

Exploring the Efficacy of Digital Flashcards on Young Learners' Acquisition of Idiomatic Expressions and Speaking Skills

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Abstract

This study investigated the effectiveness of digital flashcards (DFs) in enhancing young learners' (YLS) acquisition of idiomatic expressions and speaking skills. A quasi-experimental pre-test post-test design was employed with 34 Iranian EFL learners randomly assigned to an experimental group (utilizing DFs) and a control group (receiving traditional instruction). Over five structured sessions, the experimental group used DFs featuring engaging visuals, contextual examples, and interactive activities to practice idiomatic expressions and speaking. In contrast, the control group followed textbook-based instruction. Both groups completed pre-tests, post-tests, and delayed post-tests assessing idiomatic expression knowledge and speaking ability. Data analysis confirmed normal distribution and acceptable reliability for all tests, and the groups were homogenous in general language proficiency. Repeated measures analysis revealed significant improvement in the experimental group's post-test and delayed post-test scores, particularly in idiomatic expression retention and speaking performance. These findings support the efficacy of technology-assisted learning tools, highlighting the potential of DFs for promoting idiomatic expression acquisition and speaking fluency among young EFL learners.

Keywords: digital flashcards, idiomatic expressions, language learning, speaking skills, technology-assisted learning, young learners

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1. Introduction

Second language acquisition (SLA) research has long explored effective methods for young learners (YLs) to develop vocabulary and speaking skills. A key finding is that YLs benefit from engaging and interactive approaches that promote meaningful practice (Schmidt, 2001). In recent years, the rise of educational technology has presented exciting possibilities for SLA, with digital flashcards (DFs) emerging as a potentially valuable tool (Chapelle, 2013). DFs hold promise for promoting learner engagement through multimedia elements like audio, images, and games (McCall & McMeeken, 2020). Additionally, research suggests that DFs can be tailored to spaced repetition algorithms, which optimize memorization and retention over time (Bahrick & Roediger, 2007). However, it is important to acknowledge that the effectiveness of DFs for SLA likely hinges on factors like design and implementation (Feng et al., 2020).

Idiomatic expressions, or idioms, are phrases with figurative meanings that differ from their literal interpretations, presenting a significant challenge for YLs (Richards et al., 2014). Mastering idioms is crucial for achieving fluency and sounding natural (Pecorari, 2020). Traditional flashcards, while widely used, often lack the engagement factor needed to capture YLs' attention and promote long-term retention (Nation, 2008). Recent research emphasizes the limitations of traditional methods for learning idioms. Rote memorization, a common approach, may achieve some initial recall but fails to foster true comprehension and the ability to apply idioms in real-world contexts (Liu, 2020).

In contrast, DFs offer a dynamic learning environment with the potential to address these limitations. By incorporating multimedia elements like audio recordings of native speakers using idioms in context, DFs can enhance understanding and retention compared to traditional methods (Fotos & Ellis, 2018). Furthermore, the interactive nature of DFs, featuring games or quizzes that test not just recall but also application, can promote active engagement with the material and foster deeper learning (VanLehn, 2019). This shift from passive memorization to active engagement with language is a key advantage of DFs for idiom acquisition.

DFs, however, present a compelling alternative with several potential benefits. They can integrate multimedia elements like audio recordings of native speakers using idioms in

context, engaging visuals that depict the meaning of the idiom, and even interactive games that test comprehension and application (Fotos & Ellis, 2018). This multimedia approach has been shown to enhance understanding and retention compared to traditional methods (Fotos & Ellis, 2018). Additionally, DFs offer the advantage of accessibility. They can be readily accessed on a variety of devices, such as tablets and smartphones, allowing YLs to practice at their own pace and convenience, increasing engagement and fostering self-directed learning (Chapelle, 2013). Furthermore, DFs can be programmed with spaced repetition algorithms, a technique proven to optimize memorization and retention over time (Bahrick & Roediger, 2007). This targeted approach to learning can significantly improve long-term recall of idiomatic expressions compared to rote memorization techniques often employed with traditional flashcards.

Despite the potential benefits of DFs, their use with YLs also presents some challenges. One concern is the impact of excessive screen time on YLs' development, with research suggesting potential detriments (Christakis et al., 2016). Additionally, DFs may contain distracting elements, such as flashy animations or irrelevant sounds, which can impede focus on learning the target idioms (Feng et al., 2020). Finally, DFs often lack the social interaction aspect that is a hallmark of traditional classroom learning. This social interaction can be valuable for language development, as it allows learners to practice using idioms in conversation and receive feedback from peers and teachers (Van Lier, 2008). Finding a balance between the engaging features of DFs and the importance of social interaction will be crucial in maximizing their effectiveness for YLs.

This research aimed to explore the efficacy of DFs in promoting YLs' acquisition of idiomatic expressions and speaking skills. By investigating the benefits and challenges of DFs, this study contributes to the growing body of research on technology-assisted SLA and informs the development of effective language learning tools for YLs.

2. Literature Review

2.1. Theoretical Background

Understanding the process of SLA in YLs is crucial for evaluating the effectiveness of any learning tool, particularly those targeting challenging aspects like idiomatic expressions. Schmidt's (2001) noticing hypothesis posits that learners need to consciously attend to specific

features of the target language for successful acquisition. This highlights the importance of engaging activities that promote focused attention on idiomatic expressions, moving beyond rote memorization and toward meaningful engagement with their form and function (Fotos & Ellis, 2018).

Furthermore, research emphasizes the importance of meaningful practice for YLs (Ellis, 2021). Activities that encourage learners to use the target language in communication, rather than simply memorizing it, are more likely to lead to long-term retention and fluency (Teng & Reynolds, 2023). This concept of "meaningful practice" aligns with the theory of "comprehensible input" by Krashen (1985), which remains a cornerstone of language acquisition research. Recent studies, such as those by Nunan (2022), suggest that DFs, with their potential for multimedia integration and interactive elements, provide rich opportunities for creating comprehensible input tailored to YLs. These features facilitate the acquisition of idiomatic expressions while promoting speaking skills through meaningful, context-based engagement.

2.2. Digital Flashcards and Language Learning

DFs have emerged as a powerful tool in language education, particularly for YLs. The integration of multimedia elements—audio recordings, visual aids, and interactive tasks—has been shown to enhance engagement and motivation (Lai & Zheng, 2021). Research also highlights the role of spaced repetition, a cognitive science-based technique, in optimizing vocabulary retention. Bahrick and Roediger (2007) found that strategically spaced intervals during learning significantly improve the acquisition and retention of idiomatic expressions. Moreover, the interactive and multimodal nature of DFs aligns with the findings of Walker et al. (2023), who emphasize that gamified and personalized features within DFs increase learning effectiveness by fostering meaningful and active learning experiences.

However, the use of DFs with YLs is not without its challenges. Excessive screen time can have detrimental effects on YLs' development, impacting areas such as sleep patterns, physical activity levels, and attention spans (Christakis et al., 2016). Additionally, DFs may contain distracting elements, such as flashy animations or irrelevant background noise, which can hinder learners' focus and impede their ability to concentrate on the target language (Feng et al., 2020). Finally, DFs often lack the social interaction component inherent in traditional

classroom settings, which can be a valuable aspect of language development as it fosters collaboration, peer learning, and opportunities for negotiation of meaning (Van Lier, 2008).

DFs offer a promising approach to language learning for YLs, particularly when considering their potential to enhance engagement and promote effective memorization through spaced repetition. However, it is crucial to acknowledge the potential drawbacks associated with excessive screen time, distracting elements, and the absence of social interaction. Educators and parents should strive to implement DFs strategically and thoughtfully, ensuring a balanced learning environment that complements the social and interactive aspects of traditional classroom instruction.

2.3. Empirical Studies

There is limited research directly investigating the effectiveness of DFs for YLs' acquisition of idiomatic expressions. However, some studies offer insights into the potential benefits.

Fotos and Ellis (2018) explored the use of multimedia in teaching idioms to adult learners. Their findings suggested that incorporating audio recordings of native speakers using idioms in context could enhance understanding and retention compared to traditional methods. This approach aligns perfectly with the capabilities of DFs, which can integrate audio clips alongside visuals and text to create a richer learning experience for YLs (McCall & McMeeken, 2020). By exposing YLs to idiomatic expressions used naturally in spoken language, DFs can promote a more intuitive grasp of their meaning and usage.

Liu (2020) emphasizes the limitations of rote memorization for learning idioms and highlights the need for methods that promote deeper understanding and application. Here, the interactive nature of DFs presents a compelling advantage. Unlike traditional flashcards that primarily rely on recall, DFs can be programmed with games or quizzes that test not just memorization but also application of idioms in various contexts (Feng et al., 2020). This approach aligns with Liu's (2020) call for methods that encourage active engagement and deeper comprehension, potentially leading to more effective learning of idiomatic expressions.

McCall and McMeeken's (2020) review of research on gaming for language learning highlights a crucial aspect: active engagement with the learning material. Studies have shown that engaging in games can significantly improve vocabulary acquisition (Wertsch, 1991),

which serves as a fundamental building block for speaking fluency. Similarly, DFs, when designed with engaging and interactive elements like multimedia integration and game mechanics, have the potential to promote active engagement with vocabulary, potentially leading to improved recall and ultimately, more confident speaking skills (Granström, 2014).

Studies investigating mobile learning applications (MLAs) offer further evidence for the potential benefits of technology-assisted language learning for YLs. Research by Chapelle (2013) suggests that MLAs can be effective tools for improving YLs' vocabulary and speaking fluency. This resonates with the potential of DFs, which share some characteristics with MLAs in terms of portability, accessibility, and interactive features. By leveraging multimedia elements like audio recordings and incorporating engaging activities, DFs can create a dynamic learning environment that fosters vocabulary acquisition and potentially translates into enhanced speaking skills.

Reviewing different studies suggests that DFs have the potential to be a valuable tool for enhancing YLs' acquisition of idiomatic expressions and speaking skills. However, empirical research in this specific area is limited. More research is needed to explore how DFs specifically can be designed to target and improve speaking skills in YLs. This may involve incorporating features that encourage spoken production, such as voice recording or pronunciation practice activities.

While digital DFs hold potential for enhancing language learning, their effectiveness in directly impacting YLs' idiomatic expression acquisition and speaking skills remains unclear. This lack of conclusive evidence hinders educators and parents from fully utilizing DFs as a valuable tool for optimizing language learning experiences for YLs. Addressing these concerns is crucial to ensuring that DFs are implemented in a way that maximizes their benefits while minimizing potential drawbacks for YLs.

This study investigated the potential of DFs to enhance YLs' acquisition of idiomatic expressions and speaking skills. The following research questions were formulated to address the objectives of the study:

- 1- Does using DFs have any significant impact on YLs' idiomatic expressions?
- 2- Does using DFs have any significant impact on YLs' speaking skills?

3. Method

The study employed a quasi-experimental pre-test post-test design to investigate the impact of DFs on YLs' idiomatic expressions and speaking skills. This design involved administering pre-tests to assess participants' baseline knowledge of idiomatic expressions and speaking skills. Subsequently, participants were divided into two groups: an experimental group that utilized DFs and a control group that received traditional instruction. Following the intervention period, both groups were administered post-tests to evaluate their understanding of idiomatic expressions and speaking proficiency. This design allowed for the comparison of pre-test and post-test scores within each group, enabling the researchers to assess the potential impact of DFs on YLs' language development.

3.1. Participants

The study employed 34 Iranian participants, all female, aged 12–15 years, whose mother tongue was Persian. Participants were selected from a private language institute in Tehran, Iran, based on their scores on the Preliminary English Test (PET), indicating an intermediate level of English proficiency (aligned with the B1 level of the Common European Framework of Reference for Languages, CEFR). The decision to include only female learners was due to institutional and logistical constraints, as the participating language institute exclusively enrolled female students. This restriction is acknowledged as a limitation of the study and should be considered when generalizing the findings.

To ensure homogeneity, the PET scores served as a baseline for language proficiency, confirming that all participants had similar English language abilities before the intervention. Subsequently, participants were randomly assigned to either the experimental group ($n = 17$) or the control group ($n = 17$). This randomization was implemented to control for pre-existing differences between participants, allowing for a more accurate assessment of the effects of DFs on language acquisition. Additional demographic factors, such as socioeconomic background and years of English study, were comparable across groups, minimizing external influences on the results.

3.2. Instruments

The PET is an internationally recognized English language examination designed for learners at the B1 level of the CEFR. This level signifies intermediate proficiency, indicating that learners have mastered the basics of English and can use the language effectively in everyday situations.

The PET assesses all four key language skills: reading, writing, listening, and speaking. The exam typically consists of four parts:

Reading (45 minutes): This section tests reading comprehension through a variety of tasks like multiple-choice questions, matching exercises, and open-ended questions.

Writing (45 minutes): This section tests writing skills through two prompts, typically requiring learners to write a letter, an email, or a story.

Listening (30 minutes): This section tests listening comprehension through a variety of audio recordings and tasks like multiple-choice questions and matching exercises.

Speaking (12-17 minutes): This section tests spoken English through a pair interview format, where candidates engage in conversation with an examiner on various topics.

Passing the PET demonstrates that learners have the necessary English language skills to communicate effectively in a variety of everyday situations, making it a valuable qualification for both academic and professional purposes.

The second instrument of the study was a pre-test and post-test. This test, consisting of 20 items, aims to comprehensively assess YLs' understanding and application of idiomatic expressions and their speaking ability. It is divided into two parts, each focusing on a specific skill.

The first section tests learners' knowledge of common idiomatic expressions. Each item presents a sentence with an underlined idiom, and learners must choose the option that best completes the sentence with the correct meaning of the idiom. This format allows for efficient evaluation of multiple expressions within a limited timeframe.

The second section assesses learners' ability to use idiomatic expressions naturally and accurately in spoken language. Learners are presented with open-ended prompts that encourage

them to use specific idioms in context. This format allows for a more holistic evaluation of speaking skills, including fluency, grammar, and appropriate use of idiomatic expressions.

3.3. Materials

The DFs utilized in this study incorporated engaging multimedia elements to enhance the learning experience for YLs. These elements included:

Visuals: Images, illustrations, and animations were used to represent the idiomatic expressions visually, making them more memorable and easier to understand for YLs.

Audio Recordings: Native speakers provided clear audio recordings of the idiomatic expressions, allowing learners to hear the correct pronunciation and intonation.

Contextual Examples: Each idiom was presented within a relevant and engaging context, such as a short story, dialogue, or video clip. This helped learners understand the meaning and usage of the idiom in a practical way.

By combining these multimedia elements, the DFs aimed to create a more interactive and stimulating learning environment compared to traditional flashcards, which typically rely solely on text. This approach catered to the diverse learning styles of YLs and facilitated deeper comprehension and retention of the idiomatic expressions.

3.4. Procedure

The data collection process for this study employed a rigorous and standardized approach. Participants were recruited from a language institute in Tehran, focusing on female Iranian EFL learners. To ensure a relatively homogenous level of English proficiency, all participants completed the PET, a standardized test aligned with the B1 level of the CEFR. This test served as a baseline measure of participants' English language skills.

Based on their PET scores, participants were then randomly assigned to either the experimental group ($n = 17$) or the control group ($n = 17$) using a random number generator. This randomization process aimed to minimize pre-existing group differences and enhance the internal validity of the study.

The experimental group received instruction on idiomatic expressions and speaking skills using specifically designed DFs for a total of five sessions, each lasting 45 minutes. Each

DF session followed a structured lesson plan incorporating engaging visuals, audio recordings, and contextual examples to introduce new idiomatic expressions. Clear definitions and explanations ensured participants understood the meaning and usage of each idiom.

Interactive activities like games, quizzes, and role-playing scenarios encouraged active engagement and practice with the idiomatic expressions. Features like voice recording and speech recognition promoted self-monitoring and pronunciation accuracy. Learners had ample opportunities to use the newly learned idiomatic expressions in spoken communication through pair work, group discussions, and simulated conversations, fostering natural and spontaneous language production. The sessions concluded with dedicated time for review and consolidation, allowing participants to reinforce their learning and clarify any doubts.

The control group received traditional instruction on idiomatic expressions and speaking skills through textbook exercises, grammar explanations, and teacher-led discussions. This instruction aimed to provide a comparable learning experience in terms of content and duration (five sessions of 45 minutes each) but without the use of DFs.

Following the intervention period, all participants completed the same 20-item test assessing both idiomatic expressions and speaking ability. This post-test served as a crucial measure to compare the impact of the intervention on both groups. To assess the long-term retention of learning and the potential for transfer of skills, a delayed post-test was administered one week after the completion of the intervention. This delayed post-test employed the same 20-item test used in the immediate post-test, allowing for a comparison of performance over time and providing insights into the lasting effects of the intervention on YLs' language acquisition. The pre-test and post-test data were analyzed using appropriate statistical tests to determine if there is a significant difference between the experimental and control groups in terms of their learning outcomes.

4. Results

The results presented in this section analyzed the data collected from the pre-test and post-test to determine the impact of DFs on YLs' language acquisition. To answer the research questions, SPSS software was used to analyze the data. Prior to doing statistical analyses, the distribution of scores for the groups was examined. The normality of the data was explored through skewness and kurtosis indices and their ratios over the standard errors.

Table 1

Skewness and Kurtosis Indices of Normality

Group		N	Skewness		Kurtosis		Ratios	
			Statistic	Std. Error	Statistic	Std. Error	Skewness	Kurtosis
Experimental	PET	17	-.277	.550	-.594	1.063	-0.50	-0.56
	Pre-test	17	-.009	.550	-.700	1.063	-0.02	-0.66
	Post-test	17	.497	.550	.431	1.063	0.90	0.41
	Delayed	17	.554	.550	1.642	1.063	1.01	1.54
Control	PET	17	-.633	.550	-.430	1.063	-1.15	-0.40
	Pre-test	17	-.195	.550	-1.350	1.063	-0.35	-1.27
	Post-test	17	.940	.550	.964	1.063	1.71	0.91
	Delayed	17	.665	.550	1.879	1.063	1.21	1.77

As shown in Table 1, the ratios of skewness and kurtosis over their respective standard errors were within the ranges of ± 1.96 . Thus, it was concluded that the present data did not show any significant deviation from normality. It is worth mentioning that the criteria of ± 1.96 were proposed by Field (2018) and Abu-Bader (2021). To examine the internal consistency of the tests over time, KR-21 (Kuder-Richardson Formula 21) was run.

As shown in Table 2, the KR-21 reliability indices for the PET, post-test, and delayed post-test of speaking were .70, .73, and .75, respectively. Based on the criterion discussed above, Fulcher and Davidson (2007), these reliability indices can be considered as “appropriate”, i.e., $\geq .70$.

The results of the Independent Samples t-test ($t(32) = .836, p > .05, r = .146$, representing a weak effect size, 95 % CI [-2.45, 5.86]) indicated that there was no significant difference between the two groups’ means on the PET. Thus, it can be concluded that the two groups were homogeneous in terms of their general language proficiency prior to the administration of the treatments.

Repeated Measures ANOVA was run to compare the experimental and control groups’ means on pre-test, post-test, and delayed post-test of speaking in order to first prove that the two groups were homogenous in terms of their idiomatic knowledge and speaking ability, and then to probe the two research questions raised in this study. Besides the assumption of

normality, which was reported in Table 1, Repeated Measures ANOVA has three more assumptions.

Table 2

Descriptive Statistics and KR-21 Reliability Indices

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	KR-21
PET	34	20	41	32.74	5.925	35.110	.70
Post-test	34	15	37	24.74	6.676	44.564	.73
Delayed	34	12	39	23.85	6.885	47.402	.75

Table 3

Independent-Samples t-test for PET by Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.297	.590	.836	32	.410	1.706	2.042	-2.453	5.865
Equal variances not assumed			.836	31.761	.410	1.706	2.042	-2.454	5.866

First, it assumes homogeneity of the variances of the groups. Table 4 shows the results of Levene’s test of homogeneity of variances. The results showed that the assumption of homogeneity of variances was retained in pre-test ($F(1, 32) = .055, p > .05$), post-test ($F(1, 32) = .032, p > .05$), and delayed post-test of speaking ($F(1, 32) = .676, p > .05$).

Second, it requires that the correlations between any two dependent variables be roughly equal across the two groups, i.e., homogeneity of covariance matrices. As displayed in Table 5, the non-significant results of the Box’s test (Box’s $M = 6.02, p > .001$) indicated that the assumption of homogeneity of covariance matrices was retained. It should also be noted

that Pallant (2016) and Field (2018) believe that the results of the Box’s test should be reported at .001 levels.

And finally, Repeated Measures ANOVA assumes that the differences between any two tests should have equal variances. The significant results of the sphericity test ($\chi^2(2) = 18.66, p < .05$) indicated that the assumption of sphericity was not met (Table 6).

Table 4
Levene's Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Pre-test	Based on Mean	.072	1	32	.789
	Based on Median	.055	1	32	.816
	Based on Median and with adjusted df	.055	1	31.526	.816
	Based on trimmed mean	.070	1	32	.793
Post-test	Based on Mean	.057	1	32	.813
	Based on Median	.032	1	32	.859
	Based on Median and with adjusted df	.032	1	31.869	.859
	Based on trimmed mean	.044	1	32	.835
Delayed	Based on Mean	.639	1	32	.430
	Based on Median	.676	1	32	.417
	Based on Median and with adjusted df	.676	1	27.580	.418
	Based on trimmed mean	.675	1	32	.417

As noted by Field (2018, p. 847), “If sphericity is violated, then you can apply a correction proportionate to the extent of the violation (for example, the Greenhouse–Geisser correction) so you may as well ignore Mauchly’s test and always apply the correction”. To

compensate for the violation of this assumption, the results of the Greenhouse–Geisser (Table 7) were reported.

Table 5

Test of Equality of Covariance Matrices

Box's M	6.027
F	.902
df1	6
df2	7419.170
Sig.	.492

Table 6

Mauchly's Test of Sphericity

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
factor1	.548	18.661	2	.000	.689	.732	.500

Table 7

Tests of Within-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Tests	Sphericity Assumed	2	1341.529	238.364	.000	.882
	Greenhouse-Geisser	1.377	1948.261	238.364	.000	.882
	Huynh-Feldt	1.464	1833.040	238.364	.000	.882
	Lower-bound	1.000	2683.059	238.364	.000	.882
Tests * Group	Sphericity Assumed	2	370.039	65.749	.000	.673
	Greenhouse-Geisser	1.377	537.396	65.749	.000	.673
	Huynh-Feldt	1.464	505.614	65.749	.000	.673
	Lower-bound	1.000	740.078	65.749	.000	.673

Error (Tests)	Sphericity	360.196	64	5.628
	Assumed			
	Greenhouse-Geisser	360.196	44.069	8.173
	Huynh-Feldt	360.196	46.839	7.690
	Lower-bound	360.196	32.000	11.256

The results of the Within-Subjects Effect (Table 7) also approved the differences. The significant results of the test variable ($F(1.37, 44.06) = 238.36, p < .05, \text{partial } \eta^2 = .882$, representing a large effect size) indicated that there was a significant difference between the total samples' overall means on pre-test, post-test, and delayed post-test of speaking tests. The results also ($F(1.37, 44.06) = 66.74, p < .05, \text{partial } \eta^2 = .673$, representing a large effect size) indicated that there was a significant interaction between Group and Test factors.

According to Table 8, the results of the Between-Subjects Effect ($F(1, 32) = 76.09, p < .05, \text{partial } \eta^2 = .704$, representing a large effect size) indicated that there was a significant difference between the experimental and control groups' overall means on pre-test, post-test, and delayed post-test of speaking.

Table 8

Tests of Between-Subjects Effects

Source	Type III Squares	Sum of df	Mean Square	F	Sig.	Partial Squared	Eta
Intercept	43606.676	1	43606.676	2147.438	.000	.985	
Group	1545.186	1	1545.186	76.094	.000	.704	
Error	649.804	32	20.306				

Then the two groups' means on pre-test, post-test, and delayed post-test of speaking were compared through Simple-Effect Analysis, which, as defined by Field (2018), enables researchers to compare levels of independent variables; i.e., two groups, within another variable; i.e., three tests. That is to say, it enabled the researcher to compare the experimental and control groups' means on;

Pre-test of speaking to prove that they were homogeneous in terms of their oral performance prior to the main study,

Post-test of speaking to probe the first null-hypothesis, and finally

Delayed post-test of speaking to probe the second null-hypothesis.

Table 9 shows the experimental and control groups' means on pre-test, post-test, and delayed speaking post-test. The two groups had almost the same means on the pre-test of speaking; however, the experimental group had higher means on the post-test and the delayed post-test.

Table 9

Descriptive Statistics for Pre-Test, Post-Test, and Delayed Post-Test by Groups

Group	Tests	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Pre-test	13.529	.691	12.121	14.938
	Post-test	30.706	.689	29.302	32.110
	Delayed Post-test	29.471	.950	27.535	31.406
Control	Pre-test	13.353	.691	11.944	14.761
	Post-test	18.765	.689	17.360	20.169
	Delayed Post-test	18.235	.950	16.300	20.171

The results of Simple-Effect Analysis (Table 10) showed that there was no significant difference between experimental (M = 13.52) and control (M = 13.35) groups' means on the speaking pre-test (MD = .176, $p > .05$). Thus, it can be concluded that the two groups were homogenous in terms of their idiomatic knowledge prior to the main study.

The experimental group (M = 30.70) significantly outperformed the control group (M = 18.76) on the post-test (MD = 11.94, $p < .05$). Thus, the first null-hypothesis, “using DFs did not have any significant impact on young EFL Learners' idiomatic expressions,” was rejected.

The experimental group (M = 29.47) significantly outperformed the control group (M = 18.23) on the delayed post-test (MD = 11.23, $p < .05$). Thus, the second null-hypothesis, “using DFs did not have any significant impact on young EFL Learners' speaking skills,” was rejected. Figure 1 shows the two groups' means on the pre-test, post-test, and delayed post-test of speaking.

Table 10

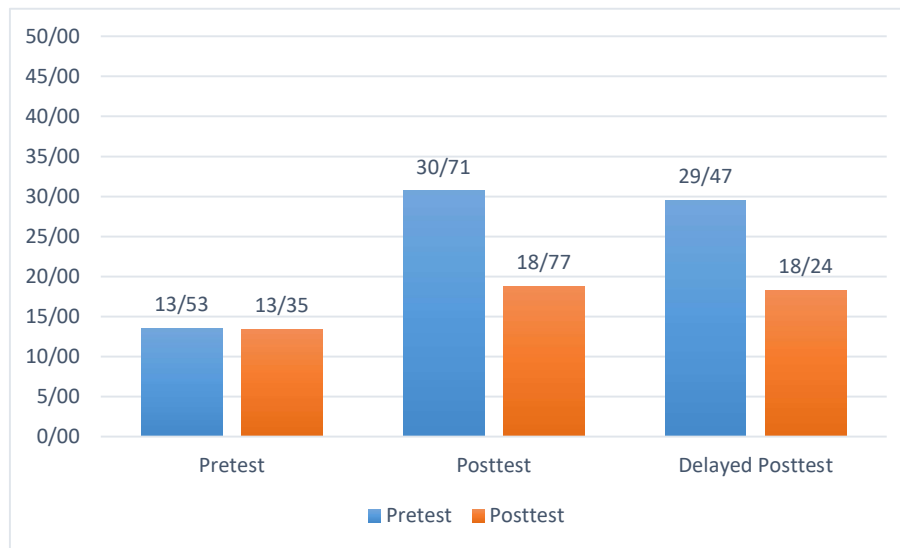
Simple-Effect Analysis

Tests	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Pre-test	Experimental	Control	.176	.978	.858	-1.815	2.168
Post-test	Experimental	Control	11.941*	.975	.000	9.955	13.927
Delayed	Experimental	Control	11.235*	1.344	.000	8.498	13.973

*The mean difference is significant at the .05 level.

Figure 1

Means of Pre-Test, Post-Test, and Delayed Post-Test



5. Discussion

The data analysis confirmed that the data were normally distributed, and the reliability coefficients indicated acceptable levels for all tests. Additionally, the groups were found to be homogeneous in terms of general language proficiency prior to the study. The results of the repeated measures analysis showed a significant difference between the total samples' overall means on the pre-test, post-test, and delayed post-test of speaking. Furthermore, a significant interaction effect was found between the group and test factors, suggesting that the intervention had an impact. Further analysis through simple-effect analysis revealed that the experimental group significantly outperformed the control group on both the post-test and delayed post-test of speaking. This indicates that using DFs had a positive impact on YLs' acquisition of idiomatic expressions and speaking skills, with the effects demonstrating long-term retention.

The significant difference between the experimental and control groups on the post-test and delayed post-test of speaking indicates a clear advantage for learners utilizing DFs. This aligns with previous research highlighting the benefits of flashcards in vocabulary acquisition and language learning (Rambli et al., 2020).

Several factors contribute to the effectiveness of DFs in this context. Firstly, the interactive and engaging nature of DFs can enhance learner motivation and engagement, leading to increased attention and focus during study sessions (Rambli et al., 2020). Additionally, DFs often incorporate multimedia elements such as images, audio, and even games, which can improve memory retention and understanding of complex concepts like idiomatic expressions (Clark & Mayer, 2016). Furthermore, the ability to easily access and review flashcards on mobile devices allows for convenient and flexible practice, facilitating consistent exposure and spaced repetition, which are crucial for long-term retention (Lee & Wang, 2018). The long-term effectiveness of DFs demonstrated by the delayed post-test results further strengthens the case for their use in language learning. This suggests that the use of DFs facilitates the transfer of learned knowledge to real-world speaking situations, leading to lasting improvements in communication skills.

The findings of the present study align with and extend the work of several researchers who have investigated the use of technology for language learning. Firstly, the study's results resonate with the work of Fotos and Ellis (2018), who explored the use of multimedia in teaching idioms to adult learners. Their research highlighted the effectiveness of incorporating audio recordings of native speakers using idioms in context. This aligns perfectly with the capabilities of DFs, which can integrate audio clips alongside visuals and text. By exposing YLs to idiomatic expressions used naturally in spoken language, DFs can promote a more intuitive grasp of their meaning and usage, further enhanced by the engaging nature of digital formats (McCall & McMecken, 2020).

Secondly, the study's findings support Liu's (2020) emphasis on the limitations of rote memorization for learning idioms and the need for methods that promote deeper understanding and application. DFs offer a compelling advantage in this regard. Unlike traditional flashcards that primarily rely on recall, DFs can be programmed with games or quizzes that test not just memorization but also application of idioms in various contexts (Feng et al., 2020). This

approach aligns with Liu's (2020) call for methods that encourage active engagement and deeper comprehension, potentially leading to more effective learning of idiomatic expressions.

Furthermore, the study's findings complement the research of McCall and McMeeken (2020) on gaming for language learning. Their review highlights the crucial aspect of active engagement with the learning material. Studies have shown that engaging in games can significantly improve vocabulary acquisition (Wertsch, 1991), which serves as a fundamental building block for speaking fluency. Similarly, DFs, when designed with engaging and interactive elements like multimedia integration and game mechanics, have the potential to promote active engagement with vocabulary, potentially leading to improved recall and ultimately, more confident speaking skills (Granström, 2014).

Finally, the study's findings resonate with research on MLAs. Chapelle (2013) suggests that MLAs can be effective tools for improving YLs' vocabulary and speaking fluency. This aligns with the potential of DFs, which share some characteristics with MLAs in terms of portability, accessibility, and interactive features. By leveraging multimedia elements like audio recordings and incorporating engaging activities, DFs can create a dynamic learning environment that fosters vocabulary acquisition and potentially translates into enhanced speaking skills.

6. Conclusion

This study provided compelling evidence that DFs can be a valuable tool for enhancing YLs' acquisition of idiomatic expressions and speaking skills. The results demonstrated the effectiveness of DFs in both the immediate and long-term, supporting their potential as a beneficial addition to language learning strategies. DFs offer several advantages over traditional methods, including the ability to integrate multimedia elements, promote active engagement, and provide opportunities for spaced repetition, all of which contribute to improved learning outcomes. Furthermore, the interactive nature of DFs offers an advantage over traditional methods by allowing for the incorporation of engaging elements like games and quizzes. This fosters active engagement with the learning material, which aligns with research emphasizing the importance of active participation for effective language acquisition.

The findings of this study have significant implications for the pedagogical use of digital DFs in language learning for YLs. DFs can be designed with interactive elements like

audio recordings, images, and gamification features, making the learning process more engaging and motivating for YLs. This can lead to increased attention and focus during study sessions, ultimately improving learning outcomes.

DFs can go beyond simple memorization by incorporating context and usage examples alongside the idiomatic expressions. This allows YLs to develop a more intuitive grasp of their meaning and how they are used in natural language, promoting deeper understanding and retention. Unlike traditional flashcards, DFs can be programmed with interactive activities and quizzes that test not just recall but also the application of idioms in various contexts. This encourages active engagement with the material and promotes the transfer of learning to real-life situations.

DFs are readily available on mobile devices, making them easily accessible to YLs anytime and anywhere. This allows for convenient and flexible practice, facilitating consistent exposure and spaced repetition, which are crucial for long-term retention. DFs can be customized to cater to individual learning styles and preferences. YLs can choose the pace, difficulty level, and types of activities that best suit their needs, promoting a more personalized and effective learning experience.

The findings of this study contribute to the growing body of research supporting the use of technology in language learning, specifically highlighting the potential of DFs as a valuable tool for YLs. Further research could explore the specific design features of DFs that contribute most effectively to language acquisition and investigate their applicability to different age groups and learning contexts.

Conflict of interest

The author(s) certify/certifies that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in the present research paper.

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Appendices

Appendix 1: Pre-test and Post-test

Part 1: Idiomatic Expressions (10 items)

Instructions: For each sentence below, choose the option that best completes the sentence with the correct meaning of the underlined idiomatic expression. (2 points each)

1. She was feeling down lately, but she tried to **keep her chin up** and stay positive. a) be very proud b) be very angry c) remain optimistic d) be very sad
2. He **kicked the bucket** last week, leaving everyone in shock. a) got married b) graduated c) died d) retired
3. They **hit it off** right away and became close friends. a) argued constantly b) got along well c) had a big fight d) became enemies
4. He **missed the boat** on the opportunity to study abroad. a) took advantage of the chance b) lost the chance c) created the opportunity d) shared the opportunity
5. She **put all her eggs in one basket** by investing all her money in one company. a) diversified her investments b) took a calculated risk c) made a wise decision d) relied on a single option

6-10. (Follow the same format with different idiomatic expressions)

Part 2: Speaking Ability (10 items)

Instructions: Answer the following questions in complete sentences, demonstrating your ability to use idiomatic expressions naturally and accurately in your speech. (3 points each)

1. Describe a time when you felt **over the moon**.
2. Explain what it means to **cut corners**.
3. Use the idiom **once in a blue moon** in a sentence.
4. Describe a situation where you had to **think outside the box**.
5. Explain the difference between **lend a hand** and **give a hand**. 6-10. (Follow the same format with different prompts and idiomatic expressions)