

EXPLORING THE POTENTIALS OF DIGITAL FLASHCARDS IN TEACHING VOCABULARY TO LEARNERS OF ENGLISH AS A SECOND LANGUAGE

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Abstract

The present study aimed to examine the impact of digital flashcards on students' academic performance in the domain of English vocabulary acquisition. The research employed a quasi-experimental methodology known as the non-equivalent control group design. The study's population consisted of 100-level students enrolled in the Agricultural Economics programme at Prince Abubakar Audu University, Anyigba, during the 2022–2023 academic sessions. The sample for the study consisted of 122 students, including 58 males and 64 females, who were selected using the purposive sampling approach. The participants were randomly assigned to treatment and control groups using a balloting procedure. The experimental group received instruction using digital flashcards, whereas the control group received instruction using the standard lecture technique. The data gathering tool utilised in this study was a researcher-developed assessment known as the "University Students Vocabulary Knowledge Achievement Test (USVKAT)." The instrument underwent a validation process conducted by three specialists affiliated with Prince Abubakar Audu University, Anyigba. The reliability coefficient was determined using Cronbach's alpha reliability, resulting in a value of 0.86. The data that was gathered was subjected to analysis utilising statistical measures such as the mean, standard deviation, and analysis of covariance (ANCOVA). This analytical approach was employed in order to address the study issue and evaluate the hypotheses. The hypotheses were evaluated using a significance threshold of 0.05 ($\alpha = 0.05$). The study's results indicate that while girls outperformed males in English vocabulary acquisition with the use of digital flashcards, there is no statistically significant disparity in the average accomplishment between the two genders. Based on the aforementioned findings, it is recommended by the research that Nigeria's educational system should adopt digital classrooms that are both engaging and pertinent to the daily lives of learners.

Keywords: Mobile-assisted vocabulary learning, academic vocabulary, digital flashcards, English language

Introduction

Technological advancements have opened new areas to use English language as the main medium for communication both for personal and advanced academic needs and these new uses create new challenge for English language teachers to introduce, use, analyze and teach to learners (Omachonu, 2021). To overcome this challenge, English language curriculum and teachers should be able to help learners to function as successful members in the globalized digital World. To flow along with this globalized digital world therefore, there is need to address the needs of non-native English speakers who must study in their various areas of discipline in English. Discipline-specific academic wordlists must be developed in light of recent critical perspectives on the utility of a generic academic vocabulary. Interestingly, Information and Communication Technology (ICT) has advanced quickly over the past two decades, dramatically altering not only how individuals interact but also how they learn to communicate via digital platforms. There is no doubt that millions of people across the world now use information and communication technology (ICT) on regular basis for different reasons Omachonu & Akanya, 2019). This rise in digitization has dramatically changed classroom instructions (Garca-Botero et al., 2021). Godwin-Jones (2017) avers that the use of smart phones as complimentary connections with other internet facilities have made smart phones partners for many people. Mobile-language learnings are now common determinants relied on by language educators for classroom instructions (Alamer & Al Khateeb, 2021). This is because it helps learners to learn in real life context.

There are plethora of researches on the use of mobile applications, specifically Digital Flashcards (DFs), for vocabulary learning in English. The findings of these researches are interesting as they points to the fact that DFs for vocabulary learning has significant positive influence on students' learning (Ascroft et al. 2016; Altiner, 2019; Zung et al. 2021). Webb and Nation (2017) assert that to learn a language, one must master its vocabulary. Knowledge of vocabulary is the base of language use because on it relies discourse. Without knowledge of the vocabulary of a language, there will be little success in language learning especially in a second language situation. Research efforts are therefore required to determine the best methods to help L2 learners acquire the vocabulary of the target language. Coxhead (2019) opines that the use of latent lexicons in regular conversations is an uphill task. This is why some researchers recommended the use of new technologies for vocabulary teaching to help assuage the burdens on both teachers and learners of English as a second language (Soyooof et al., 2021).

Words are the building blocks of language, and vocabulary knowledge is thus a crucial part of language learning. Technical vocabulary, or words and phrases that

are mainly used in a specific profession, trade, or subject area is an essential part of the language of that discipline and an important tool for professional communication (Skarpaas & Rodnes, 2022). This is why this study aims to investigate the effect of digital flashcards on students' achievement in English as a second language. Students who are familiar with the terms used in academic vocabulary do not need to ponder about them for very long. All they need to do is employ them naturally. For students to master the academic vocabulary, it is crucial for the teacher to use dynamic and technology-driven teaching strategy to teach students, hence the need for this study. It is the researcher's hope that this study will add to the knowledge base and literature on the use of digital flashcards for vocabulary learning in English as a second language in Nigeria.

Learning a second language entails picking up new terms commonly referred to as vocabulary. Understanding a word's meaning is a fundamental requirement for learning a language. Khan (2016) sees vocabulary knowledge as a crucial tool for second language learning since a lack of it prevents effective communication. On the other hand, a limited vocabulary prevents students from using the appropriate grammar and this may lead to communication breakdown. Wilkins (1972, p. 97) wrote that: "There is not much value in being able to produce grammatical sentences if one does not have the vocabulary that is needed to convey what one wishes to say... Without vocabulary, nothing can be said; without grammar, very little can." These indicate that improving vocabulary and communicative skills in English is essential in helping learners recognize pertinent "linguistic features" and "translinguistic structures" in their communication (Viera, 2016). According to Chang and Millet (2014), a word needs constant repetition for the learner to remember it. In addition to repetition, the word's context, the learner's language proficiency, the methods and strategies employed in the learning process, as well as the calibre of the teacher are crucial considerations for any word to be permanently stored in the mind (Hu & Deng, 2007). The mastery of the vocabulary of any language is therefore crucial for its effective learning. This is because the use of vocabulary enhances one's spoken and written communication.

A collection of medium-frequency terms known as academic vocabulary is mostly used to describe abstract concepts and procedures in academic discourse (Coxhead, 2019). According to Gardner and Davies (2014), mastering these terms is essential for developing academic literacy in general as well as for comprehending and producing academic writing. According to research, academic vocabulary presents significant learning difficulties for students who are both native English speakers and English as a second language (ESL) learners (Spencer et al., 2017). As a result, a variety of key academic word lists have been created for university students to use when setting vocabulary acquisition objectives due to their significance and vital role in academic discourse (Browne et al., 2013). The Academic Word List

(AWL), developed by Coxhead (2000), has served as a valuable resource for vocabulary instruction, material creation, and vocabulary evaluation in English for Academic Purposes (EAP) courses. Nevertheless, an increasing body of research examining the presence of the Academic Word List (AWL) in various academic corpora has started to challenge its status as the predominant source of essential academic vocabulary applicable across diverse fields (Hyland and Tse, 2007; Gardner and Davies, 2014; Masrai and Milton, 2018). In response to the limitations of the Academic Word List (AWL), two significant academic word lists have been developed in recent years: the Academic Vocabulary List (AVL) by Gardner and Davies (2014) and the New Academic Word List (NAWL) by Browne et al. (2013). Furthermore, the use of pedagogically advantageous units for operationalizing academic vocabulary was shown to have significant advantages, as evidenced by the remarkable improvements observed in the covering of academic texts (Brown et al., 2020). Browne et al. (2013) utilised a segment of the Cambridge English Corpus, including a total of 288 million words, in order to construct the New Academic Word List (NAWL), which consists of 960 terms. Proficiency in the vocabulary encompassed by the NAWL has significant importance for students at the university level, therefore making it a more appropriate goal for the pursuit of vocabulary acquisition.

Mobile-assisted language learning (MALL) has been the focus of researches lately (e.g., Chen et al., 2020; Nazari and Xodabande, 2021; Rassaei, 2021; Burston and Giannakou, 2021; Dashtestani and Hojatpanah, 2021). Researchers have employed different strategies to teach ESL/EFL vocabulary (Mahdi, 2017; Lin and Lin, 2019). The use of mobile applications is one of the strategies studied as an effective way of improving students' knowledge of vocabulary. According to the findings of researchers such as Mahdi (2017); Xodabande (2017); Lin and Lin (2019) and Soyoof et al. (2021), the use of mobile applications considerably improved the vocabulary knowledge of EFL learners. A growing number of studies have also examined the benefits of using mobile applications that are designed to look like digital flashcards (DFs) to learn vocabulary. Researchers such as Seibert, Hanson and Brown (2020); Xodabande and Atai (2020); Yüksel et al. (2020); Zhang et al. (2021); Xodabande et al. (2022) all found that the incorporation of DFs into language teaching curricula appears to hold promise for the instruction of academic vocabulary. Additionally, by utilizing digital flashcards, language teachers can develop targeted content and opportunities to "support learners' self-directed study efforts and help them consolidate their vocabulary knowledge" (Yüksel et al., 2020, p. 2), thereby elevating learners' agency in holding themselves accountable for the progress in learning.

In a quasi-experimental study, Yüksel et al. (2020) used data from the pre-treatment survey, two technical vocabulary examinations, and the post-treatment survey to

examine the effectiveness of DFs (i.e., Quizlet) and wordlists on 57 undergraduate pharmacy students' technical word learning over 10 weeks. The outcomes demonstrated a high potential of DFs for acquiring technical vocabulary. Kohnke et al. (2019) examined the retention of 51 students in business vocabulary at a university in Hong Kong and found that the growth of vocabulary knowledge of the students was positively impacted. In another study, Kohnke et al. (2020) investigated the vocabulary retention of 159 ESL students from four different disciplines at Hong Kong University using an internal mobile application, they found that mobile apps have positive effects on word learning and memory retention. Similarly, Honzard and Soyooof (2020) compared the impact of mobile apps on the retention of English words among 90 Iranian EFL learners, it was discovered that mobile apps had significant impact on improving word retention. In a ten-week study carried out in a Japanese university, Dizon (2016) carried out a study on the use of digital flashcards for learning academic words and found that the students benefited greatly from the DF programme. According to Ashcroft et al. (2018), who compared the impact of DFs and paper flashcards on the learning of general academic vocabulary at various English proficiency levels, they also reported outcomes that corroborate the studies mentioned above. In spite of the plethora of literature pointing out the advantages of using digital flashcards to learn technical and academic vocabulary as shown above, literature on the use of DFs is scarce in Nigeria. This study sets out to fill this gap of paucity in literature.

To guide the study, two research questions and two null-hypotheses were formulated. These are:

Research Question

1. What is the mean achievement score of students taught vocabulary with digital flashcards and those taught with the conventional method?
2. What is the mean achievement score of males and females taught vocabulary with digital flashcards?

Hypothesis

1. There is no significant difference in the mean achievement of students taught academic vocabulary with Digital Flashcards and those taught with the conventional method.
2. There is no significant difference in the achievement of males and females taught academic vocabulary with digital flashcards.

Methodology

The design of this study is a pre-test/post-test quasi-experimental non-equivalent control group research design. This design was adopted for the study because it is in line with the view of Ary, Jacobs and Razavieh (2002) who postulate that where

it is impossible to randomly allocate students to groups as a result of the intact classes that already exist, the non-equivalent control group design should be adopted.

The purposive sampling technique was used to sample all the 100 level Agricultural Economics students of Prince Abubakar Audu University, Anyigba, who registered for GST 102 (Use of English II) for the 2021–2022 academic year. The study's participants were enrolled in a 2-credit course on Use English. The course was designed to, among other things, acquaint the students with technical terms relating to agricultural economics. 122 students took part (58 males and 64 females). By flipping a coin, the participants were randomized into experimental and control conditions. In comparison to the control group, which has 62 students (30 males and 32 females), the experiment group has 60 participants (28 males and 32 females). The control group received instruction using the conventional teaching approach while the experimental group learned using digital flashcards on their mobile devices.

The New Academic Word List (NAWL) by Brown et al. (2013) was adopted as a resource for academic English vocabulary for the study. The experimental group members installed the NAWL builder flashcards (EFL Technologies, 2017) into their Android devices. The control group received printed copies of the New Academic Word List for Agricultural Economics that had been arranged alphabetically. Using the New Academic Word Lists, the researcher constructed a test tagged "University Students Vocabulary Knowledge Achievement Test", (USVKAT) containing a multiple-choice items that are 60 in number. The instrument was given to three experts for validation. One of the experts is from the Department of English and Literary Studies, one from Measurement and Evaluation and the last one is from Agricultural Economics. All the experts are from Prince Abubakar Audu University, Anyigba. Cronbach's alpha reliability was used to test the item's reliability, and the result yielded a reliability coefficient of 0.86.

The participants' vocabulary skills were tested at the beginning of the semester using the USVKAT. Digital flashcards were used to teach vocabulary to the participants in the experimental group. The traditional approach of teaching vocabulary was used to teach the control group. It was a two hours per week programme which lasted for 13 weeks (one semester). A post-test was administered to the students at the end of the semester to compare their performance. Mean and standard deviation was used to analyze the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 alpha level of significance.

Results

Research Question One: What is the difference in the mean achievement score of students taught vocabulary with digital flashcards and those taught with the conventional lecture method?

Table 1

Mean and Standard Deviation of Pre-test and Post-test Scores of Students Taught Vocabulary with Digital Flashcards and those Taught with the Conventional Method

Variables	Pre test			Posttest		Mean gain
	N	\bar{x}	SD	\bar{x}	SD	
Digital Flashcards	60	42.83	9.52	62.57	6.19	19.74
Conventional lecture Method	62	40.62	9.89	56.31	9.23	15.69
Total	122	41.82	9.72	59.69	8.32	17.87

The results on Table 1 show that the experimental group has a post-test mean of 62.57 and a standard deviation of 6.19 with a gain score of 19.74, while the control group has a mean score of 56.31 and a standard deviation of 9.23 with a gain score of 15.69. This means that the experimental group achieved higher than their counterparts in the control group.

Research Question Two: What is the difference in the mean achievement score of males and females taught vocabulary with Digital Flashcards?

Table 2

Mean and Standard Deviation of Pre-test and Post-test Achievement Scores of Males and Females Taught Vocabulary with Digital Flashcards

Variable	N	Pretest		Posttest		Mean gain
		\bar{x}	SD	\bar{x}	SD	
Male	28	44.19	9.85	59.01	9.79	14.82
Female	32	38.07	8.27	60.76	5.09	22.69
Total	60	41.82	9.72	59.69	8.32	17.87

The result on Table 2 shows that the post-test mean of the males is 59.01 and a standard deviation of 9.79 with a gain score of 14.82, while the post-test mean of the females is 60.76 and a standard deviation of 5.09 with a gain score of 22.69. This means that the females achieved higher than their male counterparts when taught vocabulary with digital flashcards.

Hypothesis One: There is no significant difference in the mean achievement of students taught academic vocabulary with Digital Flashcards and those taught with the conventional method.

Table 3
Analysis of Covariance (ANCOVA) of Achievement Scores of Students Taught Vocabulary with Digital Flashcards and those Taught with the Conventional Method.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Dec.
Corrected Model	549.507 ^a	4	137.377	4.691	0.00	0.24	
Intercept	6480.168	1	6480.168	221.275	0.00	0.78	
Pretest	2.171	1	2.171	.074	0.78	0.00	
Method	258.243	1	258.243	8.818	0.00	0.13	S
Gender	146.451	1	146.451	5.001	0.20	0.04	NS
Error	1727.853	114	29.286				
Total	62609.000	119					
Corrected Total	2277.359	118					

Note: S = Significant, NS = Not Significant and η^2_p = partial eta squared

Table 3 shows the summary of ANCOVA for significant difference in the mean achievement scores of students taught vocabulary with digital flashcards. The result revealed that the F-value for method is 8.81 with the significant value of 0.00. This value of F is significant at 0.05. This is because 0.00 is less than 0.05, that is ($p = 0.00$; $p < 0.05$). Therefore, the hypothesis claiming no significant difference is rejected. Hence, there is significant difference in the mean achievement scores of

students taught vocabulary with digital flashcards and those taught with the conventional method. In other words, method is significant.

Table 3 equally shows that the F value for gender is 5.00 which is significant at 0.20. Since 0.20 is greater than 0.05, that is ($p = 0.20$; $p > 0.05$), the hypothesis claiming no significant difference is accepted. On the interaction of method and gender, the results on table 3 show that the F value for method and gender is 0.06 which is significant at 0.79. Since 0.79 is greater than 0.05, that is, ($p = 0.79$; $p > 0.05$), the hypothesis claiming no significant difference is also accepted.

Discussion of Findings

The result on Table 1 revealed that the experimental group achieved better than their counterparts in the control group in their mean gain score. This result corroborates the results of previous studies (Kohnke et al., 2020; Xodabande and Atai, 2020; Yüksel et al., 2020) that showed beneficial learning effects for mobile-assisted vocabulary acquisition. According to Stockwell (2013), RastiBehbahani, and Shahbazi (2020), the simultaneous inclusion of digital technology and multimedia elements, such as images and audio pronunciation, improves learning outcomes and influences students' motivation. This might have accounted for the experimental group's higher achievement in this study.

The data on table 2 indicates that the females outperformed the males in achievement. This finding agrees with the findings of Omachonu et al (2021) who in their studies held that females outperformed males in online learning using technology in language learning. The gender gap can be attributed to the fact that females use more ICT related Apps than males for chatting. This might have been the reason for their achievement.

Statistically however, the result on Table 3 shows that there is no significant difference in the achievement of males and females thereby aligning with the findings of Ajoke (2017) which showed that males and females fared similarly in English when taught with instructional materials including flashcards. The rising gender parity in academic attainment can be attributed to changing gender roles, more female labour force involvement, and institutional and social structures that make education appealing to both males and females (Newman et al (2018). Also, information and communication technology and Internet access has increased, exposing both males and females to language stimuli and role models that is now closing the gender gap that has existed before now.

Conclusions

Given the findings of this study, it can be said that digital flashcard is a beneficial strategy for teaching vocabulary learning. The study's findings also showed that,

despite the fact that females outperformed males in achievement, gender was found not to have significant influence on students' achievement.

Recommendations

Based on the findings of this study the following recommendations were made:

1. Curriculum designs should be reviewed to embrace digital classrooms that are interesting and relevant to learners' everyday life.
2. Since we now live in a tech-driven society, digital literacy should be one of the major foci of language teachers' training programmes to acquaint them with the skills to implement technological innovations for language teaching.
3. Given that this strategy is tech-driven, language educators must be willing to adopt it by honing their technological competencies.
4. Seminars and workshops should be organized by the Federal Ministry of Science and Technology to train language educators on the use of different platforms for language teaching.

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