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Research Paper

Effectiveness of PEARL Mobile Application in Enhancing the Academic Performance of Students in English

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Abstract

This research aimed to test the effectiveness of the Packeted Electronically Assisted Reading Leaflets (PEARL) mobile application in enhancing students' English academic performances. The researcher gained knowledge of declining reading comprehension skills, including Grade 7 reading levels, using the Philippine Informal Reading Inventory (PHIL-IRI), the official reading material from the Department of Education. However, due to the COVID-19 pandemic, the administration of this reading inventory has been put on hold due to its inapplicability. This study was conducted with Grade 7 Calamba Bayside Integrated School students from the Division of Calamba as respondents. A quasi-experimental technique, and administration of pretest, formative, and posttest, were used in this study. As for the data collection, the respondents' pretest, formative test, and post-test scores in the experimental and controlled groups were recorded weekly. There are 22 active students participated in the study through random sampling. Next, data analysis was performed using the T-test and Pearson's formulas, respectively. Based on these findings, the researcher concluded that there was a significant difference between the pretest and posttest mean scores of the two groups, which indicates that the PEARL application is practical in enhancing English academic performance. Although there was only a medium-sized effect regarding the significant differences in the scores of the experimental group, it is concluded that several factors, like poor internet connectivity and technical difficulties, should be considered. The researcher also suggested that crafting instructional materials such as PEARL could improve students' English proficiency.

Keywords *academic performance; PHIL-IRI; PEARL; reading comprehension; technical difficulties*

INTRODUCTION

The advent of the COVID-19 pandemic has exerted tremendous effects on human activities. One of its major consequences is the educational system, which was halted due to the lockdown. As a result, as particularly reported by UNICEF, school closures, learning loss, and the increased risk of dropout were among the problems that remain unresolved.

The Philippines has been closed for over a year, requiring children to enroll in remote learning options, according to UNICEF's representative in the Philippines (UNICEF, 2021). In the same year, schools worldwide were closed for an average of 79 teaching days.

In a recent article in Cable News Network (CNN) Philippines Life, with 97.95% of the population being literate as of the third quarter of 2019, the Philippines outperformed even more developed economies like Singapore, according to the rating of United Nations Educational, Scientific, and Cultural Organization (UNESCO), which is higher in 1 goal by swiftly finding and terms of literacy than its Southeast Asian neighbors. While this is considered, the Philippines must address its deteriorating literacy rate due to the pandemic. Hence, the reason for this study was considered.

A child must learn to read, write, and count to succeed in school and life. The primary priority of the Department of Education is to improve literacy. The "Every Child A Reader Program," the department's flagship endeavor, serves as the foundation for this project, which aims to develop

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reading and writing skills in Every Filipino child in the age group, as stated in s. 14, as stated in the Department of Education (DepEd) Order No. 2018 revision of the Philippine Informal Reading Inventory. Thus, in December 2019, Malacañang stated that poor reading comprehension among Filipino students is a reality.

According to Alday (2012), e-teaching is a cutting-edge method of instruction that uses e-learning technology to empower both teachers and students and create more effective learning. The study revealed that graduate school professors are open to taking an active role in running classes in an online learning environment and are conscious of their critical role in delivering effective instruction. The university is also prepared to accept the e-teaching program.

The usage of digital technology in language acquisition by young students has become an significant concern for EFL educators, students, and other stakeholders. In the case of EFL teachers, digital technology is useful because it allows teachers to improve the quality of their instruction by supporting their students to pick up the language (EDC, 2018).

Results from the 2018 OECD PISA (Program for International Student Assessment) indicated that the internet is a nonlinear network of texts dispersed across many web pages and websites. One must comprehend the material offered in this complicated reading environment to find and learn information online. Unlike traditional printed literature, which is frequently read linearly, online reading involves browsing a network of texts where users select their paths. Readers must first access an appropriate website to properly navigate from one online page to the next. Then, users can use navigational strategies, such as various menus, tabs, and links for the main menu and submenus. In essence, reading for informational purposes on the internet calls for all the reading comprehension techniques and skills required for reading traditional printed material in a setting with significantly more information. Online reading necessitates the use of reading comprehension techniques and strategies in contexts that are very different from those found when reading traditional printed materials because of the complexity of the internet. Young children can generate text meanings in several situations by reading online. With the absence of face-to-face class interaction, it has become difficult for English teachers to assess learning among students, more so, their reading and comprehension skills, which are one of the factors in achieving academic performance. Hence, the reading comprehension skills of students, including their English academic performance, are compromised. Although alternative activities are being administered to aid the situation, the researcher still believes that they would not be sufficient to measure students' reading comprehension skills and academic performance and improve them.

Fortunately, as stated by Jamieson-Proctor et al. (2013) This is due to the fact that technology use in the classroom has a many educational areas where the use of ICT will result in successful learning with the assistance and the assistance of ICT components and elements.

This can be related to claims that globalization brings rapid developments in technology and communications with the prospect of advances in learning systems across the world. PEARL is based on the Most Essential Learning Competencies (MELCs) prescribed by the Department of Education; thus, it can be assured that the mobile application is localized.

Using the PEARL mobile application, students are expected to improve their English academic performance since this study was conducted during the pandemic. Hence, mobile learning has emerged. The effectiveness of crafted mobile applications can help improve students' academic performance.

Similarly, these forms of development and delivery have focused on short-term, small-scale pilots and trials in developed Europe, North America, and the Pacific Rim. The taxonomy emerging from these pilots and trials suggests tacit and pragmatic mobile learning conceptualizations.

With these considerations in mind, the researcher devised an interactive material that would address the needs of English teachers to gauge students' English performance and address reading

comprehension dilemmas in the New Normal. Specifically, this study sought to answer the following questions:

1. What do the pretest, formative, and post-test means?
2. Is there a significant difference between the formative test performances of the two groups of participants?
3. Is there a significant difference between the post-test scores of the two groups of participants?
4. Is there a significant difference between the pretest and post-test scores of the comparison group?
5. Is there a significant difference between the pretest and post-test scores of the experimental group?

LITERATURE REVIEW

Mobile devices are frequently used in the digital age. Social networking sites, which are becoming increasingly important with Web 2.03 technology, make it easier for teachers and students to adopt mobile devices. According to Hwang and Chang (2011), mobile learning raises students' academic standards and captures student participation. Chu et al. (2010) compared and highlighted that mobile education hurts academic achievement because of cognitive overload and inadequate learning design. This demonstrates how different mobile learning applications produce different outcomes.

The study conducted by Gikas and Grant (2013) stated that mobile learning needs to be overcome in terms of distraction, difficulty, and technical. Thus, these factors should be addressed, and solutions should be provided to mitigate concerns about mobile learning. Students' opinions of mobile devices are generally favorable, according to Chu et. al (2010) discovering.

Mobile learning tools improve learning outcomes and processes (Huang et al., 2014; Wishart, 2015). Hence, the statements of students who gained access to it proved the effectiveness of mobile learning.

In one of his studies, Karaaslan (2013) mentioned that individual factors in measuring effectiveness vary, and two characteristics mentioned are age and previous online experience. Consequently, these factors should be considered as variables in related studies. Keskin (2011), using mobile devices for education both outside and within classroom aids in students' positive attitudes toward their studies. Mobile learning increases students' motivation and interest (Ozan, 2013).

Several studies, including those by Oberer and Erkollar (2013), Kose et al. (2013), and Çelik (2012), have demonstrated that mobile learning improved academic attainment. In addition, Ozan (2013) found that learning via mobile devices is more trustworthy. However, mobile learning must address the issues raised by Gikas and Grant (2013) regarding distraction, usability, and technology obstacles.

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Wang (2015) reported that students who did Kahoot learned more and were more motivated than students who did paper quizzes.

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Moreover, according to the interviews with undergraduate students in the research projects and study in the Computer Education and Instructional Technology Department at Dokuz Eylul University, Turkey, quick information access, studying at any time and place, communicating with peers, and supporting learning are all seen as crucial elements of mobile learning. Students also stated that they would like more mobile education opportunities, employing mobile devices, for instance, for homework, more tablet computer activities, and creating animations on tablets, even though some technical difficulties with software and hardware were encountered. Mobile educational applications increase the impact of learning and enhance the learning process. These problems include sluggish Internet connection and mobile learning management system notification limitations (Huang et. al, 2014; Wishart, 2015).

Based on the problem identified, this study used PEARL to enhance the academic performance of Grade 7 English students at the Calamba Bayside Integrated School in the Philippines. The researcher plans to consider the issues encountered by the respondents using ICT-based applications to improve the PEARL mobile application, with the following hypothesis:

H1: There is no significant difference in the appraisal of students' formative test mean scores.
H2: there is no significant difference in the assessment of students' post-test mean scores
H3: there is no significant difference between the pretest and posttest mean scores of students in the Comparison group

To enhance the clarity of the study, a conceptual framework is presented in Figure 1.

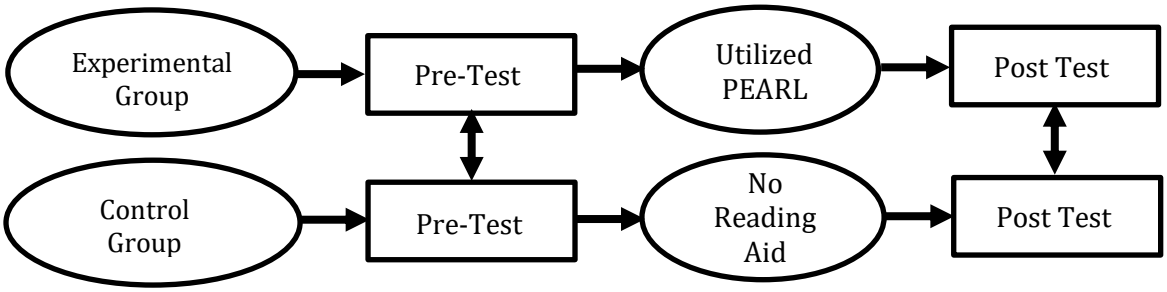

Figure 1. Conceptual Framework

RESEARCH METHOD

This study used a quasi-experimental approach to collect data to evaluate the efficacy of packaged, electronically assisted leaflets (PEARL). When it is impossible to randomly assign individuals or groups to treatment and control groups, this approach entails the development of a comparison group. According to White and Sabarwal (2014), quasi-experimental designs, like actual experiments, test causal hypotheses.

According to MacMillan and Schumacher (2001), designing quantitative research entails selecting people, data collection methods, and processes for compiling data and conducting interventions.

In particular, the researcher applied the quantitative approach in this study to quantify the effectiveness of the reading material. The quantitative approach uses data, charts, graphs, tables, or any numerical data analyzed using mathematical and statistical methods to quantify the problem and develop facts. In this study, the numerical data were obtained from the experts' assessments of the effectiveness of PEARL based on the data gathered from the pretest and posttest scores. The data were treated using descriptive methods necessary to describe the characteristics, behaviors, and various aspects of the population.

The researcher sought approval from the school head to conduct this study among Grade 7 online delivery modality (ODL) students by a formal letter. Upon approval, the pretest was administered to the participants, and the results were recorded based on their submitted outputs. The result recording process was performed in the experimental and comparison groups.

Upon approval, the pretest was administered to the participants, and the results were recorded based on their submitted outputs. The result recording process was performed in two groups: the experimental and comparison groups.

The contents of Grade 7 English modules from the Department of Education were adopted. Because this study fell under the Third Quarter period, the lessons were specifically used in weeks 6, 7, and 8. This is also because these weeks contained reading passages that can be used in the continuation of this study.

After determining the lessons to be incorporated in PEARL, an IT expert was tasked with designing the mobile application containing the lessons. The content validity of the instrument was considered during the planning phase. Face validity was also considered during this phase. PEARL was designed based on the content of the selected reading selections and lessons. The researcher also considered the colors and fonts of the infographic used in the instrument.

Participants of The Study

A match-pairing technique was used to group the respondents into experimental and control groups. The participants of this study were the ODL Grade 7 students of Calamba Bayside Integrated School S.Y. 2021-2022, which consisted of 22 active students. A small number of students were selected based on inclusive criteria like consistent attendance in the online class, prompt submission of outputs, and the availability of a reliable and strong internet connection. The remaining 22 students were those who passed the inclusion criteria for this study. Out of the results of the match-paired groups based on preliminary English proficiency, a sample of 11 students in each category was considered as participants in this study. In addition, the number of participants is small because only one section is available for those who are enrolled under the Online Delivery Learning (ODL) modality.

Research Instrument

To achieve the aims of this study, a mobile application called Packeted Electronically Assisted Reading Leaflets (PEARL). This instructional material is crafted with the help of an IT expert following the considerations stated in this study, namely, usefulness, activities, illustration, presentation, and accessibility.

The content-reading materials and lessons in PEARL were the exact reading materials and lessons found in the English 7 module, which came from the Department of Education. Since Grade 7 literature is centralized in Philippine Literature, the concept of PEARL is to introduce the Philippines to students using the devised material. The lessons in the printed modules were adapted in PEARL and converted into interactive lessons. The participants can type their answers in PEARL's provided sections and even upload their outputs. The researcher believes that in this way, the participants will become more engaged in PEARL and enhance their English academic performance.

This reading material is intended to provide an interactive reading experience for Grade 7 students by incorporating various online features. This was delivered as a mobile application that students downloaded on their Android phones. In this study, students' academic performance was determined by measuring their pretest formative and post-test scores.

The instrument used in this study consisted of comprehension questions based on the selected selections and lessons. The main instrument used in this study, PEARL, was validated by

three Master Teachers in English from various schools in the City of Calamba. The pretest was validated by the master's teacher in English of CBIS and was then pilot tested in one section of online delivery students. Then, when the validity of the pretest was confirmed, the same test was administered to the experimental group.

Research Procedure

Approval was sought by the researcher from the school head in conducting this study among Grade 7 online modality students in a formal letter. Upon approval, the pretest was administered to the participants, and the results were recorded based on their submitted outputs. The result recording process was performed in two groups: the experimental and comparison groups.

Subsequently, the experimental group of 11 students was asked to access PEARL on their gadgets to read the selection in each week's lesson and answer subsequent questions. The comparison group was required to read the selection and answer the questions using the forwarded soft copy of the English modules.

The Grade 7 English module from the Department of Education was adopted. Since this study fell under the Third Quarter period, lessons under weeks 6, 7, and 8 were specifically utilized. This is also because these weeks contained reading passages that can be used in the continuation of this study.

After determining the lessons to be incorporated into PEARL, an IT expert was consulted to craft the mobile application containing the lessons. The content validity of the instrument was considered during the planning phase. Face validity was also considered during this phase. PEARL was designed based on the content of the selected reading selections and lessons. The researcher also considered the colors and fonts of the infographic used in the instrument.

Statistical Treatment of Data

The following statistical treatments were applied in the study:

Descriptive statistics formulas for percentage, mean, and standard deviation were used to determine students' academic performance in the pretest, formative test, and post-test. The interpretations were as follows:

Table 1. Grading Scale Interpretation

Grading Scale	Descriptors
90 – 100	Excellent (PASSED)
85 – 89	Very Satisfactory (PASSED)
80 – 84	Satisfactory (PASSED)
75 – 79	Fairly Satisfactory (PASSED)
Below 75	Did not meet Expectations (FAILED)

The following statistical procedures were used in the study:

The average scores of the pretest, formative test, and posttest of the two groups were determined using their mean scores.

Since two scores came from different groups of individuals, an independent samples t-test was used to determine significant differences between the formative tests of the participants.

Since the two scores came from different groups of individuals, an independent samples t-test was used to determine significant differences between the post-test scores of the participants.

Since two scores were coming from one group of individuals, the paired samples t-test was used to determine significant differences between the pretest and posttest.

FINDINGS AND DISCUSSION

This section presents the data gathered from the respondents using tables. The data were analyzed and interpreted using tabular presentation.

Table 2. Mean pretest scores of students in the comparison and experimental groups

Group	Mean	Std. Dev.	Description Interpretation
Experimental Group	17.64	5.14	Average
Comparison Group	19.18	4.33	Average

Legend: 27 – 30 = Very High; 23 – 26 = High; 15 – 22 = Average; 9 – 14 = Low; 1 – 8 = Very Low

Table 2 shows the pre-test mean scores of the students in the comparison and experimental groups. The experimental group's mean score was 17.63, while that of the comparison group was 19.18. Therefore, the mean scores of the experimental and control groups were verbally interpreted as “Average.”

This shows the pre-test mean scores of the students in the comparison and experimental groups. As presented, the experimental group obtained a mean score of 17.63, while the comparison group obtained a mean score of 19.18. The mean scores of the experimental and control groups were therefore verbally interpreted as “Average,” which means that both groups performed well in terms of their pretest scores.

During this study, the participants in the comparison and experimental groups were eager to answer the pretest because it was an interactive material wherein they used their mobile phones to answer.

Thus, this study affirms the literature, as Oberer and Erkollar (2013) suggested, that mobile education dramatically improves academic success compared to conventional education.

Table 3. Formative test mean scores of the comparison and experimental groups

Group	Mean	Std. Dev.	Description Interpretation
Experimental Group	46.45	18.09	Average
Comparison Group	56.55	15.763	Average

Legend: 27 – 30 = Very High; 23 – 26 = High; 15 – 22 = Average; 9 – 14 = Low; 1 – 8 = Very Low

As shown in Table 3, the formative test mean scores of both groups in Table 4 obtained a descriptive interpretation of "Average," which means that during their answering formative tests, the experimental and control groups had good scores.

According to the participants in the experimental group, they found the lessons about reading engaging, so they were able to easily answer the questions in the formative test. However, the experimental group mentioned that they could access PEARL on their mobile phones although they encountered slight technical issues.

This can be supported by the citation of Hwang and Chang (2011), who stated that student engagement can be captured via mobile learning and enhance achievement. Although the experimental group encountered issues while accessing PEARL, they were still able to utilize it in their academic endeavors.

Table 4. Mean posttest scores of students in the comparison and experimental groups

Group	Mean	Std. Dev.	Description Interpretation
Experimental Group	20.82	4.87	Average
Comparison Group	23.18	3.31	Average

Legend: 27 – 30 = Very High; 23 – 26 = High; 15 – 22 = Average; 9 – 14 = Low; 1 – 8 = Very Low

Table 4 presents the mean scores of the two groups in their post-tests. The experimental group obtained 20.82, while the comparison group obtained 23.18, which was verbally interpreted as "Average."

This result is based on the findings of Ozan (2013) that mobile devices positively impact student performance. In this study, it was found that animations created by the mobile learning group were more competent. This outcome validates the additional research findings by Ozan (2013) and Huang et al., (2014).

Although the result of the post-test scores of the two groups is both “Average”, it is observed that the experimental group obtained a lower mean score than the comparison group. This is because, according to the participants, they encountered some technical issues like the loss of Internet connectivity and inconvenience in the use of the PEARL mobile application; thus, they were not able to submit their answers on time, which resulted in them getting low scores.

Table 5. Test of significant difference between mean formative test scores of the two groups

Group	Mean	Mean Difference	t-value	p-value
Experimental Group	46.45	10.10	1.395	0.178
Comparison Group	56.55			

Table 5 shows the significant differences between the two groups. The result shows that we accept the null hypothesis because there is no significant difference in the appraisal of students’ mean formative test scores.

Therefore, the finding of Yilmaz and Akpinar (2011) mobile devices may become a necessity for students and educators is affirmed in this study. Mobile gadgets may become essential for educators and students. Additionally, as mentioned in the previous test results of the two groups, although both earned “Average” mean scores in their formative tests, the comparison group obtained a higher mean score. This is because the participants of such a group were able to access the module conveniently compared to that of the experimental group who encountered technical issues with the PEARL mobile application for the first time using the application.

Additionally, as mentioned in the previous test results of the two groups, although both of them earned “Average” mean scores in their formative tests, the comparison group obtained a higher mean score. This is because the participants of such a group were able to access the module conveniently compared to that of the experimental group who encountered technical issues with the PEARL mobile application for the first time using the application.

Table 6. Test of significant difference between post-test mean scores of the two groups

Group	Mean	Mean Difference	t-value	p-value
Experimental Group	20.82	2.36	1.330	0.178
Comparison Group	23.18			

df=20

As shown in Table 6, the independent sample t-test was conducted to compare the post-test mean scores of the students in the comparison and experimental groups. Having 20 as the degree of freedom, a t-value of 1.330 and a p-value of 0.198 were identified. Since the value obtained is greater than the 0.05 significance level, the null hypothesis is accepted, which means that there is no significant difference in the assessment of students' post-test mean scores.

According to Chu et al. (2010), students have favorable opinions about mobile learning. The findings of this study corroborate those of earlier studies (Demir & Akpinar, 2018), which found that both groups perceived mobile learning. '

These findings are affirmed in this study because the scores of both groups were considered averages. The experimental group obtained a lower mean score than the comparison group in their post-test scores, though both are verbally interpreted as "Average."

Table 7. Test of significant difference between pretest and posttest mean scores of each group

Group	Test	Mean	Mean Difference	t-value	Cohen's d
Comparison Group	Pretest	19.18	4.00	3.359**	1.04 (Large)
	Posttest	23.18			
Experimental Group	Pretest	17.64	3.18	4.474**	0.64 (Medium)
	Posttest	20.82			

As shown in Table 2, regarding the t-test conducted for the comparison group's pretest and post-test, a t-value of 3.359 was identified. In a degree of freedom of 10, set at a 0.01 significance level, this may be considered significant because 3.359 is greater than 3.169 Table 6. On the other hand, Cohen's d of 1.04 indicates significance at a large effect size. Hence, the null hypothesis is rejected, meaning that there is a significant difference between the pretest and posttest mean scores of students in the Comparison group at a large effect size. Ozan (2013) confirmed these findings, stating that the incorporation of mobile devices into classroom settings enhances students' interest and motivation and motivates them to engage in educational activities. Based on the results of the experimental group's pretest and posttest, the students' interest in the application.

The t-test conducted on the Experimental group's pretest and post-test identified a t value of

4.474. On the other hand, Cohen's d of 1.04 indicates significance at a medium effect size. Hwang and Chang (2011) stated that mobile learning captures student engagement and improves performance. On the other hand, Chu et. al (2010) underlined that cognitive overload and inadequate learning design cause mobile learning to have a harmful impact on academic attainment. Additionally, according to the research conducted by Gikas and Grant (2013), distractibility, usability issues, and technological difficulties are obstacles that need to be fixed in mobile learning, affirming the findings of this study.

In this study, the issues and problems stated were experienced by the participants, which affected their performance.

Additionally, in a study by Huang et al. (2014) and Wishart (2015) revealed that student interviews revealed that easy access to information, anytime and anywhere, studying, communicating with friends, and facilitating learning were key features of mobile learning.

Although mobile learning tools improve learning outcomes and learning processes, students also stressed that they would like more mobile learning experiences, such as doing homework on mobile devices, participating in more tablet computer activities, and creating animations on tablets. However, some technical problems were encountered with the software and hardware. These problems included the mobile learning management system's notification limitations and poor internet connection.

CONCLUSIONS

This study concluded that using the PEARL mobile application helped students improve their English academic performance. Moreover, although the students in the experimental group encountered technical difficulties when using the application, which affected the results of this study, they showed a significant improvement in their scores. This signifies that the proposed PEARL mobile application is effective.

Moreover, based on the obtained data through this study, there are some limitations in the context of the PEARL mobile application itself, which make it possible that even though this mobile application provides a great impact, the development from this application, or any other application with similar features like PEARL, can develop and improve to make the impact more optimal:

1. Online-Related Activities and Classes: The PEARL mobile application is primarily designed for online activities and classes. Therefore, its effectiveness may be limited to environments in which online learning is the primary mode of instruction. The application may not be practical or applicable in traditional classroom settings.
2. Compatible Devices: Another limitation is that the PEARL mobile application may only be compatible with specific devices. If students do not have access to these specific devices, they may be unable to use the application, thus limiting its effectiveness.

LIMITATION & FURTHER RESEARCH

This study has limitations to some participants under the online delivery modality (ODL) and the compatibility of the mobile application with their gadgets. Further research should broaden the scope of similar studies by increasing the number of respondents. In addition, they can extend the research test by considering the technical difficulties stated.

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