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AI-Mobile Learning Tool and Pre-Primary School Pupils' Performance on Language Development in Rivers State

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Abstract

This research evaluated how the AI-powered mobile application, Google Read Along, influences the linguistic development of pre-primary students in Rivers State, alongside an examination of whether gender affects this progression. The inquiry was structured around two specific objectives, research questions, and hypotheses. Adopting a quasi-experimental design, the study sampled 45 pupils from two established classes across two purposefully selected co-educational pre-primary schools. Data were collected using the Language Development Performance Test (LDPT), with the Google Read Along application serving as the core intervention. Descriptive statistics, such as mean and standard deviation, were used to answer the research questions, while analysis of covariance (ANCOVA) was used to facilitate the testing of hypotheses. The results indicated that there was a significant difference in the academic performance of the experimental group who used the AI-based tool and the control group who received instruction through the conventional play-way method. The results further revealed that gender did not influence the performance of pupils in the experimental group. It is therefore recommended that school owners should encourage teachers to use the Google Read Along application in their lessons to support language development in pre-primary education.

Keywords: AI, Mobile, Learning, Tool, Language, Development, Google Read Along

Introduction

Language development is the beginning of learning as far as the pre-primary school system is concerned. All knowledge begins with language formation. Therefore, the importance of language, especially as the basis of communication, cannot be overstressed. However, teachers need to know that teaching and Learning in the 21st century has changed from traditional methods to digital techniques (Kelvin, 2020). The educational landscape has shifted from a teacher-centred model to one that prioritises the learner. Teachers therefore need to adopt strategies that allow students to explore, engage, participate and appreciate learning, especially at the pre-primary levels. Learning at this level will only make sense to them when it is interactive and facilitating (Edeh et al., 2020). The present-day learners are passionate about the use of digital gadgets in the classroom. Contemporary students inhabit environments characterised by electronic and digital connectivity, which offer communication channels that facilitate instant gratification. Such learners are defined as Digital Natives (Mickel, 2019). Consequently, it is expected that educators transition into this digital sphere to maintain their effectiveness within the educational system. Teachers also need to move to student-centred teaching approaches. This is so because education is a tool that prepares students for future relevance. Education is also an instrument for national development and social change (FRN, 2014). Teaching generally at all levels has witnessed an influx of inappropriate instructional techniques. It is therefore against this

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backdrop that the researcher is interested in introducing the use of technology in the pre-primary school classroom, which will facilitate student-centeredness and also improve students' performance. The need to expose students to instructional approaches that will involve their active participation in classroom instruction at the pre-primary school necessitated an investigation into the effect of AI-Mobile Learning (Google Read Along) Tool on Pre-primary School Pupils' Performance in Rivers State. Pre-primary education occupies a delicate position within the academic system, and the successful delivery of its curriculum relies upon the implementation of effective, efficient teaching strategies. Adopting unsuitable pedagogical methods risks undermining even the most meticulously designed programmes. This question is particularly pertinent when considering the move from teacher-centred to learner-centred environments involving digital resources.

Artificial Intelligence (AI) is one of the most prominent examples of this move, characterised as the creation of computing systems designed to accomplish tasks that usually need human intelligence, such as learning and teaching (Jones, 2023). AI has the potential to transform education by making teaching easier and enhancing the productivity of teachers. Actually, the incorporation of AI in the classroom provides great opportunities for science and technological education (Smith, 2022). Today, millions of students use AI on many platforms, including YouTube, WhatsApp, Google, and television, on different devices, such as PCs, smartphones, and tablets, to learn academic content from anywhere. In recent years, there has been a surge in the development and subsequent empirical evaluation of a variety of AI learning technologies. AI-powered instruction permits knowledge to be delivered through different illustrations that cannot be delivered by traditional techniques (Finik, 2022). Therefore, this study applied an AI-mobile learning tool, Google Read Along, for the experimental group and the control group was taught using the standard lecture technique. There is a lot of flexibility in mobile learning as it is limited to portable, handheld devices. According to Smedley (2021), thanks to characteristics such as touchscreens, mobile learning enables learning at any time and in any place. This model is built around micro-learning, which is short, focused and engaging content. Mobile learning is usually cheaper and more accessible, too, as mobile devices are so ubiquitous, making it a potential alternative to face-to-face classroom settings.

To have a meaningful impact in the classroom, teachers need a strong understanding of digital pedagogy, evolving learning theories, and the many learning styles of the twenty-first century. It is important to know how kids learn. Facilitating cognitive processes such as remembering, interpreting, applying, analysing, evaluating and creating enables educators to scaffold knowledge in a more efficient way. By scaffolding from basic recollection and understanding, teachers can produce results that stimulate creativity and innovation. The study employed the usage of the AI-mobile learning technology, Google Read Along to enhance the academic performance of pre-primary kids in Rivers State. Student engagement is a necessity for meaningful learning.

Undoubtedly, pre-primary school education was brought into the school system to help teach and create clever and self-directed students. This aspiration is almost impossible to achieve with the method teachers have been teaching at this level. If youngsters are going to continue learning, learning at this level must be exciting. The evidence is in the poor results and the lack of interest in going to school. The 21st-century pupils are digitally oriented; hence, the old way of instruction is no longer appropriate for problem-solving. This may be due to the incorrect teaching tactics adopted by the teachers. This sad state of affairs seriously threatens the possibility of reaching the goal of pre-primary school instruction. This is because the application of incorrect instructional tactics will not make the students interested in learning. However, the students will struggle to memorise the concepts and forget them soon after.

The study examined the influence of AI-Mobile Learning (Google Read Along) Tool on Pre-primary School Pupils' Performance in Rivers State. The objectives of this study were to:

1. Find out the academic performance of pre-primary school pupils when taught using AI-mobile learning (Google Read Along) Tool.
2. Investigate the academic performance of male and female pre-primary school pupils when taught using AI-mobile learning (Google Read Along) Tool.

The following research questions guided the study:

1. What is the academic performance of pre-primary school pupils when taught using AI-mobile learning (Google Read Along) tool?

2. What is the academic performance of male and female pre-primary school pupils when taught using AI-mobile learning (Google Read Along) tool?

The following hypotheses were tested

H01: There is no significant difference between the academic performance of pre-primary school pupils when taught using the AI-mobile learning (Google Read Along) tool and play-way method

H02: There is no significant difference between the academic performance of male and female pre-primary school pupils when taught using the AI-mobile learning (Google Read Along) tool

Methodology

This study utilised a quasi-experimental design, specifically incorporating a pre-test and post-test non-equivalent group structure. The sample comprised 45 pre-primary pupils from two co-educational schools, divided into an experimental group of twenty-four learners and a control group of twenty-one. Data collection involved the Language Development Performance Test (LDPT), which consisted of ten objective items. To ensure the instrument was appropriate, two specialists in Educational Technology and Early Childhood Education at Ignatius Ajuru University of Education, Port Harcourt, conducted a rigorous validation process. The reliability of the instrument was confirmed with an index of 0.76, determined through the test-retest method. The instructional methods differed between the groups, as the experimental cohort engaged with the AI-mobile learning application, while the control cohort followed the play-way method. To address the research questions, descriptive statistics, namely mean and standard deviation, were employed. Additionally, the hypotheses were evaluated at a 0.05 level of significance through the analysis of covariance (ANCOVA).

Results

Table 1: Mean and Standard deviation of pre-test and post-test performance of pre-primary school pupils when taught using AI-mobile learning (Google Read Along) tool.

Group	n	Pretest	SD	Posttest	SD	Mean Difference
AIMLT	24	69.80	3.57	75.50	7.20	5.7
PWM	21	64.60	4.52	67.80	5.60	3.2

*AIMLT = AI-mobile learning tool, PWM = play-way method

Table 1 shows the mean scores and standard deviations of the pre-test and post-test of the experimental group assigned to the AI-Mobile Learning Tool (AIMLT) and the control group assigned to the instructions thru the Play-Way Method (PWM). The experimental group (n= 24) had a pre-test mean score of 69.80 (SD= 3.57) and a post-test mean score of 75.50 (SD= 7.20), with an average increase of 5.7 points. The control group (n = 21), whereas the control group scored an average of 64.60 (SD = 4.52) on the pre-test and 67.80 (SD = 5.60) on the post-test, a mean gain of 3.2 points. The findings reveal that students taught with the use of the AI-mobile learning tool have a better academic performance on the Language Development Performance Test. The post-test mean score of this group was not only higher but they also improved more than the students who were taught using the standard play-way method.

Table 2: Mean and Standard deviation of pre-test and post-test performance of male and female pre-primary school pupils when taught using AI-mobile learning (Google Read Along) tool.

AIMLT	n	pre-test mean	SD	Post-test Mean	SD	M.G
Male	11	65.15	2.65	71.10	7.24	5.9
Female	13	71.30	4.29	75.20	7.26	3.9

MG= Mean Gain

Table 2 presents the pre-test and post-test performance metrics, including mean scores and standard deviations, for male and female pupils within the experimental group instructed using the AI-Mobile Learning (Google Read Along) Tool. The male pupils (n = 11) recorded a pre-test mean score of 65.15 (SD = 2.65) and a post-test mean score of 71.10 (SD = 7.24), which amounts to a mean gain of 5.9 points. In contrast, the female pupils (n = 13) achieved a pre-test mean of 71.30 (SD = 4.29) and a post-test mean of 75.20 (SD = 7.26), resulting in a mean gain of 3.9 points. In

summary, although female pupils maintained higher overall academic performance levels, male pupils exhibited a relatively larger positive shift following their engagement with the AI-mobile learning tool.

Hypotheses

Table 3 Analysis of Covariance (ANCOVA) on Performance of pre-primary school pupils when taught using AI-mobile learning (Google Read Along) tool and play-way method.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1145.148 ^a	2	572.574	13.726	.000
Intercept	1966.662	1	1966.662	47.147	.000
Pre-test	80.009	1	80.009	1.918	.169
Group	974.532	1	974.532	23.362	.000
Error	4296.513	52	41.714		
Total	40002.000	55			
Corrected Total	5441.660	54			

Table 3 demonstrates that an F-value of 23.362, derived from 1 and 100 degrees of freedom, resulted in a p-value of 0.000. As this figure is below the established alpha level of 0.05 ($0.000 < 0.05$), the null hypothesis is rejected. It is concluded, therefore, that a statistically significant difference exists between the academic performance of pre-primary learners instructed through the AI-mobile learning (Google Read Along) tool and those taught using the conventional play-way method.

Table 4 Analysis of Covariance (ANCOVA) on Performance of male and female pre-primary school pupils when taught using AI-mobile learning (Google Read Along) tool

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	99.649 ^a	4	24.912	.518	.723
Intercept	2493.335	1	2493.335	51.861	.000
Pretest	38.718	1	38.718	.805	.372
Group	22.323	1	22.323	.464	.497
Gender	4.685	1	4.685	.097	.756
Group * Gender	39.220	1	39.220	.816	.368
Error	5144.270	21	48.077		
Total	57145.000	24			
Corrected Total	5243.920	23			

Table 4 demonstrates that an F-value of 0.097, computed with 1 and 21 degrees of freedom, corresponds to a p-value of 0.756. Because this figure exceeds the alpha level of 0.05 ($0.756 > 0.05$), the null hypothesis is retained. It is concluded, therefore, that there is no statistically significant difference in the academic performance between male and female pre-primary pupils when they are instructed using the AI-mobile learning tool.

Discussion

The data presented in Table 1 indicate that the experimental group achieved superior outcomes. Pupils instructed via the AI-mobile learning tool, Google Read Along, attained a post-test mean score of 75.50, reflecting a mean improvement of 5.7 points. In contrast, those taught using the conventional play-way method recorded a post-test mean score of 67.80 and a mean gain of 3.2 points. Furthermore, Table 3 confirms that there is a statistically significant difference in academic performance between the cohorts taught using the AI-mobile learning tool and those instructed through the traditional play-way method. This outcome aligns with Don (2021), who concluded that students exhibit improved academic performance when taught using AI within a think-pair-share cooperative learning strategy. Similarly, Gandhi (2019) observed that student performance increases when learners engage with interactive strategies. The research conducted by Roger and Karl (2019) also demonstrated that AI-mobile learning strategies yield higher achievement and foster more positive relationships among students. These findings suggest that the use of the AI-mobile learning tool can support enhanced language development among pre-primary children. The tool appears to

assist pupils in engaging more actively with learning materials and making consistent progress in language skills. This supports the notion that interactive and technology-supported methods strengthen early language acquisition by providing repeated practice and immediate feedback in a manner that maintains the attention of young learners.

The data presented in Table 2 reveal that while female pupils achieved higher mean scores than male pupils during both the pre-test and post-test phases, male pupils demonstrated greater progress, evidenced by a mean gain of 5.9 points compared to 3.9 points for their female counterparts. Table 4 confirms that there is no statistically significant difference in academic performance between male and female pupils. This result aligns with the findings of Ikeme (2018), who noted that gender exerts no significant influence on academic progress when interactive strategies are utilised. Similarly, Jones (2023) concluded that gender does not affect performance, irrespective of the teaching method applied. However, the present results contradict those reported by Ezeugwu (2021), who found that gender significantly affects student performance when interactive teaching strategies are employed.

The results indicate that the AI-mobile learning tool produced better outcomes in language development for pre-primary pupils than the traditional play-way method. Simultaneously, the tool appears suitable for both boys and girls, even though their patterns of improvement differed slightly. These outcomes contribute to the existing knowledge regarding how technology can support young children's language acquisition within early childhood education.

Conclusion

The findings of this study demonstrate that the application of the AI-mobile learning tool, Google Read Along, exerts a significant influence on the academic performance of pre-primary pupils. Learners instructed through this technological intervention attained higher post-test scores and demonstrated more substantial improvement than those taught using the conventional play-way method. This provides compelling evidence that digital tools can enhance instructional and learning outcomes in language development at the pre-primary level. Additionally, while female pupils recorded higher mean scores than their male counterparts, the overall difference in performance between the two groups was not statistically significant. Although male pupils exhibited a marginally larger gain in scores, the evidence suggests that the AI-mobile learning tool serves as an effective resource for both boys and girls during early language acquisition. Consequently, these results reinforce the perspective that AI-driven tools provide a valuable means of strengthening language development among young children in Nigeria. By facilitating consistent progress in the Language Development Performance Test, this tool has proven to be an effective educational aid.

Recommendations

1. School proprietors should encourage educators to incorporate the AI-mobile learning tool into classroom instruction to enhance pupils' academic performance, particularly regarding language development at the pre-primary level.
2. Teacher education programs should be improved, especially on the use of AI to enhance the academic performance of students in the classroom

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