, the acquisition of reading abilities throughout a child's preschool years is not only symptomatic of developing literacy but also predictive of the child's long-term educational trajectory after preschool (Jalife et al., 2022; Guerra, 2020). Moreover, it is at this early time that children begin to acquire the building blocks of literacy, such as phonemic awareness, letter identification, and early vocabulary (Ehri, 2022).

The literature demonstrates that there is still a persistent gap in the methodological approach to reading instruction for preschoolers, despite the fact that the significance of early literacy has been

thoroughly demonstrated (Grover et al., 2023). Traditional pedagogies have frequently placed an emphasis on abstract representations and rote learning, which is a strategy that, while structured, may not be appropriate for the period of cognitive development that preschool-aged children are in (Quinn et al., 2023; Mao, 2020). A disparity of this magnitude sheds light on the urgent requirement for educational research to investigate and validate more instructional strategies that are developmentally appropriate.

Considering this is such an important need, this research was designed to fill in a significant void in the existing body of research on the topic of whether or not tangible operational instructional materials (i.e., those that involve actual, hands-on experiences) are effective in assisting toddlers in developing their early reading skills (Fan et al., 2020). Children should be able to more profoundly connect with reading concepts and internalise them with the help of these tools, which reflect a pedagogical shift towards a more sensory, experiential style of learning (Cree & Robb, 2021; Hedges, 2022).

This inquiry aims to investigate whether there is a match between the cognitive developmental stage of preschoolers and the teaching materials employed in their classrooms. According to Piaget's theory of cognitive development, preschoolers are considered to be in the preoperational stage, gradually transitioning to concrete operational thinking. This transition signifies their increasing readiness for learning experiences that make abstract concepts more tangible and intuitively understandable. However, current research primarily focuses on evaluating tangible teaching materials in subjects like science and mathematics, while early reading has received less attention compared to previous studies that emphasized its importance.

Moreover, this research is being conducted at Little Sam's Playroom and Learning Centre in Valencia, Bukidnon, it is likely that the application of concrete operational instructional materials in a practical setting could not only fill in the gaps in the existing research but also radically alter the way reading is taught. This would be a significant development for both the field of reading teaching and the field of reading research. The purpose of this study is to determine whether or not the use of these materials actually results in observable improvements in early reading skills when compared to more conventional and conceptual modes of instruction. In addition, this research is in accordance with a more general educational imperative, which is the requirement for school administrators and instructors to embrace instructional practises that are supported by practical data. The research attempts to glean meaningful information from the collected data by meticulously documenting the histories of the participants, determining the subjects' starting reading levels, and contrasting the participants' reading abilities before and after the intervention. These findings are well positioned to inform the

  

formulation of an action plan that aims to optimise reading instruction, which will ultimately contribute to the promotion of literacy education at the preschool level.

In a nutshell, the purpose of this research is twofold: first, to determine how useful tangible operational teaching materials are in the process of teaching reading to younger children; and second, to address a significant lacuna in the previous research. The findings of this study are anticipated to provide light on future directions for educational practitioners, providing evidence-based guidance on how to support early reading development with the end objective of empowering children as they begin their journey towards lifetime literacy.

## Methodology

This study employed a quasi-experimental design, specifically a pretest-posttest approach, to assess the impact of teaching materials emphasizing concrete operational concepts on early reading skills. This design was chosen because random assignment to control and experimental groups was not feasible in an educational setting. The quasi-experimental approach allowed for a structured comparison between two groups: one receiving the intervention (experimental) and one following the standard curriculum (control). Although participants were not randomly assigned, the use of pretest measurements established a baseline to evaluate the intervention's impact on reading skills. By assessing both groups before and after the intervention, the study aimed to identify significant improvements in reading skills attributable to the specialized teaching materials. This comparison helped isolate the intervention's specific contribution amid other potential factors. This design effectively balanced practical constraints in educational research with the need for robust data collection.

## Results and Discussion

**Table 1. Profile of the Subjects**

| | Control Group (n=20) | | Experimental Group (n=20) | |
|---|---|---|---|---|
| Age | f | % | f | % |
| 4 | 14 | 30.00 | 16 | 80.00 |
| 3 | 6 | 70.00 | 4 | 20.00 |
| Gender | | | | |
| Female | 12 | 60.00 | 12 | 60.00 |
| Male | 8 | 40.00 | 8 | 40.00 |
| Number of Siblings | | | | |
| 3 | 0 | 0.00 | 2 | 10.00 |
| 2 | 5 | 25.00 | 4 | 20.00 |
| 1 | 12 | 60.00 | 8 | 40.00 |
| None | 3 | 15.00 | 6 | 30.00 |

 

In Table 1, the profile of the subjects in both the control and experimental groups is presented. The study involved a total of 40 participants, with 20 in each group. Regarding the age distribution, it is evident that the majority of participants in the control group were 4 years old, constituting 70% of the group, while in the experimental group, 80% were in the 4-year-old age group. This suggests that the two groups were reasonably balanced in terms of age. In terms of gender, an equal distribution was maintained in both groups, with 60% of subjects being female and 40% male. When examining the number of siblings, it becomes apparent that a higher proportion of participants in the control group had one sibling (60%), while in the experimental group, there was a more varied distribution, with 40% having one sibling and 30% having none. The table provides a clear snapshot of the demographic characteristics of the subjects, which is essential for understanding the composition of the groups and potential influences on the study's outcomes.

Table 2. Baseline Reading Level of the Subjects

| Reading Level | Control Group (n=20) | | Experimental Group (n=20) | |
|---|---|---|---|---|
| | f | % | f | % |
| Independent | 0 | 0.00 | 0 | 0.00 |
| Transitional | 0 | 0.00 | 0 | 0.00 |
| Early | 7 | 35.00 | 9 | 45.0 |
| Emergent | 13 | 65.00 | 11 | 55.0 |
| Total | 20 | 100.00 | 20 | 100.0 |

Table 2 presents the baseline reading levels of the subjects in both the control and experimental groups. The reading levels were categorized into four groups: Independent, Transitional, Early, and Emergent. Notably, none of the subjects in either group fell into the Independent or Transitional categories, indicating that at the beginning of the study, none of the children were already reading at an independent or transitional level. In the control group, the majority of participants were at the Emergent reading level, comprising 65% of the group, while 35% were at the Early level. In contrast, the experimental group had a slightly different distribution, with 55% at the Emergent level and 45% at the Early level. These baseline reading levels provide essential insights into the starting point of the participants' reading abilities, allowing for a comparison of their progress over the course of the study. The differences in baseline levels between the control and experimental groups suggest that initial reading abilities were not identical, which should be considered when interpreting the results of the intervention.

Table 3 presents the levels of reading performance for both the control and experimental groups during the pretest. The reading levels were categorized based on the range of scores into Independent (8-10), Transitional (6-7), Early (3-5), and Emergent (0-2). Notably, neither

  

group had participants in the Independent or Transitional categories during the pretest, indicating that all children started at relatively lower reading levels.

**Table 3. Level of Performance in Reading of the Two Groups during Pretest**

| Reading Level | Range of Scores | Control Group (n=20) | | Experimental Group (n=20) | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| Independent | 8-10 | 0 | 0.00 | 0 | 0.00 |
| Transitional | 6-7 | 0 | 0.00 | 0 | 0.00 |
| Early | 3-5 | 7 | 35.00 | 9 | 45.00 |
| Emergent | 0-2 | 13 | 65.00 | 11 | 55.00 |
| **Total** | | **20** | **100.00** | **20** | **100.00** |
| **Average** | | **2.15** | | **2.50** | |
| **St.Dev.** | | **1.26** | | **1.50** | |

In the control group, 35% of participants scored in the Early category, while the majority, 65%, were in the Emergent category. In contrast, the experimental group had 45% of participants in the Early category and 55% in the Emergent category. This suggests that both groups began the study with similar baseline reading levels, with a focus on early and emergent reading skills. The table also provides additional statistical measures, including the average score and standard deviation. The average reading score for the control group during the pretest was 2.15, with a standard deviation of 1.26. In the experimental group, the average score was slightly higher at 2.50, with a standard deviation of 1.50. These pretest results offer insights into the initial reading abilities of the participants and will be essential for assessing any changes in reading performance as a result of the intervention.

**Table 4. Level of Performance in Reading of the Two Groups during Posttest**

| Reading Level | Range of Scores | Control Group (n=20) | | Experimental Group (n=20) | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| Independent | 8-10 | 0 | 0.00 | 12 | 60.00 |
| Transitional | 6-7 | 3 | 15.00 | 8 | 40.00 |
| Early | 3-5 | 10 | 50.00 | 0 | 0.00 |
| Emergent | 0-2 | 7 | 35.00 | 0 | 0.00 |
| **Total** | | **20** | **100.00** | **20** | **100.00** |
| **Average** | | **3.50** | | **7.85** | |
| **St.Dev.** | | **1.79** | | **1.04** | |

Table 4 provides a comparison of the levels of performance in reading for both the control and experimental groups during the posttest. Similar to the pretest, the reading levels were categorized based on the range of scores into Independent (8-10), Transitional (6-7), Early (3-5), and Emergent (0-2). In the control group during the posttest, no participants reached the independent category, while 15% were in the Transitional category, 50% in the Early category, and 35% in the

  

Emergent category. In contrast, the experimental group showed substantial improvement, with 60% reaching the Independent category, 40% in the Transitional category, and none remaining in the Early or Emergent categories. The posttest results indicate a marked difference in the reading performance between the two groups after the intervention. The control group's average reading score increased to 3.50, with a standard deviation of 1.79. Meanwhile, the experimental group showed significant improvement, with an average score of 7.85 and a lower standard deviation of 1.04. These findings suggest that the specialized teaching materials had a positive impact on the experimental group's reading skills, leading to a substantial shift in their reading levels, whereas the control group's progress was more modest.

**Table 5. Test of Mean Gain Difference in the Pretest and Posttest of the Subjects' Reading Performances of Both Groups**

| Source of Difference | Mean Gain | SD | Mean Gain Diff. | Comp. t- value | p-value | Decision | Remarks |
|---|---|---|---|---|---|---|---|
| Experimental Group | 5.35 | 1.14 | 4.00 | 11.611 | 0.000 | Reject Ho | Significant |
| Control Group | 1.35 | 1.04 | | | | | |

*Significant at $p < 0.05$ (two-tailed)

Table 5 presents the test of mean gain difference in the pretest and posttest of the subjects' reading performances for both the experimental and control groups. The key findings from this table are highly significant. In the experimental group, there was a substantial mean gain of 5.35, with a low standard deviation of 1.14, indicating a consistent improvement in reading skills. The mean gain difference of 4.00 was significant with a very high t-value of 11.611 and an impressively low p-value of 0.000. This result led to the rejection of the null hypothesis (Ho), highlighting the significant and positive impact of the specialized teaching materials on the experimental group's reading performance. In contrast, the control group exhibited a smaller mean gain of 1.35, which was not statistically significant. These results clearly demonstrate that the intervention had a significant and beneficial effect on the experimental group's reading skills compared to the control group, underscoring the effectiveness of the teaching materials in enhancing reading abilities in young learners.

## Conclusion

In conclusion, the findings from this study highlight the effectiveness of specialized teaching materials focused on concrete operational concepts in significantly improving the reading skills of preschool-aged

  

children. The research employed a quasi-experimental design, comparing an experimental group that received the intervention with a control group following the standard curriculum. The pretest and posttest results revealed that the experimental group made substantial gains in their reading abilities, with a mean gain of 5.35, while the control group's progress was more modest, with a mean gain of 1.35. Importantly, statistical analysis demonstrated that the difference in mean gain for the experimental group was highly significant, with a low p-value of 0.000, leading to the rejection of the null hypothesis. These findings emphasize the significance of age-appropriate teaching materials tailored to children's cognitive development stages and their potential to enhance early reading skills. The study contributes valuable insights into educational strategies for improving reading proficiency in young learners, which can have a lasting impact on their academic development.

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