



**ENHANCING EARLY CHILDHOOD'S ENGLISH VOCABULARY AT TK
'AISYIYAH BUSTANUL ATHFAL MERDUATI BANDA ACEH THROUGH
DUOLINGO ABC APPLICATION**

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Abstrak

Penelitian ini mengkaji efektivitas aplikasi Duolingo ABC dalam meningkatkan penguasaan kosakata Bahasa Inggris pada peserta didik usia dini di TK 'Aisyiyah Bustanul Athfal Merduati Banda Aceh, Indonesia. Dengan menggunakan desain eksperimen murni (*true experimental design*) berupa kerangka kelompok kontrol dengan Pre-test dan Post-tests, penelitian ini melibatkan 32 siswa taman kanak-kanak yang dibagi menjadi dua kelompok, yaitu kelas eksperimen (B-1, n=16) dan kelas kontrol (B-2, n=16). Kelompok eksperimen menerima pembelajaran kosakata menggunakan aplikasi Duolingo ABC sebagai media pembelajaran digital, sedangkan kelompok kontrol diajarkan melalui alat peraga visual konvensional, yaitu boneka tangan dan gambar. Materi pembelajaran mencakup dua tema utama, yaitu kosakata dasar (alfabet, nama-nama buah, dan nama-nama hewan) serta kalimat dasar (kalimat nominal dan kalimat verbal), yang dilaksanakan dalam sepuluh pertemuan. Data dianalisis menggunakan statistik deskriptif dan uji-t sampel berpasangan (*paired-sample t-test*) melalui program SPSS. Hasil penelitian menunjukkan bahwa kelompok eksperimen memperoleh rata-rata skor pascauji yang jauh lebih tinggi ($M = 96,88$; $SD = 4,79$) dibandingkan kelompok kontrol ($M = 78,75$; $SD = 7,19$), dengan perbedaan yang signifikan secara statistik (Sig. 2-tailed = 0,000; $p < 0,05$). Temuan ini membuktikan bahwa pengintegrasian aplikasi Duolingo ABC sebagai alat pembelajaran berbasis teknologi secara signifikan meningkatkan penguasaan kosakata bahasa Inggris siswa dan mendorong hasil belajar yang lebih konsisten di antara para peserta didik. Penelitian ini memberikan bukti empiris yang mendukung penerapan aplikasi pembelajaran digital berbasis gamifikasi dalam pendidikan bahasa Inggris anak usia dini.

Kata kunci: *Kosa Kata, Duolingo ABC, Aplikasi, Anak Usia Dini, Pembelajaran Bahasa Inggris.*

Abstract

This study examines the effectiveness of the Duolingo ABC application in improving English vocabulary mastery among early childhood learners at 'Aisyiyah Bustanul Athfal Merduati Kindergarten in Banda Aceh, Indonesia. Using a true experimental design with a control group framework and pre-tests and post-tests, this study involved 32 kindergarten students divided into two groups: the experimental class (B-1, n=16) and the control class (B-2, n=16). The experimental group received vocabulary instruction using the Duolingo ABC application as a digital learning medium, while the control group was taught through conventional visual aids, namely hand puppets and pictures. The learning materials covered two main themes: basic vocabulary (the alphabet, names of fruits, and names of animals) and basic sentences (nominal sentences and verbal sentences), which were implemented over ten sessions. Data were





analyzed using descriptive statistics and paired-sample t-tests in SPSS. The results showed that the experimental group achieved a significantly higher average post-test score ($M = 96.88$; $SD = 4.79$) than the control group ($M = 78.75$; $SD = 7.19$), with a statistically significant difference (Sig. 2-tailed = 0.000; $p < 0.05$). These findings demonstrate that integrating the Duolingo ABC app as a technology-based learning tool significantly improves students' English vocabulary mastery and promotes more consistent learning outcomes among learners. This study provides empirical evidence supporting the implementation of gamification-based digital learning apps in early childhood English education.

Keywords: Vocabulary, Duolingo ABC, Apps, Early Childhood, English Learning.

INTRODUCTION

The rapid development of technology in the era of Industrial Revolution 4.0 has significantly transformed various aspects of human life, including education. As Danuri (2019) noted, technological progress continues to develop from the era of agricultural technology to information and communication technology. In the field of education, this technological advancement has opened new possibilities for more effective and engaging learning methods, particularly in foreign language learning (Danuri, 2019).

English as an international language become a compulsory subject for students in Indonesia at various educational levels. However, many students find English a difficult language to learn, particularly due to differences in pronunciation and structure compared to the Indonesian language (Handini, Nurhasanah & Panly, 2022). One of the foundational aspects of English language learning is vocabulary mastery. As (Guaqueta & Castro-garces, 2018) emphasized, vocabulary is the key component in language learning; without mastering the vocabulary of the target language, it will be difficult for learners to hold oral or written communication, comprehend a text, or compose a written piece.

Vocabulary learning at an early age is particularly important as it forms the foundation for future language development. Students at kindergarten level, such as those at TK Aisyiyah Banda Aceh, are at a critical stage of language acquisition where engaging and appropriate learning media can greatly support their language development. At this stage, learning media that are fun, interactive, and accessible are essential to maintaining young learners' motivation and attention.

The advancement of Artificial Intelligence (AI) has given rise to various educational applications designed to support language learning. One prominent example is Duolingo, a free language-learning platform that can be accessed through the web or as a mobile application. Duolingo is supported by artificial intelligence technology and is designed to be entertaining, resembling a game, so that learners' brains can more easily absorb new material (Widyaastuti & Kusumadewi 2018., n.d.). According to Aulia, Wahjuningsih, and Andayani (2020), Duolingo has approximately 300 million learners worldwide and continues to grow, indicating its popularity as a language learning tool. Luis von Ahn is a Guatemalan-American entrepreneur and software developer, best known as the co-founder and CEO of *Duolingo* and the founder of *reCAPTCHA*, which was acquired by Google in 2009. Through these achievements, he became widely recognized as a leading figure in the world of crowdsourcing. Born on August 19, 1978, in Guatemala City, Von Ahn grew up during a period of civil conflict and witnessed deep inequalities in access to education. His early experiences left a lasting impression on him, particularly the reality that quality schooling was available only to those with financial means. After earning a bachelor's degree in mathematics from Duke



University in 2000, Von Ahn pursued a doctorate at Carnegie Mellon University, completing it in 2005. In 2009, von Ahn, along with his graduate student Severin Hacker, began developing Duolingo, a free language-learning platform. The beta version launched in November 2011, and the public app was released in June 2012.

Duolingo incorporates gamification elements into its language learning activities. Gamification, as defined by Kapp (2012, as cited in Aulia et al., 2020), is a practice that uses game-based methods and game thinking to engage people, motivate action, promote learning, and solve problems. Features such as skill trees, leaderboards, point systems, and various exercise types make the learning process more engaging and motivating for learners of all ages. The Duolingo application is available on iOS, Android, and Windows operating systems, making it easily accessible to students and teachers (Crowther et al., 2017).

Several studies have confirmed the effectiveness of Duolingo in supporting English language learning. Aulia (2020) conducted a quasi-experimental study involving eighth-grade students at a junior high school in Jember and found a significant effect of Duolingo on students' vocabulary mastery (Aulia, 2020). The experimental group that used Duolingo obtained a mean score of 84.69, which was higher than the control group's mean score of 80.78, with a significance value of 0.017, which is below the threshold of 0.05. Similarly, Handini, Nurhasanah, and Panly (2022) investigated the use of Duolingo at the university level and reported that students in the experimental class showed significantly better performance in speaking and listening skills compared to the control class, with a significance value of $0.000 < 0.05$. (Handini, Nurhasanah & Panly, 2022)

One of the most compelling arguments emerging from the study by Suryanto (2024) concerns Duolingo's capacity to extend English language learning beyond the boundaries of formal classroom instruction. The findings revealed a unanimous positive response among all 15 respondents, indicating that the application effectively motivated students to engage in self-directed learning outside structured academic settings. This phenomenon reflects a broader shift in contemporary language pedagogy, wherein mobile-assisted language learning (MALL) tools serve not merely as supplementary instruments, but as primary drivers of autonomous learning behavior (Suryanto, 2024). Furthermore, Suryanto (2024) observed that FGD participants explicitly noted that Duolingo motivated them to study during their free time, a behavioral pattern consistent with findings from Loewen et al. (2019), whose Duolingo case study demonstrated that learners frequently engaged with the application outside scheduled class hours. This spontaneous, context-independent engagement represents a qualitative shift in learner behavior that traditional classroom instruction rarely achieves (Loewen et al., 2019)

Despite the growing body of research supporting the effectiveness of Duolingo in English language learning, most existing studies focus on secondary and tertiary education levels. There is still limited research exploring the use of Duolingo at the early childhood or kindergarten level, including in Indonesia. TK Aisyiyah Banda Aceh, as an early childhood educational institution, faces the challenge of introducing English vocabulary to young learners in an engaging and age-appropriate manner. Given the potential of digital learning applications to attract and maintain young children's interest, exploring the use of Duolingo at this educational level is both relevant and necessary.

Based on the background described above, this study aims to investigate the use of the *Duolingo application* to enhance students' vocabulary at TK 'Aisyiyah Bustanul Athfal Merduati Banda Aceh. It is expected that the findings of this study will contribute to the body



of knowledge on the use of technology-based media in early childhood English vocabulary learning.

METHOD

The reasearch used experimental method. Experimental research defined as the situation in which one observes the relationship between two variables by deliberately producing a change in one and looking to see whether this alteration produces a change in other (Brown & Rodgers, 2002). In other words, it can be inferred that the experimental study tries to describe and to test the effectiveness of one method into another method. In line with this, the researcher intends to conduct research related to experimental study.

In conducting the research, the writer used a quantitative method under the true experimental design (using pre-test and post-test and control group design). Creswell (2014) in his book *Research Design (Qualitative, Quantitative and Mixed Methods Approaches)* explained that the experimental design involves two groups of students, namely the experimental and the control group. Both of groups are taken as the examined group. A control group refers to a group of students who have the same experienced as well as the experimental group with the exception that the control group does not receive the treatments. Meanwhile, the control group is needed for comparison purposes. Both groups are administered both pre-test and post-test, but the treatment only provided only to the experimental group. It was given to find out the effect of Duolingo ABC Application in developing students' vocabulary. (Creswell, 2023)

Teaching experiment was conducted to apply Duolingo ABC Application in teaching vocabulary which was accomplished in ten meetings. The allocated time for each meeting was 30 minutes. There were two classes that are selected, B-1 as the experimental class and B-2 as the control class. Both of classes consisted of 16 students. The students of experimental groups were taught vocabulary by using Duolingo ABC Application as digital aid. Whereas, the control group was treated by using *Puppet* and Picture as a visual aid. Teaching materials that used in teaching both groups were same. The materials broadly divided into two main theme that are Basic Vocabulary (Alphabet, Name of Fruits and Name of Animals) and Basic Sentence (Nomimal and verbal sentence).

Based on the true experimental design, the research design of this study can be illustrated as follows :

Tabel.1 Experimental Design

Sample	Pre-test	Treatment	Post-test
<i>Experimental Group</i>	O_1	X	O_2
<i>Control Group</i>	O_1		O_2

Notes:

O_1 = Pre-test

O_2 = Post-test

X = Treatment (Sugiyono, 2018)

RESULT AND DISCUSSIONS

Pre-test was distributed in order to determine the students' capability of vocabulary mastery before learning and to know the level of the students' vocabulary mastery before learning through Duolingo ABC Application. After introducing session, the writer began to





start the study by giving the pre-test. It was used in order to measure the students' vocabulary mastery in learning English before applying the application. Beside giving the pre-test, before presenting the main material, the researcher conducted an initial exploration of the learners' prior knowledge related to English vocabulary, specifically on the theme Names of Animals. This exploratory activity utilizes hand puppets as a contextual learning tool, which effectively enhances active engagement and enthusiasm among learners.

There are sixteen copies of the educational materials covering the four main themes Apple, Bat, Cat, and Duck were created by the researcher and given to the students. Each topic is integrated and includes three learning components: the alphabet, the names of fruits, the names of animals, and the basic sentence. The writer scored 5 points for the right answer and 0 point for the wrong answer. If the students could answer all questions, the students would get 100 points. Experimental teaching was started in five meeting. The result of pre-test and post-test of experimental class can be displayed such as follows :

Table.2 The result of The Students' Proficiency of Vocabulary before and after learning through Duolingo ABC Application in Experimental Class

NO.	STUDENTS' INITIAL	PRE-TEST	POST TEST
1.	IF	60	100
2.	HR	90	100
3.	N	80	100
4.	MA	60	90
5.	AB	60	90
6.	HJ	60	90
7.	TH	80	100
8.	BG	70	100
9.	RF	80	100
10.	DV	60	90
11.	M	60	90
12.	ZD	60	100
13.	MY	100	100
14.	ZD	100	90
15.	MD	100	90
16.	RN	70	100



In analyzing the data, this research used quantitative data analysis. After collecting all the data from experimental group and control group, the writer distributed the result of data in table of frequency and analyzed the data by using suitable statistical procedure which contains mean, standard deviation, and t-test.

Table 3. The Statistical Result of Pre-test dan Post-test of Students in Control Class

Test	Mean	SD	Sig (2-Tailed)
Pre-Test	70,62	7,72	0,000
Post-Test	78,75	7,19	

Source: Data of SPSS

Based on table 4.1, it shows that the mean score (average) of the pre-test and post-test results in the control class is an average score of 70,62 (pre-test), after teaching English vocabulary using Puppet as the media, the score was 78,75 (post-test). It can be concluded that student scores tend to increase. The Significant test shows a value of 0,000, which means there is a highly significant relationship between teaching vocabulary using visual aid (Puppet and Picture) and students' vocabulary mastery.

Table 4. The Statistical Result of Pre-test dan Post-test of Students in Experimental Class

Penilaian	Mean	SD	Sig (2-Tailed)
Pre-Test	73,12	14,01	0,000
Post-Test	96	5,7	

From the table above, it can be inferred that mean score of students in Experimental class is around 73,12 for pre-test and 96 for post-test. Meanwhile the rate of Standar Deviation in pre-test is 14,01, then for post-test is 5,7. The level of significance both test is about 0,000 which can be interpreted that there is a relation between teaching vocabulary and Duolingo ABC Application as digital aid in learning process and it has highest significance.

A paired t-test was conducted to discover the differences both in control and in experimental groups score before and after giving the treatment. It was also to know the extent effect of Duolingo ABC Application as digital media in facilitating the students' in learning vocabulary. The gain score was calculated for both groups by subtracting students' pre-test scores from their post-test scores. The table below presents the pair test of post-test in both group (control and experimental group):

Table 5. Paired-test Post-test in both Groups (Control and Experimental)

Penilaian	Mean	SD	Sig (2-Tailed)
Post-Test Kontrol	78,75	7,19	0,000
Post-Test Eksperimen	96,88	4,79	

The data in the table above shows a comparison of post-test scores in the control class and post-test scores in the experimental class. From these data, it can be concluded that the average score in the control class is 78,75, while the average post-test score in the experimental class is 96,88. The results of the significance test show that there is a very significant comparison between the post-test results in the control class and the experimental class.

Besides, the data presented in the table above provide a comprehensive comparison of post-test scores obtained by students in both the control class and the experimental class following the completion of the instructional treatment. A careful examination of these results



reveals a substantial and meaningful difference in academic performance between the two groups. Specifically, the control class recorded a mean post-test score of 78.75 with a standard deviation of 7.19, indicating a moderate level of score variability among its students. In contrast, the experimental class achieved a considerably higher mean post-test score of 96.88, accompanied by a markedly lower standard deviation of 4.79, which reflects a greater degree of consistency and uniformity in student performance within that group.

The disparity between the two mean scores, amounting to approximately 18.13 points, strongly suggests that the instructional intervention introduced in the experimental class produced a significantly more favorable learning outcome compared to the conventional approach applied in the control class. This substantial difference in mean scores further implies that the utilization of the *Duolingo ABC* application as a primary instructional medium was instrumental in enhancing students' English vocabulary mastery at a notably higher level.

Moreover, the results of the statistical significance test yielded a *Sig.* (2-tailed) value of 0.000, which falls well below the established threshold of 0.05 ($p < 0.05$). This outcome confirms that the observed difference in post-test performance between the control class and the experimental class is statistically significant and is unlikely to have occurred by chance. Consequently, these findings provide robust empirical support for the conclusion that the implementation of the *Duolingo ABC* application as a technology-based instructional tool yielded a demonstrably superior and statistically verifiable impact on students' English language learning outcomes, thereby validating its effectiveness as an innovative pedagogical intervention in the context of early English language education.

CONCLUSION AND SUGGESTION

Conclusion

Based on the findings of the present study, several significant conclusions can be drawn regarding the effectiveness of the *Duolingo ABC* application as an instructional medium in enhancing English vocabulary acquisition among young learners. The statistical analysis conducted through a paired-sample t-test demonstrated a substantial and meaningful difference in post-test performance between the control group and the experimental group, with mean scores of 78.75 and 96.88, respectively. The significance value of 0.000 ($p < 0.05$) further confirms that this difference is statistically significant, thereby providing strong empirical evidence in support of the research hypothesis.

The results of this study conclusively indicate that the implementation of the *Duolingo ABC* application as a technology-based instructional tool had a significantly positive impact on students' English vocabulary mastery, particularly in the domains of alphabet recognition, name of fruits, name of animals, and basic sentence construction. The notably lower standard deviation recorded in the experimental group (4.79) compared to that of the control group (7.19) further suggests that the application promoted more consistent and equitable learning outcomes across all participating students, regardless of individual differences in prior knowledge.

In light of these findings, it can be affirmed that the integration of digital learning applications such as *Duolingo ABC* into early English language instruction represents a highly effective and evidence-based pedagogical approach. The application's interactive, thematic, and visually engaging features were instrumental in fostering active student participation, sustaining learner motivation, and facilitating the meaningful acquisition of foundational English language competencies. These outcomes are consistent with the principles of



experiential learning and technology-enhanced language instruction, both of which emphasize the critical role of contextual, engaging, and learner-centered approaches in optimizing language learning outcomes.

Therefore, it is recommended that educators and educational policymakers give serious consideration to the broader adoption and integration of application-based learning tools, particularly *Duolingo ABC*, within the curriculum of early English language education. Future research may further explore the long-term retention effects of such digital interventions, as well as their applicability across diverse learning contexts and student populations, in order to strengthen the empirical foundation for technology-enhanced English language pedagogy.

Suggestion

In light of the findings and conclusions drawn from the present study, several suggestions are put forward for various stakeholders, including educators, school administrators, educational policymakers, and future researchers, with the aim of maximizing the potential benefits of technology-based instructional media in early English language education.

1. Suggestions for Teachers

It is strongly recommended that English language teachers at the elementary level actively integrate digital learning applications, particularly *Duolingo ABC*, into their daily instructional practices as a supplementary or primary teaching medium. Given the demonstrated effectiveness of this application in enhancing students' English vocabulary acquisition, teachers are encouraged to design thematic and interactive lesson plans that leverage the gamified and visually stimulating features of *Duolingo ABC* to sustain learner motivation and engagement. Furthermore, teachers should continuously update their technological literacy and pedagogical competencies in order to optimize the utilization of digital tools within the classroom setting.

2. Suggestions for School Administrators

School administrators and principals are advised to provide adequate institutional support for the implementation of technology-enhanced learning approaches by ensuring the availability of essential digital infrastructure, including reliable internet connectivity, projectors, laptops, and other supporting devices. Additionally, school administrators are encouraged to facilitate regular professional development programs and training workshops for teachers, focusing on the effective and purposeful integration of educational technology into English language instruction at the foundational level.

3. Suggestions for Educational Policymakers

Educational policymakers at both the regional and national levels are urged to consider the formal incorporation of technology-based instructional media, such as *Duolingo ABC*, into the official curriculum framework for early English language education. Policy initiatives that promote digital literacy and technology-enhanced pedagogy should be prioritized, particularly in underserved and resource-limited educational settings, in order to ensure equitable access to innovative and effective learning tools for all students across diverse socioeconomic backgrounds.

4. Suggestions for Future Researchers

While the present study has provided compelling evidence of the effectiveness of the *Duolingo ABC* application in improving English vocabulary acquisition within a specific instructional context, several avenues for further investigation remain to be explored. Future



researchers are encouraged to conduct longitudinal studies that examine the long-term retention and durability of vocabulary gains achieved through the use of *Duolingo ABC*, as short-term improvements may not necessarily reflect sustained learning outcomes over an extended period of time. Moreover, subsequent studies may consider expanding the scope of investigation to encompass larger and more diverse sample populations across different grade levels, geographic regions, and school types, in order to enhance the generalizability and external validity of the findings. Future research may also explore the comparative effectiveness of *Duolingo ABC* relative to other digital language learning platforms, as well as its potential impact on broader language competencies beyond vocabulary, including reading comprehension, listening skills, speaking fluency, and writing proficiency. Finally, mixed-methods research designs that combine quantitative statistical analysis with qualitative data collection such as classroom observations, student interviews, and teacher reflections would provide a more holistic and nuanced understanding of the pedagogical processes and contextual factors that contribute to the effectiveness of technology-enhanced English language instruction at the foundational level.

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