Pegem Journal of Education and Instruction, Vol. 12, No. 4, 2022 (pp. 204-219)

RESEARCH ARTICLE WWW.PEGEGOG.NET

A Systematic Review on the Effectiveness of Blended Learning on Learners' EFL Vocabulary Performance

Qiu Chuane[1*], Siti S. Shukor[2*], Charanjit K. S. Singh[3], Wang Guilin[4], Zhong Xiaofen[5], Tian Yuehong[6]

[1-3]Universiti Pendidikan Sultan Idris (UPSI), Tanjong Malim, Malaysia,

[4]Chongqing University of Posts and Telecommunications, Chongqing, China,

[5,6]Chongqing Technician College of Transportation ,+8613896068037 , Chongqing, China

Abstract

Researchers have shown significantly pervasive interest in English Foreign Language (EFL) vocabulary performance through blended learning in both K-12 and tertiary education. This study is a systematic literature review (SLR) of quantitative studies related to vocabulary performance through blended learning approach in EFL context aiming at exploring the trend of this research topic and the effectiveness of this teaching approach on learners' vocabulary performance, EFL skills (except vocabulary performance), emotions and behaviors. We systematically searched articles on the related topic in four major databases, namely, Education Resource Information Center (ERIC), Web of Science, Scopus and Google Scholar from 2017 to 2021 and the reviewers independently performed the quality assessment by using PICOS principle. 45 out of 2894 studies with 3557 participants were included in this SLR article with which employed blended learning in experimental or quasi-experimental research designs mainly cultivating learners' vocabulary. Results showed that blended learning approach was frequently associated with statistically positive significance and displayed better academic performance and imposed positive effect on learners' EFL socio- psychological factors including skills, emotions and behaviors. This study quantifies an objective evaluation and precise estimation of the effects from blended learning studies that could further encourage researchers to bridge learning gaps and to know the research trend of this topic more comprehensively.

Keywords: Blended learning, EFL, Systematic review, Vocabulary performance.

Introduction

When it comes to acquiring a language, vocabulary has always played a crucial part (Aswad, Pammu, Nasmilah & Rezaei Gashti, 2022). It is not only essential to help language learners to form sentences and express themselves in meaningful ways but also affects learners' ability in developing their listening, speaking, reading, writing skills (Pertiwi, 2018). In teaching and learning of English as a foreign language (EFL), vocabulary is deemed as complicated and challenging process and may pose a challenge for language teachers (Skarpaas & Rødnes, 2022). Commonly, what happens is teachers usually teach vocabulary by asking learners to memorize words but without understanding the words (Bahang, Bakri & Mentaruk, 2021). Studies reported that memorization or rote learning has made learning boring, uninteresting and non-engaging (Lee, 2019; Enayati & Gilakjani, 2020; Lin, Yeh, Huang & Chen, 2022).

With the rapid growth of technology, one of the most common approaches that have been widely used in technology-driven language learning and teaching environment is using blended learning approach (Ebadi & Ghuchi, 2018). In the EFL teaching and learning context, technology has allowed teachers and learners to integrate multimodal texts that combine, images, audios, and videos in various digital forms, such as blogs, digital stories, digital games and mini documentaries (Wu, Yılmaz, Zhang, Li & Tan, 2020). The repertoire of practice, specifically in language learning, has no longer bound to the four walls of teaching. Instead, digitalization has brought new experiences into language instructions (Wu et al., 2020) when teaching the four language learning skills including vocabulary.

Over the last decades, many researchers have reviewed articles related to vocabulary learning via technology tools. Mahdi (2018) for example, did a meta-analysis on effectiveness of mobile devices on vocabulary learning from 2010 to 2015. Findings showed that mobile devices had a moderate effect on all aspects of vocabulary learning. Another study by Hao, Wang & Ardasheva (2021) also conducted a meta-analysis on technology-assisted vocabulary learning for EFL learners on research articles published between 2012 and 2018. Findings suggested that technology-assisted EFL vocabulary learning was seen as more beneficial than non-technology-assisted

Corresponding Author: sshuhaida@fbk.upsi.edu.my

https://orcid.org: 0000-0002-2336-5366,

How to cite this article: Chuane Q, Shukor SS, Singh CKS, Guilin W, Xiaofen Z, Yuehong T (2022). A Systematic Review on the Effectiveness of Blended Learning on Learners' EFL Vocabulary Performance . Pegem Journal of Education and Instruction, Vol. 12, No. 4, 2022, 204-219

Source of support: Nil

Conflict of interest: None.

DOI: 10.47750/pegegog.12.04.21

Received : 15.05.2021

Accepted : 20.07.2022 **Published:** 01.10.2022

instruction in terms of different device types, game conditions, settings, test formats, and reported reliabilities. On the other hand, Palmeira et al. (2020) had systematically reviewed articles on the use of Immersive Virtual Reality (IVR) for vocabulary acquisition from year 2015 to 2019. The obtained results indicated that not only IVR facilitated autonomous learning, but also enhanced effectiveness, positive attitudes, engagement, and motivation learners of EFL learners.

Besides the meta-analysis and systematic review, there was also conventional review on the articles with similar research area. For instance, Karami (2019) reviewed the literature on audio-visual materials and their effects on vocabulary learning and results showed this strategy on the enhancement of vocabulary knowledge of the second/foreign language learners was positive. On top of that, Hasram et al. (2020) did a literature review on the topic of online games for primary school vocabulary teaching and learning. Findings showed that from a literature perspective, online games were proven to have potential in enhancing learners' vocabulary learning as well as raising their satisfaction and fostering autonomous learning. Similarly, a literature review related to the correlation of online games in learning vocabulary by Kayaaltı (2018) revealed that the relationship between online games and vocabulary learning was positive. Besides, Alharthi, Bown & Pullen (2020) reviewed the articles on the use of social media platforms to enhance vocabulary from 2014 to 2018 also found that social media was a helpful tool to enhance learners' vocabulary.

However, literature still shows a gap in terms of limited context, that to date, there were only several studies focus on the effectiveness of blended learning on vocabulary acquisition and not many were reviewed especially in recent five years. Additionally, the existing article reviews about this topic were done conventionally. According to Klimova & Kacetl (2015), blended learning is defined as a combination of instructional modalities, delivery media, and instructional methods and web-based technologies. Therefore, based on this definition, we intended to do a systematic review on blended learning using different types of technologies in investigating the effectiveness of this approach on vocabulary performance from year 2017 to 2021 based on the following three research questions:

- RQ1 What are the trends in the research of blended learning on learners' vocabulary performance?
- RQ2 What is the effectiveness of blended learning on learners' vocabulary performance?
- RQ3 What is the effectiveness of blended learning on learners' EFL skills, emotions and behaviors?

Method

This systematic review is a secondary study of identifying, interpreting and evaluating the existing literature which was carried out based on Preferred Reporting Items for Systematic reviews and Meta-Analysis guidelines (PRISMA) (Moher, Stewart & Shekelle, 2016). Explicit and transparent methods with the steps of question defining, literature searching, relevant data extracting, data analysing, and findings interpreting, and situating were applied in this study (Deschênes, 2020).

Information Source and Search Strategy

Four digital databases were chosen to search, select and filter the related articles. Namely, Eric, Web of Science, Scopus and Google Scholar. The publication period of this SLR research searching was limited from 2017 to 2021 with a comprehensive search via these four stated databases. The mixture of the keywords is another crucial step in any SLR as it defines articles that would be retrieved. Therefore, the searching keywords were ("blended learning" OR "blended teaching" OR "blended education" OR "hybrid learning" OR "hybrid teaching" OR "hybrid education" OR blended AND vocabulary OR "English word") (Figure 1).

Selection of Articles and Data Extraction

Figure 1 depicts the Preferred Reporting Items for Systematic Reviews and Meta-Analysis flowchart adapted from Al-Emran, Mezhuyev, Kamaludin & Shaalan (2018) for searching and refining the articles. Based on the keywords, a total of 2894 articles emerged. After that, the researchers scanned the titles and abstracts and filtered 97 studies including 13 identical articles. The researchers then removed the duplicated articles, leaving 84 articles behind. Using the inclusion and exclusion criteria with checking the articles against the inclusion and exclusion criteria and full text reading, 35 articles were removed and left 49 more. A full text reading together using snowball technique to get more related articles from the citations and references has finally resulted to 45 final number of related articles included in this SLR article.

Article Quality Assessment

We adopted PICOS principle (Higgins, Thompson, Deeks & Altman, 2003) to select the related articles. It generally involves randomized controlled trial (RCT), non-randomized controlled trial (NRCT), cohort studies. This study contains both RCT and NRCT trails.

Data Coding and Analysis

The data coding characteristics for this SLR article are shown in Table 1.

Findings

- **RQ1** What are the trends in the research of blended learning on learners' vocabulary performance?

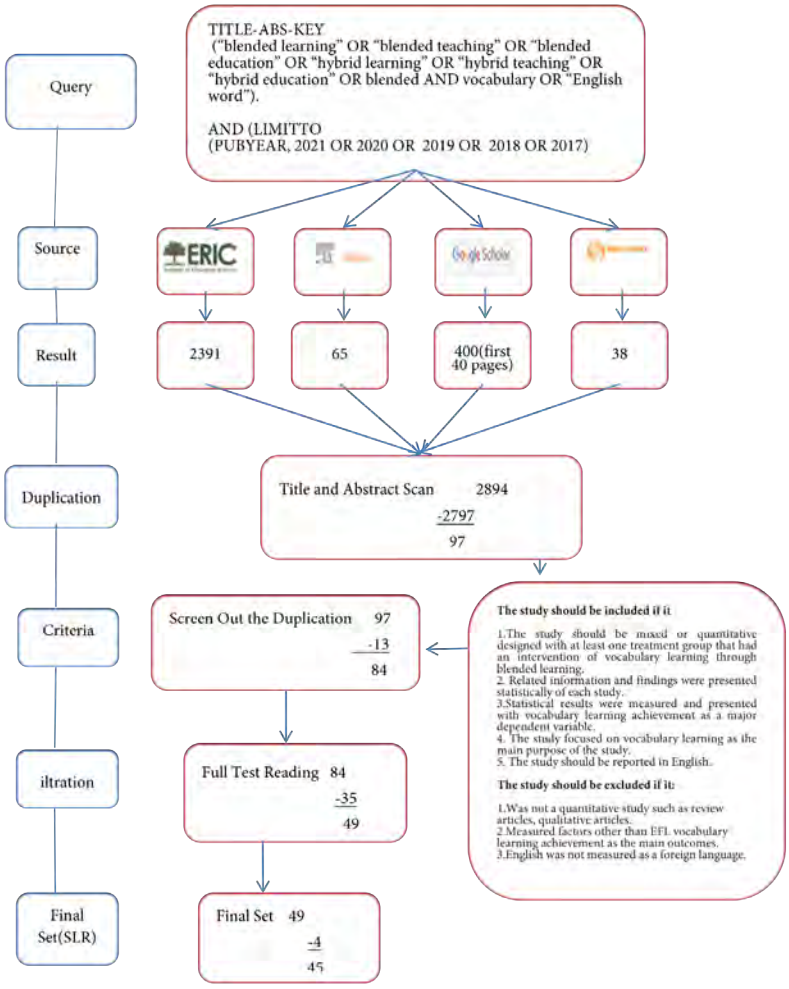

Fig. 1: Systematic Review Protocol

Table 1: Data coding based on research questions

Research question	*Subcategories*
RQ1: What are the trends in the research of blended learning on learners' vocabulary performance?	Distributions of the reviewed articles in terms of: year of publication; countries of the reviewed articles; research methods, research samples, their age range and the treatment duration.
RQ2: What is the effectiveness of blended learning on learners' vocabulary performance?	Blended learning effectiveness in terms of one experimental group research design: Author information, blended learning approach, Pre-test (Mean, SD), post-test (Mean, SD), data analysis method, statistical findings and outcome. Blended learning effectiveness in terms of two experimental groups research design: Author information, blended learning approach, post test of control group (Mean, SD), post-test of experimental group (Mean, SD), data analysis method, statistical findings and outcome. Blended learning effectiveness in terms of three or more experimental groups research design: Author information, blended learning approach, post test of control group (Mean, SD), post-test of experimental group 1 (Mean, SD), post-test of experimental group 2 (Mean, SD), data analysis method, statistical findings and outcome.
RQ3: What is the effectiveness of blended learning on learners' EFL skills,emotions and behaviors?	Author information, method, outcomes of studied EFL skills: vocabulary retention, vocabulary recall, gender difference in vocabulary learning, reading skills, writing skills. Author information, method, outcomes of studied learners' emotions: motivation, enjoyment, anxiety, perceptions, attitudes, opinions. Author information, method, outcomes of studied learners' behaviors: collaborative learning, autonomy, regulation.

Table 2: Data Coding of the reviewed articles

NO.	*Author & Country*	*Research design*	*NO.*	*Author & Country*	*Research design*	*NO.*	*Author & Country*	*Research design*
1	Hassan et al. (2017) Saudi Arab	Research design: Quantitative Quasi-experiment Research population: University Sample size: 122 Age range: 19 - 22 English proficiency: six years of experience Duration: six weeks	2	Shahbaz & Khan (2017) Saudi Arab	Research design: Quantitative Quasi-experiment Research population: University Sample size: 40 Age range: 20 on average English proficiency: -- Duration: four weeks	3	Ebrahimzadeh (2017) Iran	Research design: Mixed methodss Experiment Research population: High school learners Sample size: 241 Age range: 12 - 18 English proficiency: -- Duration: five weeks
4	Motallebzadeh & Samadi, (2017) Iran	Research design: Quantitative Experiment Research population: Sample size: 75 Age range:17 - 31 English proficiency: -- Duration: 4 weeks, 2 months.	5	Al-Tamimi, Al-Khawaldeh, al Natsheh & Harazneh (2018) Jordan	Research design: Quantitative Experiment Research population: University Sample size: 30 Age range: -- English proficiency: -- Duration: 40 days	6	Ebadi & Ghuchi (2018) Iran	Research design: Mixed methodss Experiment Research population: University Sample size: 40 Age range: 20 - 43 English proficiency: Intermediate Duration: 4 weeks
7	Djiwandono (2018) Indonesia	Research design: Mixed methodss Experiment Research population: University Sample size: 48 Age range: 18 on average English proficiency: Mid-intermediate level Duration: 6 weeks	8	Heidari Tabrizi& Onvani (2018) Iran	Research design: Quantitative Quasi-experiment Research population: English Language Institute Sample size: 31 Age range: 10 -14 English proficiency: EFL beginners Duration: 8 weeks	9	Dehghan, Rezvani, Fazeli (2018) Iran	Research design: Quantitative Experiment Research population: English institute Sample size: 32 Age range: 13-16 English proficiency: -- Duration: 3 months
10	Çetinkaya & Sütçü (2018) Turkey	Research design: Mixed methods; Quasi experiment Research population: Secondary schools' learners Sample size: 93 Age range: 14 - 15 English proficiency: -- Duration: 70 days	11	Hashemifardnia, Namaziandost & Rahimi Esfahani, (2018) Iran	Research design: Quantitative; Experiment Research population: English language institute Sample size: 50 Age range: -- English proficiency: Intermediate level Duration: 8 sessions	12	Ashcroft, Cvitkovic & Praver (2018) Japan	Research design: Mixed methods; Experiment Research population: University Sample size: 139 Age range: 18 - 24 English proficiency: Different levels of English proficiency Duration: Two semesters
13	Hajebi,Taheri, Fahandezh& Salari (2018) Iran	Research design: Quantitative Quasi-experiment Research population: University Sample size: 66 Age range: 18 - 20 English proficiency: -- Duration: 8 weeks	14	Fathi, Alipour & Saeedian (2018) Iran	Research design: Quantitative Quasi-experiment Research population: Higher education institutes Sample size: 59 Age range: 21- 33 English proficiency: -- Duration: 13 weeks	15	Kirmizi & Kömeç (2019) Turkey	Research design: Mixed methods Experiment Research population: High school Sample size: 58 Age range: -- English proficiency: -- Duration: 4 weeks

NO.	*Author & Country*	*Research design*	*NO.*	*Author & Country*	*Research design*	*NO.*	*Author & Country*	*Research design*
16	Kim,Jeong-ryeol (2019) Korea	Research design: Quantitative Experiment Research population: University Sample size: 90 Age range: -- English proficiency: Average TOEIC scores: 550 Duration: 13 weeks	17	Klímová & Pražák (2019) Czech Republic	Research design: Quantitative Experiment Research population: University Sample size: 59 Age range: -- English proficiency: (CERF) was B2-C1 Duration: 12 weeks	18	Lee (2019) Korea	Research design: Mixed method; Experiment Research population: University Sample size: 77 Age range: 19 - 27 English proficiency: -- Duration: 6 months
19	Cetinkaya & Sutcu (2019) Turkey	Research design: Mixed methods Quasi-experiment Research population: Secondary education 9th grade learners Sample size: 112 Age range: 14-15 English proficiency: -- Duration: 64 days	20	Ahmad (2019) Egypt	Research design: Quantitative Experiment Research population: University Sample size: 45 Age range:14-16 English proficiency: -- Duration: 12 weeks	21	Mansouri & Mashhadi Heidar (2019) Iran	Research design: Quantitative Experiment Research population: University Sample size: 170 Age range: 18 - 30 English proficiency: Intermediate Duration: five weeks
22	Al-Johali (2019a) Saudi Arab	Research design: Mixed methods Quasi-experiment Research population: First secondary grade Sample size:57 Age range: 15 - 18 English proficiency: -- Duration: --	23	Al-Johali (2019b) Saudi Arab	Research design: Mixed methods Quasi-experiment Research population: Male 3rd intermediate graders Sample size: 31 Age range:14 - 17 English proficiency: -- Duration: --	24	Kongprab (2019) Ecuador	Research design: Quantitative Quasi-experiment Research population: Primary school Age range: -- English proficiency: -- Sample size: 60 Duration: 15 weeks
25	Sato,Murase & Burden (2020) Japan	Research design: Quantitative Experiment Research population: University Sample size: 94 Age range: -- English proficiency: Intermediate level Duration: 3 weeks	26	Poupak Alipour (2020) Iran	Research design: Quantitative Experiment Research population: Private English language institute Sample size: 90 Age range: 17 - 19 English proficiency: Intermediate EFL learners. Duration: 8 weeks	27	Saengsawang (2020) Thailand	Research design: Mixed methods Quasi-experiment Research population: University Sample size: 146 Age range: -- English proficiency: -- Duration: 14 weeks
28	Al Masri (2020) Jordan	Research design: Quantitativ; Quasi-experiment Research population: Primary Sample size: 92 Age range: -- English proficiency: -- Duration: --	29	Nakhriyah& Wibowo (2020) Indonesia	Research design: Quantitative Quasi-experiment Research population: Senior high school Sample size: 60 Age range: -- English proficiency: -- Duration: --	30	Motlagh, Khafaie, Arastoo, Cheraghi & Khafaie (2020) Iran	Research design: Quantitative Quasi-experiment Research population: University Sample size: 32 Age range: 18 - 29 English proficiency: -- Duration: 2 months.

NO.	*Author & Country*	*Research design*	*NO.*	*Author & Country*	*Research design*	*NO.*	*Author & Country*	*Research design*
31	Bueno-Alastuey & Nemeth (2020) Spain	Research design: Quantitative Quasi-experiment Research population: State institutions , adults Sample size:23 Age range: 18 - 61, English proficiency: B2 level proficiency test Duration: Three weeks	32	Mansouri & Mashhadi Heidar (2020) Iran	Research design: Quantitative Experiment Research population: University. Sample size: 120 Age range: 10 - 12 English proficiency: Intermediate Duration: --	33	Bahari (2020) Iran	Research design: Mixed methods Experiment Research population: A language school Sample size: 95 Age range: 18 years on average English proficiency: Intermediate Duration: --
34	Enayati & Gilakjani (2020) Iran	Research design: Quantitative Quasi-experiment Research population: English Institute Sample size: 90 Age range: 13 - 17 English proficiency: Intermediate Duration: 12 sessions	35	Masoud, Aldahami & Aljehani (2020) Saudi Arab	Research design: Quantitative Quasi-experiment Research population: Secondary school learners Sample size: 106 Age range: 15 - 17 English proficiency: -- Duration: Three weeks	36	Gusnita, Salija & Atmowardoyo (2021) Indonesia	Research design: Mixed methods Experiment Research population: Secondary school Sample size: 36 Age range: -- English proficiency: -- Duration: 4 sessions
37	Waluyo & Bucol (2021) Thailand	Research design: Quantitative Experiment Research population: University Sample size: 65 Age range: 18 - 20 English proficiency: Very low - Duration: 10 weeks	38	Bashori et al. (2021) Indonesia	Research design: Mixed methods Quasi-experiment Research population: Vocational high school Sample size: 232 Age range: 14-17 English proficiency: Beginner Duration: 2 weeks	39	Mukhlif (2021) Iraq	Research design: Mixed methods Quasi-experiment Research population: Secondary schools Sample size:72 Age range: 16-17 English proficiency: Duration: 12 weeks
40	Fithriani (2021) Indonesia	Research design: Quantitative Quasi-experiment Research population: Adult, university Sample size: 74 Age range: -- English proficiency: -- Duration: seven weeks	41	Alekasir (2021) Iran	Research design: Quantitative Experiment Research population: Private English language institute Sample size: 60 Age range: 15 - 25 English proficiency: Intermediate Duration: --	42	Çil (2021) Turkey	Research design: Quantitative Experiment Research population: Secondary school Sample size:54 Age range: 9-11 English proficiency: -- Duration: 3 weeks
43	Pratiwi & Ubaedillah (2021) Indonesia	Research design: Quantitative Quasi-experiment Research population: University Sample size: 48 Age range: 18 -19 English proficiency: -- Duration:4 weeks	44	Odinokaya et al. (2021) Russia	Research design: Quantitative Experiment Research population: University Sample size:80 Age range: 17 - 19 English proficiency: Intermediate Duration: 3 months	45	Buenaño Campaña (2021) Thailand	Research design: Mixed methods Quasi-experiment Research population: Secondary school Sample size: 63 Age range: 13 -14 English proficiency: -- Duration: five weeks

To address RQ1, the following subcategories including year of publication, distribution of countries, research methods and research samples were examined by the authors (details see table 1).

Figure 2 presents the distribution of studies related to vocabulary learning through blended learning. The distribution indicates that the publication year of the selected studies was ranged from 2017 to 2021. Year 2020 was the highest publication year on this topic (n = 11). Followed by 2018, 2019 and 2021 with 10 (n = 10) related studies respectively. The least publication was found in 2017 with (n = 4) published articles.

Figure 3 illustrates the results of country distribution which was leading by Iran with 15 studies (n = 15). In the second place was Indonesia (n = 6) following by Arab (n = 5), Turkey (n = 4) and Thailand (n = 3). Similar number of studies were conducted in Korea, Jordan and Japan with, two (n = 2) related studies respectively. With the least number of studies with only one article (n=1) were six other countries including Spain, Czech, Iraq, Russia, Egypt and Ecuador. The findings impose a comprehensive coverage of countries on the topic.

Considering the research methodology applied in the 45 related studies, findings from Figure 4 & 5 illustrate that the most commonly applied research method was quantitative research method (n = 29), followed by the mixed methods (n = 16). In these 45 research articles, quasi-experimental research design was the most frequently employed with 22 (n = 22) articles, followed by the experimental research design with 21 (n = 21) related articles. True experimental and pre-experimental research design were carried out only once (n = 1) among these studies.

Figure 6 shows that vast majority of the studies were conducted among university learners (n = 21, 47%), followed by secondary schools (n = 13, 29%), other types of research samples covered English language institute (n = 8, 18%) and

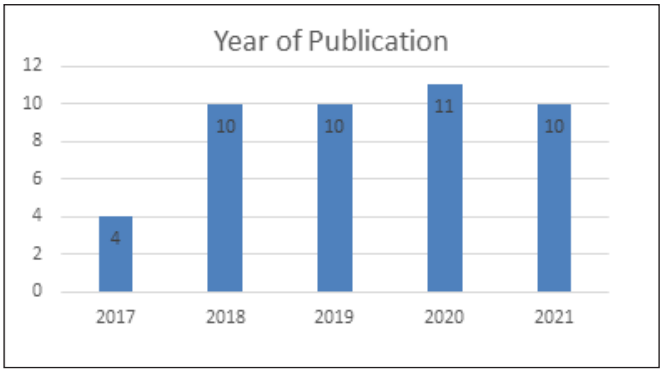

Fig. 2: Year of publication

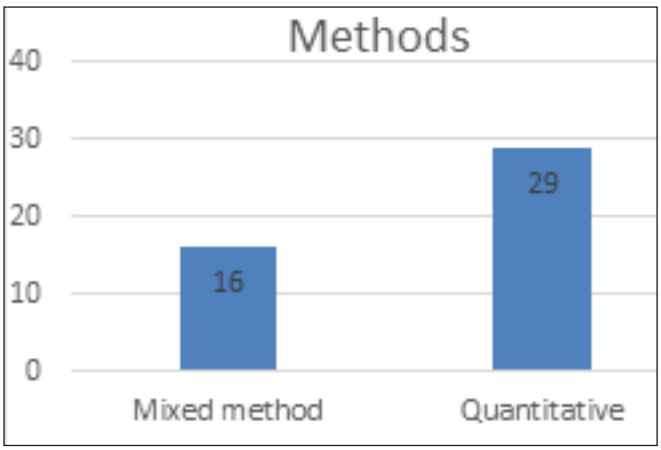

Figure 4: Research methods

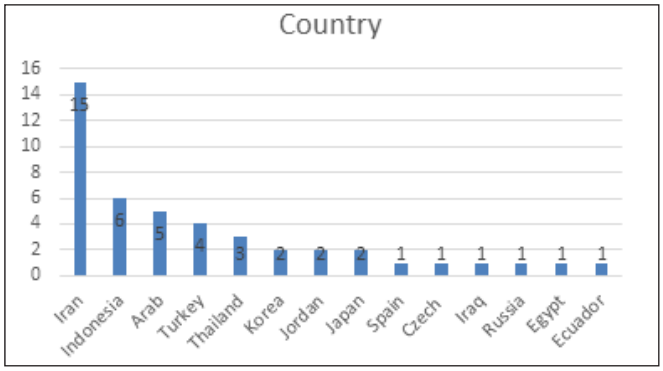

Fig. 3: Publication Country

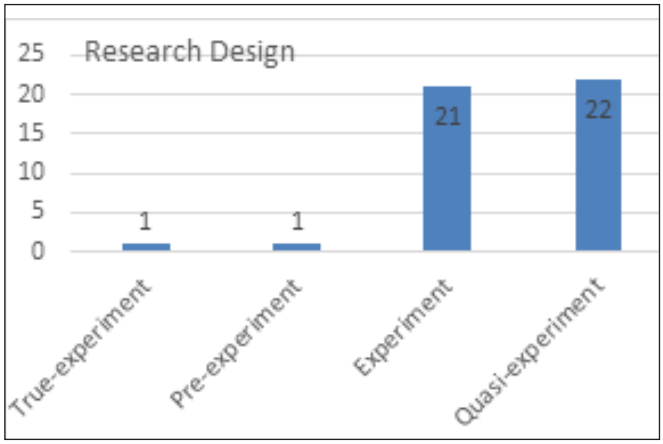

Figure 5: Research design

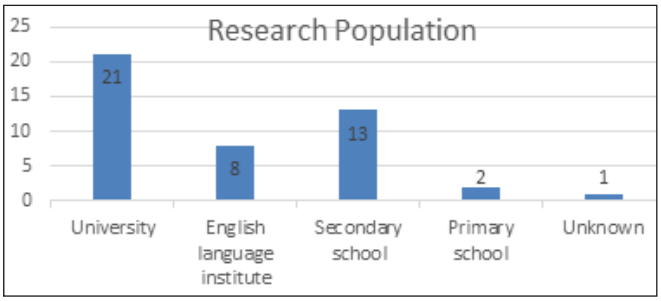

Figure 6: Research samples

Table 3: Effectiveness of blended learning on learners' vocabulary performance (One-group design)

Article	*Blended learning approach*	*Pre-test*		*Post-test*		*Data analysis method*	*Statistical findings*	*Outcome*
		Mean	*SD*	*Mean*	*SD*			
Heidari Tabrizi & Onvani (2018)	Telegram app	15.38	3.01	17.54	2.51	Wilcoxon Signed Rank Test	Z = -4.23, p = 0.000	Positive
Al-Johali (2019a)	Wiki	11 .42	2.618	12.60	2.725	Paired samples t-test	t = 10.217 p = 56.000 Effect size = 0.32 (weak)	Positive
Al-Johali (2019b)	Wiki	8.23	2.629	9.48	2.515	Paired samples t-test	t = 8.59 p = 0.000 Effect size:0.48 (weak)	Positive
Waluyo & Bucol (2021)	Quizlet	10.34	3.03	15.03	3.52	Paired-sample t-test	t = -10.60 p = 0.001 Effect size: 1.41 (strong)	Positive
Pratiwi & Ubaedillah (2021)	Kahoot! and Socrative	9.8958	2.69151	16.5000	4.55230	Paired-sample t-test	t = 12.54 p = 0.000 Effect size:1.81 (strong)	Positive

Table 4.: Effectiveness of blended learning on learners' vocabulary performance (Two groups)

Article	*Blended learning approach*	*Control group*		*Experimental roup*		*Data analysis method*	*Statistical findings*	*Outcome*
		Mean	*SD*	*Mean*	*SD*			
Hassan et al. (2017)	WhatsApp	9.3	1.909	10.48	1.766	Independent samples t-test	t = -3.544 p = 0.001 (p < 0.05) Effect size:0.64(medium to large)	Positive
Shahbaz & Khan (2017)	WhatsApp	22.8000	7.0262	30.9625	4.7972	Independent samples t-test	t = 4.989 p = 0.0012 (p < 0.05)	Positive
Al-Tamimi et al. (2018)	Facebook	18.73	4.334	20.50	4.032	ANCOVA	F = 6.324 p = 0.018 Effect size:0.190 (Partial Eta Squared)	Positive
Ebadi & Ghuchi (2018)	Memrise application	25.8500	4.24605	28.8500	4.22119	Independent T-test	F = 0.069 p = 0.031(p < 0.05)	Positive
Djiwandono (2018)	Blended learning	75.62	16.83	79.05	10.07	ANCOVA	F = 4.254 p = 0.020 (p < 0.05)	Positive
Dehghan et al. (2018)	WhatsApp	13.9375	2.08066	13.3125	3.23973	Independent samples t-test	t = -0.649 p = 0.522 (p > 0.05)	Negative
Hashemifardnia et al.(2018)	WhatsApp	14.7167	5.70486	18.8833	6.71727	Independent Samples T-test	t = 3.662 p = 0.000 (p<0.05)	Positive
Ashcroft et al. (2018)	Digital flashcards	0.51	0.28	0.57	0.23	ANOVA	F = 12.87 p = 0.00 (p < 0.05) Effect size: 0.09 (Partial Eta Squared)	Positive
Hajebi et al. (2018)	Life Syllabus andWeb-Based	3.80	0.6554	4.32	0.73045	Independent samples T-test	t = -4.624 p = 0.000 (p < 0.05)	Positive
Fathi et al. (2018)	Memrise App	36.61	12.40	43.66	11.01	ANCOVA	F = 5.63 p = 0.021(p < 0.05) Effect size: 0.091 (Partial Eta Squared)	Positive
Kirmizi & Kömeç (2019)	Flipped classroom	80.000	16.88743	91.667	9.90338	Independent samples t-test	t =-3.13 p =.003 (p < 0.05)	Positive
Klímová & Pražák (2019)	Mobile app: Anglictina TODAY	30.47	8.20	40.5 4	8.88	two sample t-test	t = -4.100 p < 0.01	Positive

Article	*Blended learning approach*	*Control group*		*Experimental roup*		*Data analysis method*	*Statistical findings*	*Outcome*
		Mean	*SD*	*Mean*	*SD*			
Ahmad (2019)	Multimedia Glosses	--	--	--	--	Mann-Whitney U-Test	U = 125 p = 0.004(p<0.05)	Positive
Kongprab (2019)	Digital Game-Based Learning	17.47	13.65	25.07	14.53	independent sample t-test	t = -2.088 p = 0.04 (p< 0.05)	Positive
Saengsawang (2020)	Flipped classroom	81.95	16.74	63.91	18.13	Mann-Whitney U test ANCOVA	U= 1007 p < 0.001 r = -0.43 F = 28.387 p < 0.001 Effect size: ηp2= .166 ((Partial Eta Squared))	Positive
Al Masri (2020)	Blended learning	5.82	2.68	2.79	1.34	Mann Whitney test	t = 5.28) p = 0.01 (p< 0.05)	Positive
Nakhriyah & Wibowo (2020)	Blended learning	77.2	7.563	85.5	6.361	One Way ANOVA	F = 0.376 p = 0.003 (p< 0.05)	Positive
Motlagh et al. (2020)	Social networks i.e.Telegram	36.31	9.48	46.03	9.92	Regression	p = 0.0002 (p< 0.05)	Positive
Bahari (2020)	Digital games	Size:22.45 Depth:23.19	1.69 2.56	26.69 38.15	1.81 2.73	Paired samples test	Size: t = -20.261 p = 0.000 Depth: t = -33.51 p = 0.000	Positive
Enayati & Gilakjani (2020)	Tell Me More (TEM) software	37.47	6.642	42.16	7.448	Independent sample t-test	t = 2.59 p= 0.01 (p < .05)	Positive
Masoud et al. (2020)	Kahoot!	15.44	0.61	18.16	0.47	Independent Sample T-Test	t = 3.489 p = 0.000 (p < .05)	Positive
Gusnita et al. (2021)	Visuwords	0.3111	0.11484	0.5057	0.09093	Independent Samples Test	t = 3.218 p = 0.003 (p < .05)	Positive
Mukhlif (2021)	Facebook	19.6389	8.50597	22.0278	8.25828	Paired samples test	Experimental group t = 2.409 p = 0.021 (p < .05)	Positive
Fithriani (2021)	Mobile devices	6.5	0.57	7.46	0.49	Independent Samples Test	t = -7.72083 p = < 0.00001	Positive
Çil (2021)	Quizlet and Kahoot	90.1852	13.96985	94.8148	7.40082	Paired samples test	t = -1.604 p = 0.121 (p > 0.05)	Negative
Odinokaya et al. (2021)	Discord application	20.9	1.834081	26	1.482486	Independent Samples Test	t = 8.524 P = 0.000 (p < .05)	Positive
Buenaño Campaña (2021)	Flipped classroom	5.839	1.1575	8.161	1.0984	Paired samples test	t = -13.204 p = 0.000 (p < .05)	Positive

primary school samples (n = 2, 4%)(one study did not report the research sample).

- **RQ2** What is the effectiveness of blended learning on learners' vocabulary performance?

To answer this research question, the researchers categorized the 45 studies into three research designs namely one-group design, two-group design and three or more groups design to review the effectiveness.

Table 5: Effectiveness of blended learning on learners' vocabulary performance (Three or more groups)

Article	*Blended learning approach*	*Control group*		*Experimental group 1*		*Experimental group 2*		*Data analysis method*	*Statistical findings*	*Outcome*
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*			
Ebrahimzadeh (2017)	Digital video game	Readers		Players		Watchers		ANOVA	p = 0.000 (p < .05) Effect size:0.371(partial eta squared)	Positive
		1.48	0.90	2.39	0.73	1.94	0.88			
Motallebzadeh & Samadi (2017)	Online Collaborative Tasks	Control		Impulsive Iranian EFL learners		Reflective Iranian EFL learners		Independent samples t-test	Control group & impulsive Iranian EFL learners: : t = 0.780, p = 0.656 (p > .05) Control group & reflective Iranian EFL learners: t = 3.825,p = 0.000, p < .0005	Positive on reflective learners Negative on impulsive learners
		--	--	--	--	--	--			
Çetinkaya & Sütçü (2018)	Facebook and WhatsApp	Control		Facebook		WhatsApp		two-factor ANOVA	F = 73.216 p < 0.05	Positive
		29.32	6.04	34.33	5.85	42.19	6.50			
Kim,Jeong-ryeol (2019)	Blended learning	Meaning-focused teaching (baseline)		Input-enhanced FnF group (FnF-A)		Output-enhanced FnF group (FnF-B)		analysis of fixed effects	F = -3.75 p < 0.01	Positive
		78.1	9.95	78.7	8.95	84.7	8.66			
Cetinkaya & Sutcu (2019)	WhatsApp	Text		Text+Audio		Text+Picture		ANCOVA	F = 38.111 p = 0.000 p < 0.05 Effect size: 0.660 (Cohen's d)	Positive
		54.00	35.19	53.38	35.88	64.81	29.31			
Mansouri &Mashhadi Heidar (2019)	Technology-Enhanced Scaffolding	Control		Peer		Teacher		One-way ANOVA	F = 9.19 p = 0.00 P < 0.05	Positive
		97.7500	7.84056	104.602	8.11709	104.102	7.93499			
Poupak Alipour (2020)	Blended learning & Online learning	Control		Online group		Blended learning		One-way ANOVA	F = 15.32 p = 0.000 p < .05	Positive
		15.41	2.00	16.91	1.54	17.68	1.17			
Bashori et al. (2021)	Websites	Control		I Love Indonesia (ILI) website		NovoLearning (NOVO) website		Independent samples t test	Control group & ILI, t = 5.638, p = 0.000; Control group & NOVO, t = 8.892, p = 0.000	Positive
		--	--	--	--	--	--			
Alekasir (2021)	Rosetta Stone Application	Control		PC based		Mobile based		One-way ANOVA	F = 28.85 p = 0.000 (p <0.05) Effect size: 0.50 (partial eta squared)	Positive
		11.20	2.50	16.45	1.82	13.70	2.05			
Lee (2019)	Informal digital learning	--	--	--	--	--	--	Correlation	PVLT: r = 5.46, p = 5.00; RVLT: r = 5.27, p = 5.02	Positive

3 summarizes the effectiveness of blended learning on learners' vocabulary performance based on the one-group research design. Statistical findings from all five study (n = 5) showed that blended learning had positive potential on learners' vocabulary performance among which strong positive effect size could be observed from two (n = 2) studies. However, regardless of the strong positive effects, there were also two studies (n = 2) reported weak effect size when using Wiki as an approach of intervention.

Next to one-group research design, 27 articles designed its intervention as two groups. Table 4 concludes the effectiveness of blended learning on learners' vocabulary performance by comparing with traditional teaching through the post-test (Mean, SD) of the control group and the experimental group.

Table 6: Effectiveness of blended learning on learners' EFL skills, emotions and behaviors

Items		*Articles*	*Method*	*Outcomes*
EFL skills	Vocabulary retention	Ahmad (2019)	quantitative	Positive: U = 126; p < 0.05
		Kongprab (2019)	quantitative	Negative: t = -1.027, p = 0.31, p > 0.05
		Saengsawang (2020)	quantitative	Positive: F = 1.216, p = 0.274, p > 0.05, effect size: 0.019
	Vocabulary recall	Sato et al. (2020)	quantitative	Positive: t = 2.82, p < 0.05
	Gender difference	Hassan et al. (2017);	quantitative	Negative: p = 0.497, p > 0.05
		Saengsawang (2020)	quantitative	Negative: t = 1.46, p = 0.154, p > 0.05
	Writing skills	Al-Tamimi et al. (2018).	quantitative	Positive: F = 11.400; p = 0.002, p < 0.05
	Reading skills	Djiwandono (2018)	quantitative	Positive: F = 29.684, p < 0.05
Emotions	Opinions	Çetinkaya & Sütçü (2018)	qualitative	Learners' positive opinions outweigh their negative opinions
		Cetinkaya & Sutcu (2019)	qualitative	Learners' positive opinions outweigh their negative opinions
	Attitudes	Hajebi et al. (2018)	quantitative	Positive: p = 0.000, p < 0.01
		Kirmizi & Kömeç (2019)	qualitative	Positive: generally had positive attitudes
		Tabrizi & Onvani (2018)	quantitative	Positive: t = 14.26, p = 0.000
		Al-Johali (2019a)	quantitative	Positive: t = 8.86, p = 0.000
		Al-Johali (2019a)	quantitative	Positive: t = 8.66, p = 0.000
		Saengsawang (2020)	qualitative	Positive: more opportunities to practice and communicate with peers and teacher, better learning and motivation
	Perceptions	Kongprab (2019)	qualitative	Positive: enjoyment learning atmosphere, effective method for vocabulary learning
		Saengsawang (2020)	qualitative	Positive: vocabulary improvement convenience for in-class and out-of-class interaction
	Perceptions and attitudes	Ebadi & Ghuchi (2018)	qualitative	Positive(most): flexibility,convenient timing, systematic,personalized learning. Negative(few): limited direct interaction,and inefficiency in using ICT tools.
	Motivation	Kongprab (2019)	quantitative	Positive: t = -3.587,p = 0.00, p < 0.05
		Sato et al. (2020)	quantitative	Positive: t = 2.01, p < 0.05
	Enjoyment	Bashori et al. (2021)	quantitative	Positive: p = 0.001
	Anxiety	Bashori et al. (2021)	quantitative	Positive: p = 0.001
Behaviors	Self-regulation	Fathi et al. (2018)	quantitative	Positive: F = 9.12, p = 0.004, effect size: 0.140 (partial eta squared)
		Mansouri & Mashhadi Heidar (2019)	quantitative	Negative: F = 0.87, p = 0.32, p > 0.05
	Autonomy	Sato et al. (2020)	quantitative	Positive: t = 2.36, p < .05
	Collaborative patterns	Djiwandono (2018)	quantitative	Negative: z score:0.764, p = 0.447,p > 0.05

On the one hand, from the reported statistical results, it can be interpreted that the experimental group gained a higher achievement than that of the control group in terms of their vocabulary performance. Thus a variety of blended learning approaches can be proven to have positive effectiveness on learners' vocabulary performance with two articles (n = 2) reported strong statistical effect size, three (n = 3) reported medium effect size and other twenty (n = 20) studies just reported positive findings without giving the effect size. Nonetheless, there was also negative statistical results reported from two studies (n = 2), which can be considered as an isolated case.

As shown in Table 5, among all publications, a total of 10 articles measured the effectiveness of the blended learning method by comparing it with three or more research groups. Nine out of ten studies found out that blended learning approach was an effective teaching method in enhancing learners' vocabulary performance. One of the studies was inconclusive since both positive and negative results were obtained.

- **RQ3** What is the effectiveness of blended learning on learners' EFL skills, emotions and behaviors?

Table 6 provides a summary of the taxonomy of the effectiveness of different research on vocabulary learning through blended learning. By searching, scanning, filtering, full-text reading and intensive reading, we classified all the related studies into three main categories namely effectiveness of blended learning on learners' EFL skills, emotions and behaviors.

Related to Learners' EFL Skills

In terms of learners' EFL skills, studies proved that different blended learning approaches have positive potential on learners' vocabulary recall (n = 1), writing skills (n = 1) and reading skills (n = 1). Besides, this kind of teaching method is testified to have no significant difference on both genders by two studies (n = 2). As for learners' vocabulary retention, two studies (n = 2) reported positive statistical findings but negative result was still reported by one (n = 1) article.

Related to Learners' Emotions

As was shown in table 6, positive opinions were found by two studies (n = 2). Similar results were reported by six studies (n = 6) investigating learners' attitudes and three studies (n = 3) investigating learners' perceptions. In like manner of checking learners' emotions in blended learning environment, two articles (n = 2) reported positive findings in enhancing learners' motivation, similar positive effect could be observed with learning enjoyment by one study (n = 1) and reducing learning anxiety also by one study (n = 1).

Related to Learners' Behaviors

When it comes to learners' behaviors, one study (n = 1) reported positive outcome of increasing learners' autonomy. While for self-regulation, one study (n = 1) reported positive result but another one (n = 1) reported negative result. In terms of collaborative patterns, one study (n = 1) revealed blended learning approach had no positive effectiveness.

Discussion

This systematic review aims to provide the statistical evidence in terms of the effectiveness of the blended learning on learners' vocabulary performance. To reach this aim, we put forward three research questions.

- To answer RQ1: "What are the trends in the research of blended learning on learners' vocabulary performance? we reviewed the articles' year of publication, country, research sample, research design of the selected articles. The number of the articles had a rapid increase since 2017 which may indicate an increasing popularity of blended learning approach in recent years with the fast development of technology. Findings showed a good range of countries covered on this topic, but studies are still scarce in the literature from other EFL and ESL countries such as China and Malaysia due to different cultures and educational backgrounds. In the analysed studies, the most common research samples were university learners, while for K-12 learners and other types of participants such as adults and training institutes samples were with a lower number of articles. The related research is especially scarce among different kinds of vocational learners for there was only one study investigated this population (see Bashori et al, 2021). Therefore, the effectiveness of vocabulary learning through blended learning approach on K-12 learners and different types of vocational learners need to be further explored.
- To answer RQ2: "What is the effectiveness of blended learning on learners' vocabulary performance?", the researchers categorized the 45 studies into three different types according to their research designs namely one-group design, two-group design and three or more groups design to review the effectiveness. 42 out of 45 articles with 40 frequencies reported positive outcomes and two frequencies reported negative outcomes. These positive findings fundamentally and apparently indicate that different blended learning approaches such as WhatsApp, Facebook, Kahoot!, Quizlet, Telegram app, Flipped classroom provided learners' vocabulary learning with support for its flexibility and autonomously learning (see Fathi et al., 2018), in-depth interaction (see Motallebzadeh & Samadi, 2017; Pratiwi & Ubaedillah, 2021), motivating learners to acquire richer knowledge more vividly and effectively (see Masoud et al., 2020) and receiving instructional materials in a variety of language inputs (textual, visual, audio-visual) at learners' own pace with no time limitation (see Alekasir, 2021). Al-Johali (2019a) and

Al-Johali (2019b) revealed the results that Wiki technology had only a slight positive effect on learners' vocabulary performance. The low effect size (0.38) & (0.48) may attribute to ICT incompetency, the absence of teacher's role and the shortness of the experiment (only lasted for 15 days) which matched with what Alshalan (2016), Elabdali (2016), and Halsey (2012) have found. Conversely, Çil (2021) revealed Quizlet and Kahoot! did not signal a significant difference in fostering learner's vocabulary knowledge. The author mentioned three potential reasons: 1) the short period of treatment (only lasted for 3 weeks) which could not yield fruitful results; 2) both groups' learners were already highly motivated to learn English before treatment; 3) the majority of the learners were already familiar with the target vocabulary before treatment. Despite the positive outcomes revealed by Hassan et al. (2017), Shahbaz & Khan (2017) and Hashemifardnia et al. (2018) by using WhatsApp to enhance learners' vocabulary, Dehghan et al. (2018) on the other hand, reported this approach with a negative finding. The authors elaborated that this phenomena could be attributed to: 1) learners' poor self-control ability as learners were attracted to distracters including chatting, irrelevant games, watching clips; 2) the learners had not been guided to a desired objectives which resulted in attracting by distracters; 3) The number of learners and items included in the test were limited which lead to similarities in their performance in both groups with less variance be observable. These positive and negative factors mentioned above may provide researchers with a better understanding and starting points for their future studies on this topic.

The examined articles in this study confirmed that blended learning approach in EFL classrooms boosts learners' learning outcomes especially their vocabulary performance. Additionally, to address RQ3: "What is the effectiveness of blended learning on learners' EFL skills, emotions, and behaviors?", we further explored the effectiveness that blended learning approach had on these three domains. In general, this teaching approach was associated with superiority comparing with the conventional teaching approach in supporting learners' vocabulary retention (see Ahmad, 2019; Saengsawang, 2020), vocabulary recall (see Sato et al., 2020), reading skills (see Djiwandono, 2018) and writing skills (see Al-Tamimi, 2018). However, this approach is found to be gender neutral in vocabulary learning (see Hassan et al., 2017; Saengsawang, 2020). This is in accordance with the results revealed by Motallebzadeh and Ganjali (2011). As for the negative outcome of vocabulary retention, Kongprab (2019) concluded the potential reasons: 1) experimental learners already had gained large size of vocabulary in the post-test that lead to a worse retention; 2) learners focused too much on competition games that their intrinsic motivation and engagement were dropped after a few weeks; 3) learners did not focus on the vocabulary learning itself as the games required them to think and answer fast so that they could gain more scores. Next, we focused our attention on learners' emotions about blended learning approach. After reviewing the related publications, we found learners hold positive attitudes and perceptions toward this teaching method mainly because it could bring them more opportunities to practice, communicate and interact with peers and teacher (see Saengsawang, 2020), enjoyment learning atmosphere, effective and convenient methods for vocabulary learning (see Kongprab, 2019). Besides, it could stimulate learners' motivation (see Kongprab, 2019), enjoyment (see Sato et al., 2020) and reduce learning anxiety (see Muzakki Bashori et al., 2021) as well. The use of technology such as mobile application and telegram had positive potential on learners' self-regulation where they could explore the apps by themselves at their own time and pace (see Fathi et al., 2018; Mansouri & Mashhadi Hendar, 2019). Similar positive effect could be observed with learning autonomy (see Sato et al., 2020) as significant improvement of motivation triggered an enhancement of learner autonomy because the two factors are closely related to each other and motivation can strengthen autonomy (Dörnyei, 2001). However, regardless the positive effects, there was no significant difference on learners' collaborative pattern (see Djiwandono, 2018) possibly due to: 1) learners were more inclined to maintain the comfortable feelings with their initial groups; 2) learners felt reluctant to work with other level of classmates due to the discrepancy of language proficiency. Therefore, the author suggested that teachers can conduct a simple questionnaire previously to know the outstanding learners and the less competent learners for differentiated instructions.

Conclusions

This study has systematically reviewed 45 articles on the topic of the effectiveness of blended learning on learners' vocabulary performance. Generally, blended learning approach had a significant positive impact on vocabulary performance, learners' EFL skills, learners' emotions as well as learners' behaviors based on different research populations, education levels and treatment duration.

Suggestions

Based on the findings of this study, future studies should focus more on the following aspects:

- The K12 research samples should be focused more as the included studies were mostly on university learners.
- Only one research was on the vocational high school learners. This shows a critical gap on different types of vocational schools, colleges, universities for future investigation.

- Many of the studies investigated learners' perceptions and attitudes at the same time investigating the vocabulary performance through blended learning. Future studies should focus more on learners' other types of affective domains such as grit, emotion regulation, loving pedagogy and learning well-being.
- Future studies can elongate the period of treatment duration in case short period of time can not reflect the effectiveness of the intervention totally.
- When conducting a research to investigate learners' vocabulary learning through blended learning approaches, learners should be guided to a certain and desired objectives in case they will be attracted to distracters because of poor sense of self-control ability.

Limitations

However, this systematic review also had some limitations. For instance, some of the included research articles did not have fully reported statistical methods and data as well as some of the blended intervention approaches, duration and data analysis instruments had not been stated clearly. Additionally, this systematic review research only focused on the quantitative studies in getting larger samples for generalization. However, qualitative data could also be included so that the process of conducting blended learning could be understood in breadth and depth.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest: The authors declare that they have no conflict of interest.

References

Ahmad, S. Z., & Ahmad, S. Z. (2019). Multimedia Glosses for Enhancing EFL Students' Vocabulary Acquisition and Retention. English Language Teaching, 12(12), 46. https://doi.org/10.5539/elt.v12n12p46

Al-Emran, M., Mezhuyev, V., Kamaludin, A., & Shaalan, K. (2018). The Impact of Knowledge Management Processes on Information Systems: A Systematic Review. International Journal of Information Management, 43, 173-187.

Alekasir, S. (2021). An Account of EFL learners' Vocabulary Learning in a Mobile-Assisted Language Environment: The Case of Rosetta Stone Application. Computer-Assisted Language Learning, 22(1), 80-110.

Alharthi, M., Bown, A., & Pullen, D. (2020). The Use of Social Media Platforms to Enhance Vocabulary Developing in Learning a New Language: a Review of the Literature. Arab World English Journal (AWEJ) Special Issue on CALL, (6), 318-331.

Al-Johali, K. Y. E. (2019). Teaching Vocabulary Through Wiki to First Secondary Graders. English Language Teaching, 12(5), 42-54. https://doi.org/10.5539/elt.v12n5p42

Al-Johali, K. Y. (2019). Teaching Vocabulary through Wiki: Can It Works?. Journal of Research in Curriculum Instruction and Educational Technology, 5(2), 45-76.

Al Masri, A. (2020). The Effectiveness of Using Blended Learning for Teaching English Language Vocabulary for 1 st Grade Students at Al Tafila Directorate of Education. International Journal of Education Research and Reviews, 8(8), 001-006.

Alshalan, A. M. (2016). The Effects of Wiki-Based Collaborative Writing on Student's Individual Writing Performance. Doctoral Dissertation, Wayne State University, America.

Al-Tamimi, M. F., Al-Khawaldeh, A. H., al Natsheh, H. I. M., & Harazneh, A. A. (2018). The Effect of Using Facebook on Improving English Language Writing Skills and Vocabulary Enrichment among University of Jordan Sophomore Students. Journal of Social Sciences (COES&RJ-JSS), 7(3), 187–214. https://doi.org/10.25255/jss.2018.7.3.187.214

Ashcroft, R. J., Cvitkovic, R., & Praver, M. (2016). Digital Flashcard L2 Vocabulary Learning Out-Performs Traditional Flashcards at Lower Proficiency Levels: A Mixed-Methods Study of 139 Japanese University Students. The EuroCALL Review, 26(1),14-28.

Aswad, M., Pammu, A., Nasmilah, N., & Rezaei Gashti, Z. (2022). An Account of Teaching Vocabulary to Indonesian EFL Learners through Web-Based Language Instruction (WLI): Attitude in Focus. Education Research International, 2022.

Bahang, M. D., Bakri, R. A., & Mentaruk, F. (2021). Improving Students' Vocabulary Mastery by Using Banana Race Game at the First Grade of SMP Negeri Bangkelekkila. The Educational Review, USA, 5(3), 46-51.

Bahari, A. (2020). Game-based Collaborative Vocabulary Learning in Blended and Distance L2 Learning. The Journal of Open, Distance and e-Learning, 1-22. DOI: 10.1080/02680513.2020.1814229.

Bashori, M., van Hout, R., Strik, H., & Cucchiarini, C. (2021). Effects of ASR-based Websites on EFL Learners' Vocabulary, Speaking Anxiety, and Language Enjoyment. System, 99 (2021), 102496.

Buenaño Campaña, V. G. (2021). Flipped Teaching Method Implementation to Improve Students' Vocabulary. Unpublished Master's Thesis, Universidad Tecnica De Ambato, Ecuador.

Bueno-Alastuey, M. C., & Nemeth, K. (2020). Quizlet and Podcasts: Effects on Vocabulary Acquisition. Computer Assisted Language Learning, 1-30.

Cetinkaya, L., & Sutcu, S. S. (2019). Students' Success in English Vocabulary Acquisition through Multimedia Annotations Sent via WhatsApp. Turkish Online Journal of Distance Education, 20(4), 85-98.

Çetinkaya, L., & Sütçü, S. S. (2018). The Effects of Facebook and WhatsApp on Success in English Vocabulary Instruction. Journal of Computer Assisted Learning, 34(5), 504–514. https://doi.org/10.1111/jcal.12255

Çil, E. (2021). The Effect of Using Wordwall. net in Increasing Vocabulary Knowledge of 5th Grade EFL Students. Language Education and Technology, 1(1), 21-28.

Davies, K. S. (2011). Formulating the Evidence-based Practice Question: a Review of the Frameworks. Evidence Based Library and Information Practice, 6(2), 75-80.

Dehghan, F., Rezvani, R., & Fazeli, S. (2017). Social Networks and Their Effectiveness in Learning Foreign Language Vocabulary: A Comparative Study Using WhatsApp. CALL-EJ, 18(2), 1-13.

Deschênes, M. (2020). Recommender Systems to Support Learners' Agency in a Learning Context: a Systematic Review. International Journal of Educational Technology in Higher Education, 17(1), 1-23.

Djiwandono, P. I. (2018). The Effect of Blended Learning on Reading Abilities, Vocabulary Mastery, and Collaboration among University Students. The New English Teacher, 12(1), 23-23.

Dörnyei, Z. (2001). New Themes and Approaches in Second Language Motivation Research. Annual review of applied linguistics, 21, 43-59.

Ebadi, S., & Ghuchi, K. D. (2018). Investigating the Effects of Blended Learning Approach on Vocabulary Enhancement from EFL Learners' Perspectives. Journal on English Language Teaching, 8(2), 57-68.

Ebrahimzadeh, M. (2017). Readers, Players, and Watchers: EFL Students' Vocabulary Acquisition through Digital Video Games. English Language Teaching, 10(2), 1-18.

Elabdali, R. (2016). Wiki-based Collaborative Creative Writing in the ESL Classroom. Unpublished Master Thesis, Portland State University, America.

Enayati, F., & Gilakjani, A. P. (2020). The Impact of Computer Assisted Language Learning (CALL) on Improving Intermediate EFL Learners' Vocabulary Learning. International Journal of Language Education, 4(1), 96–112. https://doi.org/10.26858/ijole.v4i2.10560

Fathi, J., Alipour, F., & Saeedian, A. (2018). Enhancing Vocabulary Learning and Self-regulation via a Mobile Application: An Investigation of the Memrise app. Journal of Modern Research in English Language Studies, 5(1), 27-46.

Fithriani, R. (2021). The Utilization of Mobile-assisted Gamification for Vocabulary Learning: Its Efficacy and Perceived Benefits. Computer Assisted Language Learning Electronic Journal (CALL-EJ), 22(3), 146-163.

Gusnita, G., Salija, K., & Atmowardoyo, H. (2021). The Effectiveness of Blended Learning Model for Teaching Vocabulary at Secondary School. Celebes Journal of Language Studies,1(1), 64-76.

Hajebi, M., Taheri, S., Fahandezh, F., & Salari, H. (2018). The Role of Web-based Language Teaching on Vocabulary Retention of Adult Pre-intermediate EFL Learners. Journal of Language Teaching and Research, 9(2), 372. https://doi.org/10.17507/jltr.0902.20

Hao, T., Wang, Z., & Ardasheva, Y. (2021). Technology-Assisted Vocabulary Learning for EFL Learners: A Meta-Analysis. Journal of Research on Educational Effectiveness, 1-23.

Hashemifardnia, A., Namaziandost, E., & Rahimi Esfahani, F. (2018). The Effect of Using WhatsApp on Iranian EFL learners' Vocabulary Learning. Journal of Applied Linguistics and Language Research, 5(3), 256-267.

Halsey, S. (2012). Time to Wiki: A tool to Build Students' Science Vocabulary. Unpublished Master Thesis, Montana State University at Bozeman, Montana, USA.

Hasram, S., Arif, F. K. M., Nasir, M. K. M., Mohamad, M., Daud, M. Y., Abd Rahman, M. J., & Mohammad, W. M. R. W. (2020). Online Games for Primary School Vocabulary Teaching and Learning: A Literature Review. Creative Education, 11(11), 2327.

Hassan Taj, I., Ali, F., Aslam Sipra, M., & Ahmad, W. (2017). Effect of Technology Enhanced Language Learning on Vocabulary Acquisition of EFL Learners. International Journal of Applied Linguistics and English Literature, 6(3), https://doi.org/10.7575/aiac.ijalel.v.6n.3p.262

Heidari Tabrizi, H., & Onvani, N. (2018). The Impact of Employing Telegram App on Iranian EFL Beginners' Vocabulary Teaching and Learning. Applied Research on English Language, 7(1), 1-18.

Higgins, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring Inconsistency in Meta-analyses. Bmj, 327(7414), 557-560.

Karami, A. (2019). Implementing Audio-Visual Materials (Videos), as an Incidental Vocabulary Learning Strategy, in Second/Foreign Language Learners' Vocabulary Development: A Current Review of the Most Recent Research. Journal on English Language Teaching, 9(2), 60-70.

Kayaaltı, M. (2018). A Literature Review on the Impact of Online Games in Learning Vocabulary. International Journal of Scientific and Research Publications, 8(2), 312-317.

Klimova, B. F., & Kacetl, J. (2015). Hybrid Learning and Its Current Role in the Teaching of Foreign Languages. Procedia-Social and Behavioral Sciences, 182, 477-481.

Klímová, B., & Pražák, P. (2019, July). Mobile Blended Learning and Evaluation of its Effectiveness on Students' Learning Achievement. In International Conference on Blended Learning (pp. 216-224). Springer, Cham.

Kim,Jeong-ryeol, & 김영희. (2019). The Effects of Input/output Enhanced Instructions on Vocabulary and Grammar Gains in Blended Learning. Linguistic Research, 36, 107–122. https://doi.org/10.17250/khisli.36.201909.005

Kirmizi, Ö., & Kömeç, F. (2019). The Impact of the Flipped Classroom on Receptive and Productive Vocabulary Learning. Journal of Language and Linguistic Studies, 15(2), 437-449.

Kongprab, T. (2019). Effects of Digital Game-Based Learning on Vocabulary Gain, Retention Motivation and Perceptions of Thai Upper Primary School Students. Unpublished Doctorate Dissertation, Prince of Songkla University, Thailand.

Lee, J. S. (2019). Informal Digital Learning of English and Second Language Vocabulary Outcomes: Can Quantity Conquer Quality? British Journal of Educational Technology, 50(2), 767–778. https://doi.org/10.1111/bjet.12599

Lin, V., Yeh, H. C., Huang, H. H., & Chen, N. S. (2022). Enhancing EFL Vocabulary Learning with Multimodal Cues Supported by an Educational Robot and an Lot-Based 3D book. System, 104, 102691.

Liu, J. L. (2011). The Role of the Funnel Plot in Detecting Publication and Related Biases in Meta-analysis. Evidence-based dentistry, 12(4), 121-122.

Mahdi, H. S. (2018). Effectiveness of Mobile Devices on Vocabulary Learning: A Meta-Analysis. Journal of Educational Computing Research, 56(1), 134-154.

Mansouri, S., & Mashhadi Heidar, D. (2019). Peer/Teacher Technology-Enhanced Scaffolding through Process Approach and Iranian EFL Learners' Vocabulary Knowledge: A Probe into Self-regulation. Journal of Teaching Language Skills (JTLS), 38(3), 189–223. https://doi.org/10.22099/jtls.2020.34379.2717

Mansouri, S., & Mashhadi Heidar, D. (2020). The Sociological Effects of Peer/Teacher Technology-Enhanced Scaffolding through Process Approach on Young Male vs. Female EFL Learners' Vocabulary Knowledge. Sociological Studies of Youth, 11(38), 29-48.

Masoud, M. M. A., Aldahami, S. A., & Aljehani, W. M. A. (2020). The Effect of Using Kahoot! Web-based Learning on EFL Secondary Students' Vocabulary Learning. Educational Research International, 9(1). 9-20

Moher, D., Stewart, L., & Shekelle, P. (2016). Implementing PRISMA-P: Recommendations for Prospective Authors. Systematic Reviews, 5(1), 1-2.

Motallebzadeh, K., & Ganjali, R. (2011). SMS: Tool for L2 Vocabulary Retention and Reading Comprehension Ability. Journal of Language Teaching & Research, 2(5), 1111-1115.

Motallebzadeh, K., & Samadi, F. (2017). The Effect of Using Online Collaborative Tasks on Incidental Vocabulary Learning of Impulsive vs. Reflective Iranian EFL Learners. International Journal of Applied Linguistics and English Literature, 6(6), 127. https://doi.org/10.7575/aiac.ijalel.v.6n.6p.127

Motlagh, H. S., Khafaie, H., Arastoo, A. A., Cheraghi, M., & Khafaie, M. A. (2020). Application of Social Network in Traditional Sciences Education on the Vocabulary Acquisition of Secondary English Learner Students. Education and Information Technologies, 25(4), 3071–3085. https://doi.org/10.1007/s10639-020-10108-4

Mukhlif, M. I. (2021). Enhancing Vocabulary Knowledge among Secondary School EFL Students by Using Facebook. Turkish Online Journal of Distance Education, 22(3), 293-309.

Nakhriyah, M., & Wibowo, H. (2020). Investigating Blended Learning Impact on Students Vocabulary Achievement. Lingua, 16(2), 46-55.

Odinokaya, M. A., Krylova, E. A., Rubtsova, A. V., & Almazova, N. I. (2021). Using the Discord Application to Facilitate EFL Vocabulary Acquisition. Education Sciences, 11(9), 470.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an Updated Guideline for Reporting Systematic Reviews. Bmj, 372.

Palmeira, E. G. Q., Saint Martin, V. B., Gonçalves, V. B., Moraes, Í. A., Júnior, E. A. L., & Cardoso, A. (2020, November). The Use of Immersive Virtual Reality for Vocabulary Acquisition: a Systematic Literature Review. In Anais do XXXI Simpósio Brasileiro de Informática na Educação (pp. 532-541). SBC.

Pertiwi, D. R. (2018). Blended Learning to Improve the Students' Vocabulary Mastery for Mechanical Engineering Purposes At STT Adisutjipto Yogyakarta. ADJES (Ahmad Dahlan Journal of English Studies), 5(1), 1-11.

Poupak Alipour | (2020) A Comparative Study of Online Vs. Blended Learningon Vocabulary Development Among Intermediate EFL Learners, Cogent Education, 7:1, 1857489. DOI: 10.1080/2331186X.2020.1857489

Pratiwi, D. I., & Ubaedillah, U. (2021). Digital Vocabulary Class in English for Railway Mechanical Technology. Teaching English with Technology, 21(3), 67-88.

Saengsawang, P. (2020). The Use of Blended Learning to Support Vocabulary Learning and Knowledge Retention in Thai Tertiary EFL Classrooms. Unpublished Doctorate Dissertation, Durham University, England.

Sato, T., Murase, F., & Burden, T. (2020). An Empirical Study on Vocabulary Recall and Learner Autonomy through Mobile-assisted Language Learning in Blended Learning Settings. CALICO Journal, 37(3), 254–276. https://doi.org/10.1558/cj.40436

Shahbaz, M., & Khan, R. M. I. (2017). Use of Mobile Immersion in Foreign Language Teaching to Enhance Target Language Vocabulary Learning. MIER Journal of Educational Studies Trends and Practices, 7(1),66-82.

Skarpaas, K. G., & Rødnes, K. A. (2022). Vocabulary Teaching Practices of L2 English in Upper Secondary Vocational Classrooms. Languages, 7(1), 55.

Waluyo, B., & Bucol, J. L. (2021). The Impact of Gamified Vocabulary Learning Using Quizlet on Low-proficiency Students. Computer Assisted Language Learning Electronic Journal, 22(1), 164-185.

Wu, J., Yılmaz, E., Zhang, M., Li, H., & Tan, K. C. (2020). Deep Spiking Neural Networks for Large Vocabulary Automatic Speech Recognition. Frontiers in Neuroscience, 14, 199.