

Exploring Online Flipped Classroom Utilizing Interactive Response System in Vocabulary Learning for Low-Proficiency Students

On the Internet

February 2026 – Volume 29, Number 4
<https://doi.org/10.55593/ej.29116int2>

Damar Isti Pratiwi

Politeknik Perkeretaapian Indonesia Madiun, Indonesia
<damar@ppi.ac.id>

Candradewi Wahyu Anggraeni

Universitas Tidar, Indonesia
<candradewi@untidar.ac.id>

Abstract

This study examines the effectiveness of a fully online flipped classroom (FC) supported by an Interactive Response System (IRS) in enhancing vocabulary learning among low-proficiency EFL learners. Addressing the limited research on IRS-integrated online FC models for vocabulary instruction, the study compares a traditional paper-based FC with an online IRS-based FC. A two-cycle classroom action research design was implemented with 46 first-year students at an Indonesian Polytechnic, targeting 300 items from the Academic Word List. In Cycle 1, students engaged with paper-based materials in an offline FC environment, while Cycle 2 involved online vocabulary learning using various IRS platforms. Vocabulary outcomes were measured through a pretest and two posttests and analyzed using paired t-tests. Results indicate that although both FC models significantly improved learners' vocabulary scores, the online IRS FC yielded substantially greater gains. Thematic analysis of students' open-ended responses showed that both approaches promoted engagement; however, the paper-based FC was perceived as monotonous and tiring, while the online IRS FC presented challenges related to unstable internet access and learning anxiety. The findings highlight the pedagogical potential of integrating IRS platforms into online flipped classrooms to strengthen vocabulary learning and inform instructional design in technology-enhanced EFL contexts.

Keywords: flipped classroom, interactive response system, online flipped classroom, paper-based method, vocabulary learning

The swift advancement of technology has transformed the educational landscape by enhancing its accessibility and personalization, which provide effective and meaningful learning opportunities (Oguguo et al., 2020), connecting students to wider knowledge transfer (Hehir et al., 2021), enhancing students' transversal skills (Niemi et al., 2024), and enriching their educational experiences (Al-Labadi & Sant, 2021). One example of the rapid development of technology in education is the emergence of the flipped classroom. Many studies yield on flipped learning due to its virtues in fostering self-paced, collaborative learning, deepening conceptual understanding, enhancing learning skills, positively impacting students' learning, focusing on student-centered learning, encouraging self-efficacy, developing independent thinking, creating active engagement, and improving learning outcomes (Aidoo et al., 2022; Dusengimana et al., 2023; W. Han & Hamzah, 2024; Putri et al., 2024). In the context of vocabulary learning, the flipped classroom offers opportunities to enhance students' engagement (Pratiwi et al., 2024), improve students' vocabulary gains (Yang et al., 2019), and develop students' self-directed learning (Anggoro & Khasanah, 2022).

In the implementation of the flipped classroom, the integration of technology and educational platforms, such as an Interactive Response System (IRS), has the potential to enhance the entirely online flipped classroom. IRS, which provides real-time feedback and interaction, contributes to English learning ecology by fostering engagement, promoting focus, boosting motivation through interactive and challenging activities, leading to more meaningful learning experiences, and assisting students' learning (Anggoro & Pratiwi, 2023b; Sun & Hsieh, 2018); Various IRS platforms can be utilized to scaffold and support students' vocabulary learning, such as *Quizizz*, *Quizlet*, *Socrative*, *Pear Deck*, *Magoosh Vocabulary Builder*, *Kahoot!*, *Quizlet*, *Memrise*, *Vocablet*, *Wordle*, etc.

There has been a growing interest in conducting studies on online flipped classrooms in many educational contexts (Althubaiti & Althubaiti, 2024; Dermentzi, 2024; Domu et al., 2023; Gok et al., 2023; Marshall & Kostka, 2020; Widodo, 2022; Xu et al., 2023). The online class facilitated students' participation in outside-class activities, while in-class activities were conducted in a face-to-face manner. However, there is a lack of studies, particularly those exploring the utilization of a fully online flipped classroom integrating an Interactive Response System for vocabulary learning. This current study attempts to investigate this gap by exploring online flipped classrooms in relation to students' vocabulary learning.

Research Objectives

The present study intends to add knowledge to the literature by exploring the extent to which an Interactive Response System (IRS) can facilitate vocabulary learning in a fully online flipped classroom environment. It seeks to compare the implementation of a traditional paper-based and online IRS flipped classroom to enhance academic vocabulary learning. The following questions are raised:

- 1) What are students' vocabulary learning outcomes in a fully online IRS flipped classroom?
- 2) What are the impacts of implementing a fully online IRS flipped classroom in vocabulary learning?

Literature Review

The flipped classroom, the basic framework of the present study, was discussed comprehensively to provide a broader insight into the learning model. It explained the general concept of the flipped classroom and both models – traditional and online. Further, vocabulary learning integrated with IRS platforms was reviewed to add a comprehensive theoretical framework underlying the study.

General Concept of Flipped Classroom

Teachers were long tasked with finding a method to cater to the diverse demands of their students. Personalizing education has been suggested as a remedy in this scenario. Teachers have been instructed to deliver a customized education for every student, and the majority of them view personalization as a beneficial objective for each student. Yet, the administrative burden of customizing numerous educational experiences regularly appears overwhelming to many teachers. Personalization can be challenging for many teachers, leading them to adopt a broad teaching method that presents a large amount of knowledge to reach as many learners as possible. Those reflections were written in a book entitled “Flipped Your Classroom: Reach Every Student in Every Class Every Day” (Bergmann & Sams, 2013), based on the teaching experiences of Jonathan Bergmann and Aaron Sams in chemistry and advanced chemistry lectures.

Drawing from such urgent conditions, both began to implement the flipped classroom model by recording their lectures in video format from 2007 to 2008. They uploaded the video to the internet, and then the students viewed it as part of their homework. Subsequently, they dedicated the entire class session to assisting students with the subjects they struggled to grasp. They were very pleased with their students’ learning after implementing the model for a year of lectures. They had evidence to show how the flipped classroom model worked and was beneficial for students. Clearly, this strategy proved to be more efficient than traditional methods such as teaching and distributing homework. The students acquired additional knowledge and obtained preliminary data suggesting that the flipped classroom was more effective than the usual approach. They claimed that flipping the classroom created a structure that guaranteed students would receive an academic experience tailored to their specific needs. The model enabled teachers to effectively personalize the education of each student.

In the development, the flip model is derived from the acronym F-L-I-P, which stands for a flexible environment, a learning culture, intentional content, and professional educators (Marshall & Kostka, 2020). A flexible environment pertains to the shift in learning dynamics when students take greater control over how and where they take part in learning, rather than the teacher being the primary focus in the traditional classroom setting. Learning culture emphasizes the transition from teacher-centered to student-centered instruction, focusing on active learning, feedback, and scaffolding. The intentional content emphasizes the instructors’ responsibility in assisting learning, developing, and organizing pertinent content to aid learning outside the classroom. As an expert instructor, the teacher establishes an adaptable learning setting, administers frequent formative evaluations within and outside of class, and collaborates with colleagues to exchange ideas and contemplate teaching practices. This model accentuates the transition from teacher-centered to student-centered instruction and emphasizes the significance of active learning by referring to the method and setting in which students participate in learning, besides the physical classroom (Pratiwi et al., 2022, 2024).

Flipped Classroom: Traditional and Online Model

The progress of science and technology in the era of Society 5.0 has inspired many learning innovations. The “what to learn” approach has become obsolete and has been replaced by the “how to learn” approach. Accordingly, the innovation affects the “how to learn” of the flipped classroom model. The ‘traditional’ flipped classroom, which utilized video as the early model, developed into Website material, PDF material, and audio listening. Gamification can also facilitate the flipped classroom model due to its growing interest and positive impacts on student learning experience and outcomes. However, the reliance on technology and internet issues has become a significant challenge in the implementation of the flipped classroom (S.

Han, 2022). To overcome these challenges, schools can provide access to technology resources and offer training sessions to ensure students and parents are comfortable using the technology.

Furthermore, teachers can offer alternatives like providing physical resources in a paper-based method (Pratiwi et al., 2024). Flipped learning is a teaching method where direct instruction is done individually, allowing the group learning space to become an interactive environment where the educator assists students in applying concepts and engaging creatively with the subject matter (Bergmann & Sams, 2013). Flipping a class may result in flipped learning, but it is not guaranteed to do so. Some teachers may already implement aspects of flipped learning by assigning readings, films, or extra tasks for students to complete outside of class. However, for students to succeed in a flipped learning environment, teachers need to integrate the four essential components of the flipped classroom into their practice.

Patel (2021) argues that paper is a crucial educational tool as it offers a physical surface for students to structure and document their ideas, information, and innovation. According to the findings, students chose to write by hand since it assisted them in remembering the information that they had studied. In addition, paper has the potential to make it simpler for students to recognize and comprehend, and aid students in establishing a higher degree of active involvement and participation. Zhao and Watterston (2021) claim that students have the ability to engage with paper-based materials in a more profound manner than they would be enabled to do with content that is solely digital if they were able to grasp and touch the materials physically.

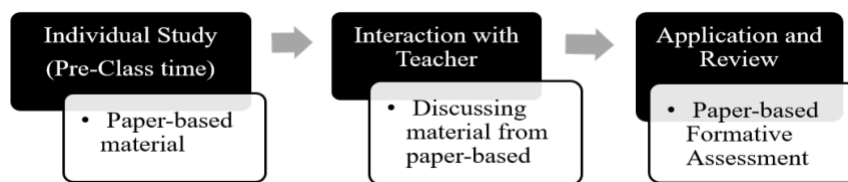


Figure 1. Traditional Flipped Classroom with Paper-based Method

Gamified technology, as part of an Interactive Response System in a flipped classroom setting, employs a flipped classroom concept that utilizes games to enhance student learning. In order to inspire players to engage in an activity that they would not find appealing in any other circumstance, the learning process entails the utilization of game components, such as incentive systems (Plass et al., 2015). Lam et al. (2023) argue that the game enhances the opportunity for users to learn in authentic environments. Therefore, the game-based method is implemented for delivering material in pre-class sessions, discussing unclear material, and completing assignments in class time. This method is appropriate for schools and students, and it provides complete support for technological devices, including computers or laptops, mobile phones or tablets, and an internet connection. Utilizing game design elements in education is intended to create more captivating and enjoyable learning settings (Waluyo & Bucol, 2021). In the same vein, gamification is defined as a strategic technique that utilizes game design ideas to establish an engaging and dynamic learning setting (Pratiwi & Waluyo, 2022).

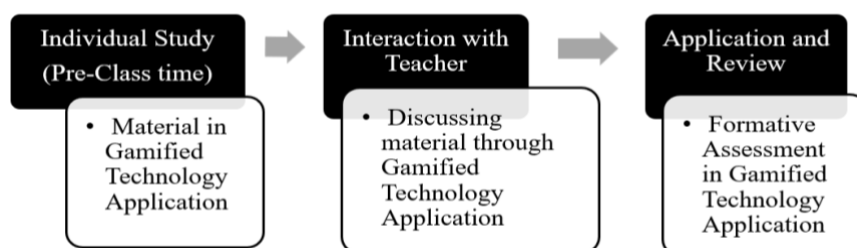


Figure 2. Online Flipped Classroom with Interactive Response System

Research has indicated that the implementation of a flipped classroom has received positive feedback from students in the EFL setting (Johnson, 2013; Pratiwi et al., 2024; Talan & Gulsecen, 2019). Pratiwi and Waluyo (2022) argued that technology has the potential to provide a learning environment where students can learn at their own speed and effectively achieve mastery. Furthermore, educators implementing the flipped classroom approach have the ability to incorporate supplementary components such as formative evaluations, inquiry-based problem-solving activities, and methods for accommodating diverse learning needs. This enables them to establish a more adaptable instructional environment compared to conventional classroom settings (Pratiwi et al., 2022). Johnson (2013) found out that students in a flipped classroom complete less homework assignments compared to students in a typical lecture-based classroom. However, students find the learning experience enjoyable in a flipped classroom environment.

Furthermore, students derive benefits from watching their lectures in shortened lesson videos. Similarly, Pratiwi et al. (2024), and Talan and Gulsecen (2019) stated that the learners expressed happiness with the implementation of the flipped classroom framework in the EFL context. Consequently, teachers have to pay attention to students' characteristics and needs before implementing the learning model in their EFL classroom (Pratiwi & Waluyo, 2022; Waluyo & Bucol, 2021). However, Teng (2017) argued that due to an overwhelming amount of learning materials in today's EFL learning, flipped learning can be a solution to this. Accordingly, the flipped classroom has been receiving increased attention at all levels of education (Anggoro & Khasanah, 2022; Arifani et al., 2020; Phoeun & Sengsri, 2021).

Vocabulary Learning Utilizing Interactive Response System (IRS)

According to Teng and Reynolds (2024), acquiring vocabulary is not merely the act of memorizing a set of words but rather an intricate and prolonged undertaking. It requires continual exercise to strengthen learners' innovative thinking, cognitive processes, communicative proficiency, and ability to infer meaning from context. For instance, we have all encountered the phenomenon of being able to comprehend and identify a word when encountering it in written form or hearing it in a discussion, yet lacking the ability to employ it oneself (Webb & Nation, 2017). Due to the complexity of the learning process, various strategies may be suitable at different stages of the gradual learning process, and learners must possess extensive lexicons in order to utilize a second language effectively; therefore, it is imperative to establish and strive for ambitious vocabulary goals (Schmitt, 2019). Instructors deliberately promote beneficial vocabulary, and unfamiliar words are frequently taught when they arise.

Research in Japanese university EFL classrooms revealed that the students positively perceived vocabulary learning using a paper-based method through simplified pictures (Bates & Son, 2020). In the context of learning and teaching English vocabulary through a paper-based method, it has been claimed that simple visual forms have the potential to serve as an alternate and supplementary option. Graphical representations, such as diagrams, drawings, and photographs, should be abundant in textbooks. This will make the content more engaging and easier to absorb, ultimately helping students improve their comprehension of foreign languages. In the same vein, a study in Saudi Arabian EFL classrooms found that students had more positive attitudes toward the use of image-associative methods in language classrooms than toward video or audio-associative methods (Alhamami, 2016). Further, Gallegos (2021) identified the impact of utilizing flashcards as a novel approach to enhance the acquisition and comprehension of English language vocabulary through a traditional paper-based method. The findings indicated that the use of flashcards had a beneficial impact on the acquisition of new vocabulary and, hence, on language learning as a whole. Some research findings have shown

less effectiveness in paper-based vocabulary learning compared to digital vocabulary learning (Ahmadian, 2015). The findings demonstrated that the contextualization of the words through the use of a computer had a more significant impact on vocabulary acquisition than the contextualization of the words through the use of paper.

There is a belief that incorporating an IRS through gamified technology platforms into vocabulary learning can effectively improve language acquisition by facilitating quicker and easier vocabulary acquisition for learners (Gokbulut, 2020; Wardoyo et al., 2021). IRS vocabulary learning serves as a method to engage and stimulate students' interest in learning words within a playful framework, while still providing comprehensive vocabulary training. A high-quality vocabulary game provides players with the opportunity to learn in meaningful and applicable situations, where crucial information is delivered promptly and aligned effectively with gamers' preferences (Qin & Hua, 2020). Vocabulary learning through gamification has transitioned to digital technologies that make use of Computer-Assisted Language Learning (CALL) and Mobile-Assisted Language Learning (MALL) in the form of IRS. Empirical research has demonstrated that interactive response system platforms are suitable for fulfilling both students' requirements in vocabulary learning and teachers' requirements in facilitating vocabulary learning, including *Google Forms*, *Socrative*, *Kahoot!*, *Quizizz*, and *Quizlet* (Anggoro, 2021; Rofiah & Waluyo, 2020). In the same vein, Wu et al. (2025) suggested that collaborative interactions in gaming can significantly enhance learner engagement by necessitating precise actions, effective communication, and emotional investment, thereby facilitating a deeper connection with the language being learned. Acquiring vocabulary via IRS enhances class participation beyond conventional classroom environments, incorporating digital platforms where behavioral, cognitive, and affective factors interact dynamically.

Research Methodology

This part outlined the methodology employed in the current study, which comprised five primary components: 1) research design, 2) contexts and participants, 3) research procedures, 4) data collection and instruments, and 5) data analysis.

Research Design

The present study employed a two-cycle classroom action research design. Action research emphasizes the benefits of action in research for improving practice and adopting an integrated approach to learning, as opposed to a single-subject style of teaching and learning (Cohen et al., 2017). In education, action research is manifested when teachers implement several changes to their teaching practices in an attempt to address emerging problems in the classroom and among their learners (Waluyo & Bakoko, 2021). Therefore, this study focused on exploring the effectiveness of using paper-based materials in a traditional flipped classroom compared to IRS materials in an online flipped classroom to teach vocabulary.

In the first cycle, the learners were taught using paper-based vocabulary materials in the traditional flipped classroom environment. In the second cycle, the learners were taught using gamified vocabulary materials in the online flipped classroom setting. The study lasted for 13 weeks, during which each cycle consisted of a 5-week teaching-learning process and 3 weeks for conducting pretest and posttest. Following the posttests, online open-ended surveys were distributed to the students to gather their thoughts and comments on the vocabulary learning model in each cycle.

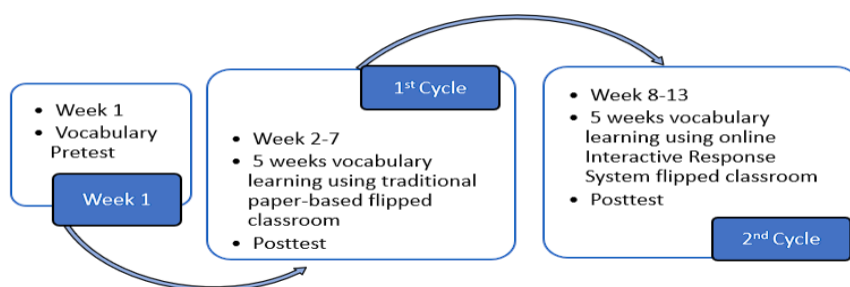


Figure 3. Research Design

Context and Participants

The study was conducted in the 2nd semester of the 2023/2024 academic year at an Indonesian Polytechnic. As a single-subject study in action research design, this study utilized a purposive sampling method. The participants were first-year students in the Railway Mechanical Technology study program, comprising 46 students. They enrolled in General English II with proficiency at a low level (under 70 out of 100 points), which was equivalent to basic users in the Common European Framework of Reference for Languages (CEFR). Ranging in age from 18 to 20 years old, all participants were informed and agreed to participate in the research, and the results did not affect their scores.

Research Procedure

General English II was an integrated English subject that encompassed listening, reading, structure, vocabulary, and writing. There were 16 meetings in a semester, including mid-semester and final-semester tests – the teaching and learning process lasted for 14 meetings. Each meeting lasted for 150 minutes. The vocabulary learning used in this study spanned 13 sessions, each with a duration of approximately 30 minutes. Since the present study implemented the flipped classroom model, the material was provided as pre-class activities outside the classroom one week prior to the start of class (see Table 1). In the first cycle, the activities were conducted using a face-to-face model with paper-based materials. In the second cycle, the activities were held fully online through a Zoom meeting, utilizing several Interactive Response System (IRS) platforms, including *Quizlet*, *Quizzes*, *Kahoot!*, and *Socrative*.

Table 1. Learning Procedure

Week	Learning Method	Learning Media	Materials and Activities	
			Pre-Class	During Class
1	Offline	<i>Google Form</i>	-	Pretest
2	Offline	Paper-based	Vocabulary set 1	Discussion and review
3	Offline	Paper-based	Vocabulary set 2	Discussion and review
4	Offline	Paper-based	Vocabulary set 3	Discussion and review
5	Offline	Paper-based	Vocabulary set 4	Discussion and review
6	Offline	Paper-based	Vocabulary set 5	Discussion and review
7	Offline	Paper-based, <i>Google Form</i>	-	Posttest 1 and Survey
8	Online	<i>Quizlet</i> , <i>Quizizz</i>	Vocabulary set 6	Games on <i>Quizizz</i>
9	Online	<i>Quizlet</i> , <i>Kahoot!</i>	Vocabulary set 7	Games on <i>Kahoot!</i>
10	Online	<i>Quizlet</i> , <i>Quizizz</i>	Vocabulary set 8	Games on <i>Quizizz</i>
11	Online	<i>Quizlet</i> , <i>Kahoot!</i>	Vocabulary set 9	Games on <i>Kahoot!</i>
12	Online	<i>Quizlet</i> , <i>Socrative</i>	Vocabulary set 10	Games on <i>Socrative</i>
13	Online	<i>Socrative</i> , <i>Google Form</i>	-	Posttest 2 and Survey

In the 1st week, a pretest was administered to determine students' basic vocabulary knowledge. After completing the pretest, students received vocabulary paper-based material as a pre-class activity for the 2nd meeting. The students had to fill out a table that consisted of parts of speech, their meanings, and corresponding sentences. During offline class activities, the task was discussed, and synonyms and antonyms of the word were listed. The pre-class materials were

delivered after the in-class activities were finished. The activities were repeated till the 6th week. In the 7th week, a posttest (posttest 1) was administered to measure students' learning outcomes of vocabulary learning utilizing paper-based materials in the traditional flipped classroom environment. After the posttest, a student survey was distributed to collect their opinion on the paper-based method in the face-to-face flipped classroom environment.

At the end of the seventh week, students were provided with a link to access the 6th vocabulary set material on *Quizlet* as pre-class tasks. On the platform, they can self-directed learning through flashcards, learn, test, and match. In the 8th week, the students discussed the materials through several IRS platforms such as *Quizizz*, *Kahoot!*, and *Socrative*. After finishing the in-class activities, the pre-class activity link for the next meeting was delivered. The activities were repeated till the 12th week. In the 13th week, the students did a posttest (posttest 2) as vocabulary evaluation to find out students' vocabulary learning outcomes utilizing IRS platforms through gamified technology applications in the online flipped classroom setting. The students' survey to collect their opinions toward the IRS in the fully online flipped classroom environment was distributed after the posttest.

The material for vocabulary learning was drawn from the Academic Word List (AWL), which comprises scientific vocabulary consisting of context-independent formal words with high frequency and a wide range of occurrence across various scientific disciplines (Dizon, 2016). It was purported to encompass vocabulary often found in academic books, making it a valuable gauge of learners' academic proficiency (Gholaminejad & Sarab, 2021). The present study selected 300 words from AWL and delivered 30 words per week to the students. (Table 2)

Table 2. Vocabulary List 1

No	Words	Part of Speech	Meaning	Sentences
1	analysis	N	the act of studying or examining something in detail	Some of these arguments need further analysis.
2	approach	V	to come near or nearer to something or someone in space, time, quality, or amount	We could just see the train approaching in the distance.
3	area	N	a particular part of a place, piece of land, or country	All areas of the country will have some rain tonight.
4	assessment	N	the act of judging or deciding the amount, value, quality or importance of something	We conduct an annual assessment of the system to determine the need for any safety improvements.
5	assume	V	to accept something to be true without question or proof	I assumed that you knew each other because you went to the same school.

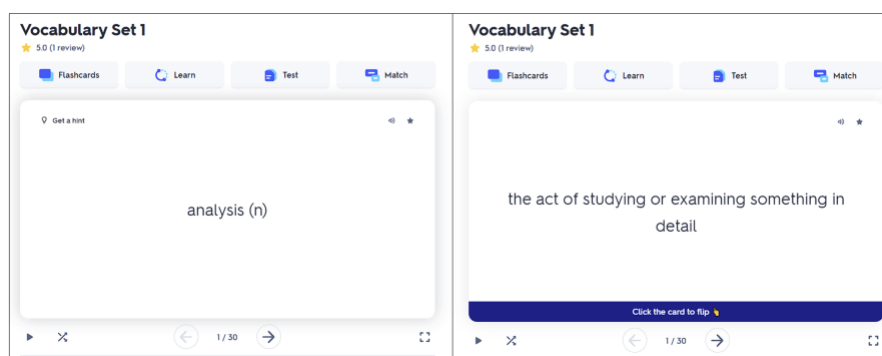


Figure 4. Vocabulary List Material in *Quizlet*

Data Collection and Instruments

The data for the study were gathered from the results of pretest, posttests, and students' surveys. The pretest was conducted at the beginning of the class (1st week) to assess students' prior vocabulary knowledge. The posttests were performed twice: after the 1st cycle (7th week) and

after the 2nd cycle (13th week). Both pretest and posttest were adapted from previous research conducted by Pratiwi et al. (2024). To assess vocabulary knowledge, there were 50 multiple-choice questions consisting of synonyms, antonyms, definitions, sentence completion, and parts of speech. Despite acknowledging the limitations of the multiple-choice format in fully capturing vocabulary proficiency, particularly in contextual application, it was utilized for its standardized and efficient data collection capabilities. All tests had different questions, but they shared the same aspects and qualities.

<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: right;"> Name _____ Date _____ Score _____ </div> </div> <h3 style="text-align: center; margin-top: 10px;">Pretest Vocabulary</h3> <hr/> <ol style="list-style-type: none"> 1. Business class is sold out, but there are still a few seats <u>available</u> in first class. What is the part of speech of the underlined word? <input type="radio"/> (A) Noun <input type="radio"/> (B) Verb <input type="radio"/> (C) Adjective <input type="radio"/> (D) Adverb 2. Complete the sentence! Government sources a long-term 50 percent increase in rail fares in 2023. <input type="radio"/> (A) estimate <input type="radio"/> (B) approach <input type="radio"/> (C) identify <input type="radio"/> (D) assume 3. The new development will <u>create</u> hundreds of jobs in the area. What is the synonym of the underlined word? <input type="radio"/> (A) contract <input type="radio"/> (B) generate <input type="radio"/> (C) formula <input type="radio"/> (D) income 	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: right;"> Name _____ Date _____ Score _____ </div> </div> <h3 style="text-align: center; margin-top: 10px;">Posttest Vocabulary</h3> <hr/> <ol style="list-style-type: none"> 1. There has been a <u>consistent</u> improvement in her attitude. What is the part of speech of the underlined word? <input type="radio"/> (A) Noun <input type="radio"/> (B) Verb <input type="radio"/> (C) Adjective <input type="radio"/> (D) Adverb 2. Complete the sentence! The research will be used to training needs. <input type="radio"/> (A) identify <input type="radio"/> (B) assume <input type="radio"/> (C) estimate <input type="radio"/> (D) approach 3. I haven't had much <u>income</u> from my stocks and shares this year.. What is the synonym of the underlined word? <input type="radio"/> (A) distribution <input type="radio"/> (B) earning <input type="radio"/> (C) formula <input type="radio"/> (D) function
---	---

Figure 5. Pretest and Posttest Sample Questions

The survey was conducted to gather students' opinions about vocabulary learning in a flipped classroom environment, using each learning method. It was in an open-ended questionnaire distributed online through *Google Forms*. Their comments were anonymous, allowing students to express their thoughts freely. The survey results were used to support the quantitative data, providing comprehensive insights into the vocabulary teaching method.

Please share your thoughts, comments, and suggestions about <u>Offline</u> Paper-based Flipped Classroom
Please share your thoughts, comments, and suggestions about <u>Online</u> Game-based Flipped Classroom

Figure 6. Open-Ended Survey

Data Analysis

The data analysis involved two sets of data: students' vocabulary test scores (quantitative) and survey results (qualitative). The quantitative data were analyzed in SPSS using descriptive statistics and correlation analysis (paired sample t-test), while the qualitative data utilized content analysis to support the quantitative findings. The results of the data analysis were triangulated to answer research questions about the impact of the traditional flipped classroom, utilizing the paper-based method, and the online flipped classroom, utilizing the interactive response system.

Results and Discussion

Students' Vocabulary Learning Outcomes

The results of descriptive statistics analysis in Table 3 showed that students' learning outcomes improved from pretest to posttest 1 and posttest 2. Posttest 1 resulted from vocabulary scores at the 1st cycle, which employed the paper-based method in the face-to-face flipped classroom environment. Posttest 2 was the result of vocabulary scores at the 2nd cycle, which utilized the interactive responses system in the online flipped classroom environment. The *Skewness* and *Kurtosis* values indicated that the data was normally distributed, as the results fell within the range of -2 to +2. Therefore, the data fulfilled the assumptions for a paired sample t-test analysis.

Table 3. Results of Descriptive Statistics (N = 46)

	M	SD	Skewness		Kurtosis	
			Value	SE	Value	SE
Pretest	41.587	14.361	1.023	.350	.702	.688
Posttest 1	46.587	12.519	.752	.350	.017	.688
Posttest 2	63.369	13.006	-.089	.350	-1.066	.688

The results of paired sample t-test displayed a significant difference between students' vocabulary scores from pretest and offline paper-based flipped classroom, pretest and online IRS flipped classroom, and offline paper-based and online IRS flipped classroom.

Table 4. Results of Paired Sample t-test Comparison of Means

Paired -test	Mean Diff.	SD	SE Mean	95% Confidence Interval of the Difference		t	df	p
				Lower	Upper			
				Pre-Post 1	-5.000			
Pre-Post 2	-21.782	13.111	1.933	-25.676	-17.889	-11.268	45	.000
Post 1-Post 2	-16.782	12.928	1.906	-20.621	-12.943	-8.804	45	.000

The correlation was moderate for all paired test, yet the effect size was different. The effect size for the pretest and posttest of the offline paper-based flipped classroom was moderate, whereas the paired sample t-test between the pretest and posttest of the online IRS flipped classroom had a large effect size. This meant that traditional paper-based and fully online IRS flipped classrooms effectively boosted students' vocabulary learning outcomes. Specifically, the mean differences showed that the fully online IRS flipped classroom received higher scores on their Pre-Post test (1) than the offline paper-based flipped classroom Pre-Post test (2).

Table 5. Results of Paired Sample t-test Correlation

Paired -test	r	p	d
Pre-Post 1	.480	.001	.371
Pre-Post 2	.545	.000	1.590
Post 1-Post 2	.487	.001	1.315

Comparing the offline paper-based flipped classroom posttest and the online IRS flipped classroom posttest yielded a moderate correlation and a large effect size ($r = .487$, $d = 1.315$). The mean difference revealed that the online IRS flipped classroom enhanced students' vocabulary learning scores more than the offline paper-based flipped classroom ($M_D = 16.782$, $SD_D = 12.928$). As a significant difference was observed, the results indicated that the online IRS flipped classroom was more effective than the offline paper-based flipped classroom in enhancing students' vocabulary learning outcomes.

Students' Perceptions of Paper-Based in Offline Flipped Classroom

The content analysis results showed that the students' responses highlight two main aspects: benefits and challenges. In the open-ended survey distributed to 46 students, 91% shared their viewpoints, while 9% perhaps did not respond to the open-ended question. From 91% of the views, 48% reflected the benefits of the offline paper-based flipped classroom. A total of 43% students shared the challenges. Students' views of the benefits were categorized into two aspects: 1) enhanced preparation and comprehension, and 2) increased engagement and enjoyment. On the other hand, students' views on the challenges were identified into two parts: 1) paper-based format issues, and 2) fatigue and boredom. Table 6 presents the virtues of the offline paper-based flipped classroom in vocabulary learning based on the two categories.

Table 6. Students' Viewpoints of Offline Paper-Based Flipped Classroom Benefits

Benefits	Viewpoints
1. Enhanced Preparation and Comprehension	1.1 Activities before class prepare yourself usefully.
	1.2 Before going to class, there is a test to review the lessons learned. I feel very good.
	1.3 Have a test before class helps to practice good learning skills.
	1.4 Help in adjusting the learning of the content because have a test before class.
	1.5 I really like that before studying there is a test to do. It made me understand the lesson better.
2. Increased Engagement and Enjoyment	2.1 Before going to class, there are activities together which is great.
	2.2 I'm very happy when I learn English.
	2.3 I'm so excited.
	2.4 I am happy in the class. Thank you with knowledge. I love teacher.
	2.5 I'm happy when I study English.

Albeit the use of paper in offline flipped classrooms provided many benefits in vocabulary learning, several challenges had also been observed – these challenges related to paper-based issues, fatigue, and perceived monotony. Fatigue referred to the students' viewpoints, which showed a state of tiredness, while perceived monotony dealt with the feeling of boredom. Table 5 displays the hurdles of the offline paper-based flipped classroom in vocabulary learning.

Table 7. Students' Viewpoints of Offline Paper-Based Flipped Classroom Challenges

Challenges	Viewpoints
1. Paper-based issues	1.1 I don't like the activities using paper.
	1.2 The activities before class make me more prepared for class, but my paper often lost, so I need to copy it again and again.
	1.3 I want teacher give us spare paper because my paper often lost.
	1.4 The activities are very good. It's like learning by yourself before 1 round. But the paper is useless.
	1.5 My paper was lost, so I can't study.
2. Fatigue and boredom	2.1 Doing paper every week is tiring.
	2.2 It's a very helpful activity but tired.
	2.3 I thought it would be something boring and difficult.
	2.4 I thought this subject was difficult when I came to class, and it was boring because paper is not good.

Students' Perceptions of Interactive Response System in Online Flipped Classroom

The content analysis results showed that the impact of the IRS in online flipped classrooms dealt with the benefits and challenges. Based on the survey, 94% of respondents shared their viewpoints, while 6% did not provide any input. From 94% of the views, 87% reflected the benefits of the online IRS flipped classroom. A total of 7% students shared the challenges. Students' views of the benefits were categorized into two aspects: 1) knowledge integration, and 2) enhanced engagement and enjoyment. However, students' views of the challenges were identified into two parts: 1) internet connection issues, and 2) learning anxiety.

The first benefit highlighted that the IRS improved knowledge integration. The IRS assisted the students in having a better understanding of the material and acquiring knowledge effectively. Besides, the IRS supported the students to grasp the notion and retain information, which enhanced their learning outcomes. The second benefit of the IRS in the online flipped classroom underscored that the IRS enhanced engagement and enjoyment. The IRS improved the learning process to be more interactive and enjoyable. This learning experience also encouraged the students' active participation in classroom activities, making them feel more engaged in the learning process. The following table of students' responses gave evidence for the virtues of IRS in an online flipped classroom context.

Table 8. Students' Viewpoints of Online IRS Flipped Classroom

Benefits	Viewpoints
1. Knowledge integration	1.1 During the study, I had fun and felt that I had gained knowledge along with it.
	1.2 I think your teaching is very good for me. It makes me understand the lesson more and enjoy it.
	1.3 I felt fun and started to understand better. And teachers also teach easy-to-understand and fun.
	1.4 It's the most fun learning I've ever learned. Because teachers teach with games along with, but all are content in the lesson and knowledge that can be used.
	1.5 The activities make me more understanding the lesson in fun and interesting ways
2. Enhanced Engagement and Enjoyment	2.1 It's fun to study and the teachers are very attentive to the students. They work in groups with friends and exchange ideas.
	2.2 During the class, there are fun and educational activities.
	2.3 The activities during class are what I enjoy the most because it's so fun.
	2.4 I enjoy doing activities in games because it's fun.
	2.5 It's so much fun and happiness because we can learn English through games before and during the class activities.

Table 9 revealed two challenges students faced when implementing the IRS. The internet connection issues can impede students' engagement and enjoyment during classroom activities using IRS, as a lagging internet connection can create boredom. Further, some students showed learning anxiety during the class as they thought that they did not have good English competence, so they could not follow the class well. Instead, the learning anxiety led them to feel a little pressure during the learning process.

Table 9. Students' Viewpoints of Online IRS Flipped Classroom

Challenges	Viewpoints
1. Internet connection issue	1. Sometimes I think doing activities is boring because my internet connection is lagging
2. Learning anxiety	2.1 Feel fun, comfortable, happy to study, may have a little pressure
	2.2 I'm not good at English. Sometimes it doesn't work out well.

Discussion

The discussion of this study highlights two main points regarding the impact of paper-based instruction in an offline flipped classroom and IRS in an online flipped classroom, based on students' learning outcomes and perceptions after joining the classes. First, both methods have successfully increased students' learning outcomes in vocabulary learning. Accordingly, some empirical research has confirmed that visualization through a paper-based method is beneficial for comprehending English vocabulary learning (Alhamami, 2016; Bates & Son, 2020; Gallegos, 2021). However, this contradicts the previous study, which claimed that students' vocabulary learning outcomes in online IRS outperformed those in the paper-based method (Ahmadian, 2015; Gokbulut, 2020; Rofiah & Waluyo, 2020). The discrepancy might lie in the nature of learners' attitudes and knowledge backgrounds in experiencing both vocabulary learning methods, as suggested by Wu et al. (2025).

Second, the results of students' perceptions were categorized into two main points – benefits and challenges, based on each vocabulary learning method. As discernible from the results of the study, the benefits of offline paper-based flipped classrooms consisted of improving academic readiness and engagement. The students reported that the pre-class activities were helpful in preparing for and comprehending the discussed material. Besides, the offline flipped classroom approach fostered increased engagement and enjoyment, making the learning experience more interactive and enjoyable for students. These findings align with those of Khanova et al. (2015) and Wanner and Palmer (2015), who found that the flipped classroom fosters engagement, pre-lecture preparation, and enhances enjoyment. The challenges of the offline paper-based flipped classroom in this study relate to paper-based issues and the associated fatigue and boredom. The students reported difficulties in managing paper-based resources, which led to an increased workload and decreased engagement. Moreover, the monotonous nature of paper-based tasks contributed to feelings of fatigue and boredom. These findings are in the same vein as Pratiwi et al. (2024), who revealed that paper-based methods can lead to student boredom and difficulty in preserving materials, which can easily be damaged or lost.

On the other hand, the findings collectively demonstrated the students' viewpoints on the benefits of IRS utilization in the online flipped classroom, which included enhancing students' knowledge integration and affective engagement. This was in line with the findings of Anggoro and Pratiwi (2023a) and Wu et al. (2025) in which the students viewed that the IRS contributed to students' better comprehension and understanding of the materials due to it pointed out its efficacy in recalling, processing, correcting, and reinforcing learned material. This current finding was also congruent with the findings of Balta and Awedh (2017), who reported that IRS enhanced students' engagement in the class, which in turn supported students' learning outcomes. This aligns with the work of Wang (2018), who explored the implementation of IRS among college students, underscoring that it fostered course participation, promoted interaction, and enhanced classroom enjoyment. Thus, the integration of the IRS in online flipped classrooms facilitated knowledge comprehension and enhanced students' engagement, supporting its efficacy as emphasized in prior studies. While the use of the IRS in online flipped classrooms offers numerous benefits, it is not without its challenges.

Moreover, the findings revealed two challenges students faced when implementing Interactive Response Systems (IRS). This finding adheres to Anggoro and Pratiwi (2023b) and Aslan and Şeker (2017), who found that the internet connection problems impacted students' accessibility to the IRS, which caused difficulties in answering questions and using the program. Another challenge, learning anxiety, was identified as a barrier to students' engagement with IRS integration in online flipped classrooms. In this context, learning anxiety deals with students' anxiety in grasping the learning materials and the anxiety in answering the IRS due to the real-time responses. Albeit most previous studies highlighted that the IRS implementation could reduce students' learning anxiety (Chang & Lin, 2019; Cheng & Chen, 2022; Xiangming et al., 2020), this finding added a nuanced perspective by demonstrating that the pressure of real-time interaction can enhance anxiety for some students.

Capturing the benefits and challenges of offline paper-based flipped classrooms and online IRS flipped classrooms in vocabulary learning contributed to a broader understanding of the potential and limitations of these approaches, as well as finding solutions to the issues. Therefore, teachers and lecturers need to consider the benefits and challenges to create engaging and meaningful learning environments that achieve learning goals and enhance students' learning outcomes. Furthermore, the study emphasizes that the choice between an offline paper-based flipped classroom and an online IRS flipped classroom should be determined by the learning context, students' needs, and the institution's resources. By

mapping the benefits, challenges, and potential solutions in vocabulary learning, it fosters the teachers to purposefully adopt, adapt, or hybridize these approaches.

Implications and Recommendations

Expanding further on the implications of the study for English vocabulary teaching and learning, course designs in higher education, curriculum development, and policy in English teaching and learning require a deeper exploration of how these insights can be operationalized to enhance educational practices and outcomes.

English Vocabulary Classroom Teaching and Learning. The nuanced findings of this study suggest a paradigm shift in classroom teaching and learning towards a more learner-centered approach. Educators are encouraged to employ diagnostic assessments to understand the learning styles of their students better. This understanding can inform the tailored use of IRS to engage and motivate students while employing paper-based methods to reinforce learning and ensure depth of understanding. The integration of technology should be strategic, enhancing learning without detracting from the educational goals. This requires educators to be not only proficient in technological tools but also skilled in pedagogical strategies that effectively blend traditional and modern teaching methods.

Course Designs in Higher Education. Regarding course design in higher education, the findings suggest a holistic approach that integrates various teaching methods and assessment strategies to cater to the diverse needs of learners. Course designs should incorporate elements of IRS to stimulate interest and motivation alongside traditional exercises that promote critical thinking and deep learning. Courses should be structured to allow for adaptive learning paths, where students can progress at their own pace and according to their own needs. Assessments should be varied, combining formative assessments that provide ongoing feedback with summative assessments that evaluate comprehensive learning outcomes. This approach ensures that courses are not only engaging and relevant but also rigorous and effective in achieving learning objectives.

Curriculum Development. For curriculum development, this study highlights the importance of creating curricula that are both flexible and comprehensive, integrating a wide range of learning activities that cater to different learning preferences. The curriculum should include clear objectives for vocabulary acquisition, incorporating both core and supplementary materials that leverage vocabulary learning by utilizing IRS for engagement and traditional resources for depth. Additionally, it should offer structured pathways for educators' professional growth, focusing on developing their pedagogical and technological skills to adapt to evolving teaching contexts and emerging educational technologies.

Policy in English Teaching and Learning. In terms of policy, the implications extend to the support structures necessary for the effective implementation of innovative teaching and learning strategies. Policies should prioritize the development of a robust digital infrastructure that facilitates access to educational technologies and resources for both students and educators. This includes providing platforms for online learning, digital libraries with access to a wide range of materials, and support for developing custom gamified learning applications. Furthermore, policies should advocate for continuous professional development programs that are accessible and relevant, enabling educators to stay abreast of the latest educational technologies and teaching methodologies.

Conclusion

The flipped classroom has sparked interest in EFL classes within the higher education context, replacing the 'what to learn' approach with the 'how to learn' approach in the increasingly

technological era, inspiring learning innovations. Previously, the flipped classroom model was implemented using a traditional technique that employed video in an offline setting. Then, the model evolved into an online setting to link distance learning in the current educational era. While vocabulary is the core of language knowledge, it is tedious to acquire a massive number of words at once. The present study reports the students' vocabulary learning outcomes and explores the impacts of a traditional flipped classroom and an online IRS flipped classroom. Both flipped classroom methods improve vocabulary learning outcomes and enhance students' engagement and enjoyment. However, the results reveal the differences in effectiveness levels and how the methods support students in vocabulary learning. The online IRS flipped classroom surpasses the traditional flipped classroom in terms of efficacy. While the traditional flipped classroom benefits students in terms of learning preparation, the monotony can lead to fatigue. Moreover, the online IRS flipped classroom supports knowledge integration; however, there are internet connection problems and learning anxiety. Therefore, teachers and policymakers related to education should collaborate to create engaging and meaningful learning environments that achieve the learning goals. Several pedagogical implications concerning English vocabulary teaching and learning, course designs in higher education, curriculum development, and policy in English teaching have been discussed to imply the impacts of a fully online flipped classroom utilizing IRS in vocabulary learning.

As much as this study intends to offer, there are several limitations that have to be acknowledged. First, an integrated English subject could lead to time limitations, which creates learners' anxiety. Focusing an EFL class on vocabulary learning may yield different results, which more precisely reflect the effectiveness of the flipped classroom in vocabulary learning. Second, the notion of technology usage has its limits. The IRS platforms and online classroom setting depend much on the internet connection. The teaching and learning process can be entirely ineffective without supportive infrastructure. Therefore, it is essential to note that the inclusion of IRS in an online flipped vocabulary classroom may enhance students' learning outcomes and engagement, provided that the school and related education policymakers accommodate the requisite learning assistance. Third, the utilization of multiple-choice vocabulary tests has its limitations in the context of vocabulary use in contextualized communication. Hence, future research may enrich the findings by integrating vocabulary assessment tools, including oral interviews, portfolio assessments, and discourse analysis, to achieve a more comprehensive understanding of vocabulary acquisition.

About the Authors

Damar Isti Pratiwi is an Assistant Professor at Politeknik Perkeretaapian Indonesia Madiun, Indonesia. She holds Bachelor's, Master's, and Doctoral degrees in English Education from Universitas Negeri Semarang, Indonesia. Her research interests include Teaching English as a Foreign Language (TEFL), technology-enhanced learning, and educational technology integration in higher education. ORCID ID: 0000-0002-8009-0215.

Candradewi Wahyu Anggraeni is an Assistant Professor in English Education Department at Universitas Tidar. She obtained her Doctor of Language Education degree from Universitas Negeri Semarang. Her research interests involve English language teaching, writing, technology-enabled learning, and self-regulated learning. ORCID ID: 0000-0003-1610-1124.

To Cite this Article

Pratiwi, D. I. & Anggraeni, C. W. (2026). Exploring online flipped classroom utilizing interactive response system in vocabulary learning for low-proficiency students. *Teaching English as a Second Language Electronic Journal (TESL-EJ)*, 29(4).
<https://doi.org/10.55593/ej.29116int2>

References

- Ahmadian, M. (2015). A comparative study of paper-based and computer-based contextualization in vocabulary learning of EFL students. *Advances in Language and Literary Studies*, 6(2). <https://doi.org/10.7575/aiac.all.v.6n.2p.96>
- Aidoo, B., Vesterinen, V. M., Macdonald, M. A., Gísladóttir, B., & Pétursdóttir, S. (2022). Perceptions of Ghanaian student teachers on benefits and challenges of the flipped classroom: a case study. *Contemporary Educational Technology*, 14(4). <https://doi.org/10.30935/cedtech/12163>
- Alhamami, M. (2016). Vocabulary learning through audios, images, and videos: linking technologies with memory. *Computer Assisted Language Learning Electronic Journal (CALL-EJ)*, 17(2), 87–112. <http://www.calleg.org/journal/17-2/Alhamami2016.pdf#>
- Al-Labadi, L., & Sant, S. (2021). Enhance learning experience using technology in class. *Journal of Technology and Science Education*, 11(1), 44–52. <https://doi.org/10.3926/jotse.1050>
- Althubaiti, A., & Althubaiti, S. M. (2024). Flipping the online classroom to teach statistical data analysis software: a quasi-experimental study. *SAGE Open*, 14(1), 1–12. <https://doi.org/10.1177/21582440241235022>
- Anggoro, K. J. (2021). Pear deck. *RELC Journal*, 52(3), 645–647. <https://doi.org/10.1177/0033688220936735>
- Anggoro, K. J., & Khasanah, U. (2022). A flipped classroom model to improve students' online EFL. *TESOL Journal*, 13(1), e631. <https://doi.org/10.1002/tesj.631>
- Anggoro, K. J., & Pratiwi, D. I. (2023a). Fostering self-assessment in English learning with a generative AI platform: a case of Quizizz AI. *Studies in Self-Access Learning Journal*, 14(4), 489–501. <https://doi.org/10.37237/140406>
- Anggoro, K. J., & Pratiwi, D. I. (2023b). University students' perceptions of interactive response system in an English language course: a case of Pear Deck. *Research in Learning Technology*, 31, 1–13. <https://doi.org/10.25304/rlt.v31.2944>
- Arifani, Y., Asari, S., Anwar, K., & Budianto, L. (2020). Individual or collaborative whatsapp learning? a flipped classroom model of EFL writing instruction. *Teaching English with Technology*, 20(1), 122–139. <https://tewtjournal.org/download/8-individual-or-collaborative-whatsapp-learning-a-flipped-classroom-model-of-efl-writing-instruction-by-yudhi-arifani-slamet-asari-khoirul-anwar-and-langgeng-budianto/>
- Aslan, B., & Şeker, H. (2017). Interactive response systems (IRS) socrative application sample. *Journal of Education and Learning*, 6(1), 167–174. <https://doi.org/10.5539/jel.v6n1p167>
- Balta, N., & Awedh, M. H. (2017). The effect of student collaboration in solving physics problems using an online interactive response system. *European Journal of Educational Research*, 6(3), 385–394. <https://doi.org/10.12973/eu-jer.6.3.385>
- Bates, J., & Son, J. B. (2020). English vocabulary learning with simplified pictures. *Teaching English as a Second Language Electronic Journal (TESL-EJ)*, 24(3). <https://www.tesl-ej.org/pdf/ej95/a12.pdf>
- Bergmann, J., & Sams, A. (2013). Flipping for mastery. *Educational Leadership*, 71(4). <https://www.ascd.org/el/articles/flipping-for-mastery>

- Chang, C., & Lin, H.-C. K. (2019). Classroom interaction and learning anxiety in the IRS-integrated flipped language classrooms. *The Asia-Pacific Education Researcher*, 28(3), 193–201. <https://doi.org/10.1007/s40299-018-0426-x>
- Cheng, C. H., & Chen, C. H. (2022). Investigating the impacts of using a mobile interactive English learning system on the learning achievements and learning perceptions of student with different backgrounds. *Computer Assisted Language Learning*, 35(1–2), 88–113. <https://doi.org/10.1080/09588221.2019.1671460>
- Cohen, L., Manion, L., & Morrison, K. (2017). *Research methods in education* (8th ed.). Routledge. <https://doi.org/10.4324/9781315456539>
- Dermentzi, E. (2024). Using game-based learning and online flipped classrooms with degree apprenticeship students. *Journal of Computer Assisted Learning*, 40(2), 494–509. <https://doi.org/10.1111/jcal.12896>
- Dizon, G. (2016). Quizlet in the EFL classroom: enhancing academic vocabulary acquisition. *Teaching English with Technology*, 16(2), 40–56. <https://tewtjournal.org/download/4-quizlet-in-the-efl-classroom-enhancing-academic-vocabulary-acquisition-of-japanese-university-students-by-gilbert-dizon/>
- Domu, I., Pinontoan, K. F., & Mangelep, N. O. (2023). Problem-based learning in the online flipped classroom: its impact on statistical literacy skills. *Journal of Education and E-Learning Research*, 10(2), 336–343. <https://doi.org/10.20448/jeelr.v10i2.4635>
- Dusengimana, C., Munyemana, J. J., & Mugabe, G. (2023). Trends in the use of flipped classroom model and its effectiveness in higher learning education: a systematic review. *African Educational Research Journal*, 11(4), 616–633. <https://doi.org/10.30918/aerj.114.23.096>
- Gallegos, H. N. H. (2021). *Flashcards and vocabulary learning* [Universidad Técnica De Ambato]. <https://repositorio.uta.edu.ec/server/api/core/bitstreams/629121ec-e8a3-4128-9290-28d657276bca/content>
- Gholaminejad, R., & Sarab, M. R. A. (2021). A comparison of the academic word list and the academic vocabulary list: should the AVL replace the AWL? *Teflin Journal*, 32(1), 167–182. <https://doi.org/10.15639/teflinjournal.v32i1/167-182>
- Gok, D., Bozoglan, H., & Bozoglan, B. (2023). Effects of online flipped classroom on foreign language classroom anxiety and reading anxiety. *Computer Assisted Language Learning*, 36(4), 840–860. <https://doi.org/10.1080/09588221.2021.1950191>
- Gokbulut, B. (2020). The effect of mentimeter and kahoot applications on university students' e-learning. *World Journal on Educational Technology: Current Issues*, 12(2), 107–116. <https://doi.org/10.18844/wjet.v12i2.4814>
- Han, S. (2022). Flipped classroom: challenges and benefits of using social media in English language teaching and learning. *Frontiers in Psychology*, 13(September), 1–11. <https://doi.org/10.3389/fpsyg.2022.996294>
- Han, W., & Hamzah, M. (2024). Research on the influence of flipped classroom on self-efficacy in English language learning of Chinese higher vocational college students. *Discover Education*, 3(11). <https://doi.org/10.1007/s44217-024-00097-8>
- Hehir, E., Zeller, M., Luckhurst, J., & Chandler, T. (2021). Developing student connectedness under remote learning using digital resources: a systematic review. *Education and Information Technologies*, 26(5), 6531–6548. <https://doi.org/10.1007/s10639-021-10577-1>

- Johnson, G. B. (2013). *Student perceptions of the flipped classroom* [The University of British Columbia]. <https://doi.org/10.1080/10511970.2015.1054011>
- Khanova, J., Roth, M. T., Rodgers, J. E., & McLaughlin, J. E. (2015). Student experiences across multiple flipped courses in a single curriculum. *Medical Education*, *49*(10), 1038–1048. <https://doi.org/https://doi.org/10.1111/medu.12807>
- Lam, M. C., Lim, S. M., & Tan, S. Y. (2023). User evaluation on a mobile augmented reality game-based application as a learning tool for biology. *TEM Journal*, *12*(1), 550–557. <https://doi.org/10.18421/TEM121>
- Marshall, H. W., & Kostka, I. (2020). Fostering teaching presence through the synchronous online flipped learning approach. *Teaching English as a Second Language Electronic Journal (TESL- EJ)*, *24*(2), 1–14. <https://tesl-ej.org/pdf/ej94/int.pdf>
- Niemi, L. H. L., Kangas, J., & Köngäs, M. (2024). Blending pedagogy: equipping student teachers to foster transversal competencies in future-oriented education. *Frontiers in Education*, *9*(May), 1–9. <https://doi.org/10.3389/educ.2024.1373176>
- Oguguo, B. C. E., Okeke, A. O., Dave-Ugwu, P. O., Ocheni, C. A., Ugorji, C. O., Nwoji, I. H. N., & Ike, I. C. (2020). Assessment of ICT skills relevant for effective learning possessed by undergraduate students at university of Nigeria. *International Journal of Higher Education*, *9*(4), 206–215. <https://doi.org/10.5430/ijhe.v9n4p206>
- Patel, N. (2021). *Why is paper important in education & learning*. Smart Paper. <https://www.smartpaperapp.com/post/why-is-paper-important-in-education>
- Phoeun, M., & Sengsri, S. (2021). The effect of a flipped classroom with communicative language teaching approach on undergraduate students' English speaking ability. *International Journal of Instruction*, *14*(3), 1025–1042. <https://doi.org/10.29333/iji.2021.14360a>
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist*, *50*(4), 258–283. <https://doi.org/10.1080/00461520.2015.1122533>
- Pratiwi, D. I., Fitriati, S. W., Yuliasri, I., & Waluyo, B. (2024). Flipped classroom with gamified technology and paper - based method for teaching vocabulary. *Asian-Pacific Journal of Second and Foreign Language Education*, *9*(1), 1–18. <https://doi.org/10.1186/s40862-023-00222-4>
- Pratiwi, D. I., Ubaedillah, U., Puspitasari, A., & Arifianto, T. (2022). Flipped classroom in online speaking class at Indonesian university context. *International Journal of Instruction*, *15*(2), 697–714. <https://doi.org/10.29333/iji.2022.15238a>
- Pratiwi, D. I., & Waluyo, B. (2022). Integrating task and game-based learning into an online TOEFL preparatory course during the COVID-19 outbreak at two Indonesian higher education institutions. *Malaysian Journal of Learning & Instruction*, *19*(2), 37–67. <https://doi.org/10.32890/mjli2022.19.2.2>
- Putri, E. D., Cahyono, B. Y., & Zubaidi, N. (2024). Flipped learning in EFL classrooms effects on tertiary students' writing skills and perceptions. *The Electronic Journal for English as a Second Language (TESL-EJ)*, *28*(2), 1–18. <https://doi.org/10.55593/ej.28110a7>
- Qin, T. P., & Hua, T. K. (2020). In-game instructions: the extent of their usefulness in enhancing the vocabulary acquisition of ESL learners. *International Journal of Emerging Technologies in Learning*, *15*(4), 73–89. <https://doi.org/10.3991/ijet.v15i04.11647>

- Rofiah, N. L., & Waluyo, B. (2020). Using socrative for vocabulary tests: Thai EFL learner acceptance and perceived risk of cheating. *The Journal of AsiaTEFL*, 17(3), 966–982. <https://doi.org/10.18823/asiatefl.2020.17.3.14.966>
- Schmitt, N. (2019). Understanding vocabulary acquisition, instruction, and assessment: a research agenda. *Language Teaching*, 52, 261–274. <https://doi.org/10.1017/S0261444819000053>
- Sun, J. C.-Y., & Hsieh, P.-H. (2018). Application of a gamified interactive response system to enhance the intrinsic and extrinsic motivation, student engagement, and attention of English learners. *Journal of Educational Technology & Society*, 21(3), 104–116. <http://www.jstor.org/stable/26458511>
- Talan, T., & Gulsecen, S. (2019). The effect of a flipped classroom on students' achievements, academic engagement and satisfaction levels. *Turkish Online Journal of Distance Education-TOJDE*, 20(4), 31–60. <https://doi.org/10.17718/TOJDE.640503>
- Teng, M. F. (2017). Flipping the classroom and tertiary level EFL students' academic performance and satisfaction. *Journal of Asia TEFL*, 14(4), 605–620. <https://doi.org/10.18823/asiatefl.2017.14.4.2.605>
- Teng, M. F., & Reynolds, B. L. (2024). *Researching incidental vocabulary learning in a second language* (1st ed.). Routledge. <https://doi.org/10.4324/9781003270782>
- Waluyo, B., & Bakoko, R. (2021). Vocabulary list learning supported by gamification: classroom action research using quizlet. *The Journal of Asia TEFL*, 18(1), 289–299. <https://doi.org/10.18823/asiatefl.2021.18.1.20.289>
- Waluyo, B., & Bucol, J. L. (2021). The impact of gamified vocabulary learning using quizlet on low-proficiency students. *Computer Assisted Language Learning Electronic Journal (CALL-EJ)*, 22(1), 164–185. <http://callej.org/journal/22-1/Waluyo-Bucol2021.pdf>
- Wang, Y. H. (2018). Interactive response system (IRS) for college students: individual versus cooperative learning. *Interactive Learning Environments*, 26(7), 943–957. <https://doi.org/10.1080/10494820.2017.1421563>
- Wanner, T., & Palmer, E. (2015). Personalising learning: exploring student and teacher perceptions about flexible learning and assessment in a flipped university course. *Computers & Education*, 88, 354–369. <https://doi.org/10.1016/j.compedu.2015.07.008>
- Wardoyo, C., Satrio, Y. D., Narmaditya, B. S., & Wibowo, A. (2021). Do technological knowledge and game-based learning promote students achievement: lesson from Indonesia. *Heliyon*, 7(11), e08467. <https://doi.org/10.1016/j.heliyon.2021.e08467>
- Webb, S., & Nation, P. (2017). *How vocabulary is learned*. Oxford University Press. <https://elt.oup.com/teachers/hvil/?cc=id&selLanguage=id>
- Widodo, W. (2022). Online flipped classroom: developing postgraduate science education students' critical thinking skills. *Journal of Science Learning*, 5(3), 469–477. <https://doi.org/10.17509/jsl.v5i3.43107>
- Wu, J. G., Miller, L., & Teng, M. F. (2025). Engagement and incidental L2 vocabulary acquisition in digital gaming: a qualitative perspective of an “in-denial gaming addict” from Hong Kong. *International Journal of Applied Linguistics*, 1–13. <https://doi.org/10.1111/ijal.12712>

Xiangming, L., Liu, M., & Zhang, C. (2020). Technological impact on language anxiety dynamic. *Computers & Education, 150*, 103839. <https://doi.org/10.1016/j.compedu.2020.103839>

Xu, Y., Chen, C., Ji, M., Xiang, Y., Han, Y., Feng, D., & Luo, Z. (2023). An online flipped classroom approach improves the physiology score and subsequent course scores of the top-performing students. *Advances in Physiology Education, 47*(3), 538–547. <https://doi.org/10.1152/advan.00060.2022>

Yang, S.-C., Liu, Y.-T., & Todd, A. G. (2019). Effects of flipped classroom on high- and low-achievers' English vocabulary learning. *The Journal of Asia TEFL, 16*(4), 1251–1267. <https://doi.org/10.18823/asiatefl.2020.17.2.10.463>

Zhao, Y., & Watterston, J. (2021). The changes we need: education post Covid-19. *Journal of Educational Change, 22*(1), 3–12. <https://doi.org/10.1007/s10833-021-09417-3>

Copyright of articles rests with the authors. Please cite TESL-EJ appropriately.