

EMPLOYING THE SMART INTERACTIVE WHITEBOARD TO TEACH GUIDED WRITING VOCABULARY

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ABSTRACT

This study investigates the effects of employing the Smart Interactive Whiteboard in a Malaysian primary-level guided writing class. The study also examines students' perspectives on different teaching techniques and the factors affecting personal preferences. The study employs a sequential explanatory research design. The participants comprise 42 11-year-old students at the Malaysian Year 5 level. Quantitative data are collected in the form of pre- and post-test scores. Simultaneously, qualitative data are gathered using semi-structured interviews to support the quantitative findings and to provide data triangulation. The findings reveal that the Smart Interactive Whiteboard is preferred by most participants over traditional flashcards. The study also provides valuable comparative insights into vocabulary teaching methods and identifies areas of improvement for guided writing teaching approaches. Therefore, the Smart Interactive Whiteboard can potentially cater to students' multiple needs and learning requirements, being aligned with the

academic and professional needs of the target community. The Smart Interactive Whiteboard is also effective in engaging students in the learning process, making vocabulary learning enjoyable and effective at different proficiency levels.

Keywords: Smart Interactive Whiteboard; vocabulary teaching; guided writing; flashcards; ESL

Introduction

The principal aim of primary-level English language education in Malaysia is to equip students with fundamental linguistic skills to enable effective communication in various contexts (Ministry of Education Malaysia, 2013). Primary-level English is divided into two levels, with Level One (Years 1 to 3) encompassing phonic learning and writing skills followed by Level Two (Years 4 to 6) for improved linguistic skills. Nonetheless, numerous students struggle to master English vocabulary (Misbah et al., 2017; Namaziandost et al., 2021). This poses difficulties in carrying out short essay writing tasks.

Various factors contribute to the inadequate command of English vocabulary, including low learner motivation levels among young students in school (Hsu, 2019; Protacio, 2017). In particular, Md Yunus and Abdullah (2011) argued that young students are required to learn various subjects daily, thereby generating significant pressure which leads to a sole focus on passing examinations.

Furthermore, low English learning motivation arises due to teaching methods by some teachers who continually practise conventional teaching methodologies (Intan & Fatin, 2015). As such, English lessons might lack crucial communicative elements, which are considered more enjoyable than traditional grammar-based methods, thus resulting in constantly low English learning motivation. Similarly, Sathya (2020) posited that varied and engaging teaching methodologies would produce the most optimal learning outcome to fulfil different student learning styles and intelligence.

In Malaysia, English is acquired as a second language (Gill, 2002), mainly through formal English lessons in school. However, primary students' English proficiency remains inadequate even after completing the primary school level. In terms of writing, numerous students struggle to employ appropriate vocabulary (Afzal, 2019; Fareed et al., 2016), due to ineffective conventional teaching techniques over multiple writing lessons (Abdullahi, 2003; Karimi et al., 2018; Suhaimi, 2014). When a teaching technique is not highly engaging to students' senses, such as visualising and listening, boredom and disengagement would be engendered in the classroom (Macklem, 2015).

Existing literature has extensively investigated the effectiveness of different teaching methodologies at different educational levels. This study sets out to add to the existing literature by comparing the effects of technological and conventional approaches in teaching vocabulary to primary school students. The findings are valuable for policymakers and English as a Second Language (ESL) practitioners in implementing pertinent interventions to improve students' English skills.

Following this, the current study attempts to answer three research questions:

- 1) Is the use of the Smart Interactive Whiteboard more effective than flashcards in teaching vocabulary to young Malaysian ESL learners?
- 2) What are the ESL learners' perceptions of the two vocabulary teaching techniques?
- 3) Which factors affect the learners' preferences for a particular technique?

Based on these questions, there is one testable hypothesis, as follows:

H1: The Smart Interactive Whiteboard is more effective than flashcards in teaching English vocabulary to young Malaysian ESL learners.

Literature Review

The Mediated Mind

The Mediated Mind refers to the employment of meaningful media to mediate the cognitive processes in students' brains (Ai & Lu, 2018) through what is known to mediators as artefacts. Vygotsky (1978) categorised artefacts into two types, namely, physical and symbolic. Physical artefacts include books and computers while language and technology represent symbolic artefacts. This concept is reflected in this study by comparing the Smart Interactive Whiteboard and flashcards.

Mayer's Multimedia Instructional Principles

Mayer (2009) proposed 12 instructional principles for ESL practitioners when designing multimedia teaching and learning materials. Six principles were selected due to their high relevance to the objectives of this study:

- 1) Coherence: "People learn better when extraneous material is excluded rather than included." (p. 89)
- 2) Redundancy: "People learn better from graphics and narration than some graphics, narration, and printed text." (p. 118)
- 3) Segmenting: "People learn better when a multimedia message is presented in user-paced segments rather than as a continuous unit." (p. 175)
- 4) Modality: "People learn more deeply from pictures and spoken words than from pictures and printed words." (p. 200)
- 5) Voice: "People learn better when narration is spoken in a human voice rather than in a machine voice." (p. 242)
- 6) Image: "People do not necessarily learn better when the speaker's image is added to the screen." (p. 242)

Mayer's (2009) principles are important because firstly, they contextualise the theoretical insights of the Mediated Mind approach, which is based on older theories, especially Vygotsky's (1978) distinction between physical and symbolic artefacts.

Secondly, Mayer (2009) offers a set of concrete rules, or predictions, that enable us to grasp the relationship between media and learning.

Finally, a set of principles like this directly feeds into the objectives and research questions of this paper, dealing as they do with student perceptions and preferences and the effectiveness of different media in learning.

Technology in Education

Technology is a powerful educational tool that effectively improves teaching development and initiatives while ensuring sustainable teaching approaches (Anthonia et al., 2016). Dunkel (as cited in Liu et al., 2002) asserted that technology could increase students' self-esteem, vocational preparedness, language proficiency, learning autonomy, and ability to provide immediate feedback. Furthermore, Richards and Renandya (2002) discovered that integrating technological resources in the teaching and learning process would facilitate authentic learning environments to communicate in the intended language and allow collaborative learning.

Accordingly, this paper employed the Smart Interactive Whiteboard as a vocabulary teaching technology application. Butler-Pascoe and Wiburg (as cited in Lin, 2009) proposed some benefits of adopting technological tools in a second-language classroom:

- 1) Technology provides interaction, communicative activities, and a real audience;
- 2) Technology makes students become active learners;
- 3) Technology supplies comprehensible input;
- 4) Technology facilitates the focused development of English skills; and
- 5) Technology employs multiple modalities to support various learning styles and strategies.

Chunk Pedagogy

Chunk pedagogy (Lewis, 1993) for vocabulary teaching is a pedagogy that emphasises learning "language chunks" that contain certain lexical-grammatical structures. In a similar vein, Ziafar (2020) and Nelson (2018) argued that vocabulary teaching should provide students with sensitivity to word chunks, word collocation, and basic "chunk" structures to assist in expanding vocabulary.

Furthermore, Li (2004) and Zhang and Wei (2004) demonstrated that vocabulary teaching should concentrate on output training on chunks instead of mere reading and writing to improve communicative competence. Concurrently, providing vocabulary examples based on students' proficiency levels could enhance the long-term recall of the learnt language.

Conventional Instructional Materials

Margulieux and Catrambone (2021) defined resources that organise and support instruction as instructional materials that assist the information aspect of teaching

and enhance the learning and retention of information (Shukla, 2019). Lin et al. (2021) provided a list of typical and conventional instructional materials employed in teaching and learning. These included blackboards, textbooks, charts, pictures, posters, maps, atlases, globes, flashcards, flip cards, worksheets, science lab apparatus and materials, models, crossword puzzles, quizzes, storytelling, dramatisation, one-act plays, dictionaries, encyclopaedias, reference books, learning toys, and abacuses. For the current study, flashcards are chosen from this list as they are commonly used to support vocabulary pedagogy.

Flashcards

Flashcards are traditional teaching tools to help ESL learners acquire vocabulary (Li & Tong, 2019). According to Obermeier and Elgort (2021), a flashcard is a piece of cardboard with a word, a sentence, or a simple picture printed on it. The letters displayed on the flashcards must be written in capital letters to allow high legibility for students sitting both in the front and back of the classroom. A sample sentence is provided for students to compose a correct sentence with learnt words. Flashcards are considered effective in acquiring new vocabulary compared to memorising wordlists (Sun et al., 2021). However, the use of flashcards has also been associated with several disadvantages, as follows (Auliya, 2016):

- 1) The creation process is time-consuming.
- 2) Flashcards are not sufficiently large for students sitting at the back of the classroom to read the words and pictures displayed.
- 3) Flashcards are only effective for small classes with 5 to 10 students and might not be feasible for a large class.
- 4) As flashcards primarily utilise pattern drills, students might not understand the pronunciations owing to the goal of producing similar sentences. Students may not be able to produce sentences that are not introduced and drilled in a particular lesson.
- 5) Flashcards are monotonous when teachers apply them repetitively.

Method

Research Design

A sequential explanatory research design was employed. This is a mixed-method design in which both quantitative and qualitative approaches are utilised. Creswell and Plano Clark (2007) explained that this type of research design commences with collecting quantitative data before collecting qualitative data that assist in elaborating the quantitative findings.

The sequential explanatory design is chosen because the qualitative analysis of student perceptions can offer a refined explanation and extension of the quantitative findings.

Sampling

Simple random sampling was conducted to collect quantitative data by randomly selecting eligible participants with a certain probability (Lavrakas, 2008). Forty-two students from two classes were recruited for either control (n=21) or experimental (n=21) groups. In the qualitative phase, purposive sampling was performed as a non-probability method in selecting a judgmental or expert sample (Lavrakas, 2008). The participants in the qualitative and quantitative phases were the same participants to maintain high data validity and relevance during the interviews.

The qualitative phase used a smaller sample size than the quantitative phase as only participants who could provide extensive responses were selected.

Research Materials

Essays and Tests

To analyse the effectiveness of each teaching technique, pre- and post-tests in the form of guided essay writing were conducted. The questions were adapted from the previous exam questions for UPSR (Ujian Pencapaian Sekolah Rendah or Primary School Achievement Test) from 2016 and 2017. The UPSR questions have been standardised across the whole of Malaysia to ensure adequate reliability and validity. In addition, the tests were designed by qualified and certified teachers with a set of standard instructions to administer and mark the tests, thus ensuring the validity of the test items. Finally, the same format has been employed for over a decade (Ministry of Education Malaysia, 2015). As the present study focuses on vocabulary, the marking scheme for vocabulary was adopted instead of the conventional UPSR marking scheme.

Interviews

The current study followed Kvale's (1996) six stages of interview investigation. The first stage is thematising, in which participants answer the following questions: What is going to be studied? Why this is going to be studied? and How this is going to be studied? The answers were then categorised based on the three questions to provide the background and guidelines of data analysis and reporting.

The second stage is interviewing, where the researcher maintains the participants' motivation by asking necessary background questions (Krosnick & Presser, 2009). The third stage is transcribing. Mishler (1991) explained that the data and the relationship between meaning and language are contextually situated, unstable, and subject to continuous reinterpretation. Thus, only the clearest and most suitable interpretations are encouraged.

The fourth stage, analysing, followed Hycner's (1985) guidelines for analysing interview data using the following techniques:

- 1) Performing transcription.
- 2) Listening to the interview for the gist.

- 3) Delineating units of general meaning.
- 4) Delineating units of meaning relevant to the research questions.
- 5) Eliminating redundancies.
- 6) Clustering units of relevant meaning.
- 7) Determining themes from clusters of meaning.
- 8) Writing a summary of each interview.
- 9) Returning to the participants with the summary and themes.
- 10) Modifying the themes and summary.
- 11) Identifying general and unique themes for all interviews.
- 12) Contextualising the themes.
- 13) Producing a composite summary.

In the fifth stage, data validity and reliability are verified to minimise bias. This is achieved by conducting peer debriefing on the interpreted data and inviting an expert, such as a lecturer, to endorse the interview questions (Barber & Walczak, 2009). The sixth and final stage is reporting, which includes an introduction (main themes and contents), an outline of the methodology, results, and discussion. Direct quotations from the interview transcript are also utilised to illuminate and relate to the general text (Kvale, 1996).

Data Analysis

Table 1 shows the data analysis techniques. Participants' essays from the pre- and post-tests were marked using a rubric before the scores were analysed quantitatively using the Statistical Package for Social Science (SPSS) software version 21.

The scores were subjected to a t-test to reveal significant differences between the scores of pre- and post-tests from both groups. A dependent t-test was used where the two groups were related – comprising the same participants, whereas an independent t-test was used where two groups were unrelated, such as an experimental group and a control group.

The interviews were also video-recorded and transcribed to record the students' perceptions as well as to ascertain the factors affecting the learners' preferences for vocabulary teaching approaches.

Table 1

Data Analysis Framework

No.	Data	Data Analysis Technique
1.	Pre- and Post-Test Scores (Students' Essay)	Independent and dependent t-test
2.	Interview Responses	Hycner's (1985) Guidelines from Kvale's (1996) Stage 4

Qualitative data were obtained from the interviews. Following Hycner's (1985) guidelines, the interviews were transcribed and listened to repeatedly to grasp and

classify the common themes and latent meanings in the texts. The researcher delineated units of general meaning and specific meanings relevant to the present research. Meanwhile, redundancies were removed for improved data organisation.

Subsequently, coding was performed by clustering units of relevant meaning, where the generated codes were analysed systematically to determine related themes. A summary was written for each interview, which was then returned to the interviewed participants to be confirmed or modified. Finally, through contextualisation, the general theme was reviewed while unique themes were refined for all interviews to generate clear theme definitions and names.

Results

Students' Guided Writing Performance

Table 2 reveals a mean difference of 0.667 between the pre-and post-test scores, which indicates that the students in the experimental group who were taught using the Smart Interactive Whiteboard obtained higher scores in the post-test at 5% significance level ($p < 0.001$). This result suggested that vocabulary teaching using the Smart Interactive Whiteboard could improve students' guided writing performance based on lexical knowledge and skills.

Table 2

Dependent t-test Results on Mean Pre- and Post-test Scores of the Experimental Group

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Standard Deviation	Standard Error mean	95% Confidence Interval				
				Lower	Upper			
Pre-Test						-		
Post-Test	.667	.557	.126	-.929	-.404	5.292	20	.000

Table 3 illustrates the mean scores of pre- and post-tests among students taught vocabulary using both flashcards (FC) and Smart Interactive Whiteboard (SIW). The mean post-test scores for both control and experimental groups were 4.548 and 10.381, respectively, which posited that the Smart Interactive Whiteboard could assist students in achieving higher guided writing scores compared to flashcards only.

Table 3*Mean Pre- and Post-test Scores of the Control and Experimental Groups*

IV	N	Mean	Std. Deviation	Std. Error Mean
Pre-test_SIW	21	6.095	5.2717	1.1504
FC	21	4.619	3.9652	.8653
Post-test_SIW	21	10.381	5.3803	1.1741
FC	21	4.548	4.5191	.9862

Table 4 presents the independent t-test results regarding the mean pre- and post-test scores of both control and experimental groups. As the p-values of the pre-test scores were 0.311 and 0.312 exceeding 0.05, the findings indicated insignificant test score improvement before utilising flashcards or the Smart Interactive Whiteboard. Nonetheless, the p-values of the post-tests were 0.000 (under 0.05), hence indicating significant test score improvement after adopting the Smart Interactive Whiteboard.

Table 4*Independent t-test Results on Mean Pre- and Post-test Scores of the Control and Experimental Groups*

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval	
								Lower	Upper
Pre_Equal Variances Assumed			1.026	40	.311	1.4762	1.4395	-	1.4331 4.3855
Equal Variances not Assumed	1.943	.171	1.026	37.143	.312	1.4762	1.4395	-	1.4401 4.3924
Post_Equal Variances Assumed			3.804	40	.000	5.8333	1.5333	2.7344	8.9322
Equal Variances not Assumed	1.772	.191	3.804	38.842	.000	5.8333	1.5333	2.7316	8.9351

Therefore, flashcards did not manifest a significant improvement in students' guided writing vocabulary, although the positive difference was significant. Although both techniques produced significant improvements in terms of spelling and the contextual usage of relevant words, flashcards were less effective than the Smart Interactive Board. This provides support for hypothesis H1.

Themes on Feelings towards the Smart Interactive Whiteboard (SIW) for Vocabulary Teaching

Qualitative data was extracted from the interview transcripts following the analytical procedures suggested by Hycner (1985). The data took the form of general themes and specific sub-themes or codes based on the students' interview responses. The themes and codes were then tabulated (see Table 5), along with representative extracts, following Bartels et al. (2008). Finally, a composite summary was produced following Hycner (1985).

Table 5
Identified Themes and Codes with Extracts from the Transcripts

Themes	Codes	Extracts
Positive Perceptions About SIW	Opportunity to learn from Internet.	"I could surf the Internet to look for vocabulary and refer to sample essays"
	Interesting Features.	"Colours help me to remember better as they enable us to understand comprehension learnt in the class by highlighting vocabulary". "It is attractive as I could listen to the pronunciation by the sound system, and it is clear".
	Videos and Animations. Visualiser.	"The animations are interesting. It is not boring being just a picture" "The size of words and pictures could be adjusted so we could look at them clearly"
Positive Feelings About Flashcards	Colourful Pictures.	"I like flashcards because the pictures are beautiful. For example, the word 'wonderful' has many children playing around. They are colourful. I like colourful pictures because I learn new vocabulary by recognising the pictures. Without pictures, I cannot know what the vocabulary is about".
	Dual Languages. Flashcard Size.	"The meaning of the vocabulary is shown in dual languages".

Negative Feelings About Flashcards	Inconvenience.	<p>"The size of the picture is big. I could see the words even though I sit at the back of the class"</p> <p>"I do not like it because it is inconvenient. The teacher must keep flipping the cards. I also have to sit in front of the class'.</p> <p>"I do not like it because it is inconvenient. The teacher has to keep flipping the cards. I also have to sit in front of the class".</p>
	Environmental Waste. Recall and learning.	<p>"Wasting papers because we need to print the materials many times".</p> <p>"I do not remember anything from the four sessions of learning, and I do not improve from learning with flashcards".</p>
SIW Features Assisting Vocabulary Learning	Video Content.	"I learn the content of the videos and some vocabulary from subtitles easily."
	Vocabulary Learning.	"I prefer the Smart Interactive Whiteboard because it helps me to learn many vocabularies"
	Pictures as Assistants.	"I can learn the vocabulary from the pictures by just looking at the pictures and the words given"
	Learning through Sounds and Music.	"Sounds and music attract me in learning so I could remember the words easily".
	Moral Values. Correct Sentences.	<p>"I learn how to earn money".</p> <p>"I can learn a lot of vocabulary and beautiful sentences for essay writing"</p>
	Pronunciation Listening.	"I could practice my pronunciation of words by listening to the pronunciation projected from Smart Interactive Whiteboard".
Flashcard Features Influencing Teaching Method Preference	Internet Access.	"I can learn the meaning of vocabulary through the Internet"
	Bright and Colourful Pictures.	"The pictures and the colours are beautiful. I learn new vocabulary by recognising the pictures. With pictures, I know what the vocabulary is. Without pictures, I cannot know what the vocabulary is".
	Constructing Sentences.	"I like flashcards because I learn how to make sentences and know the meanings of new vocabulary".

Table 5 shows 5 broad themes and 20 narrower codes or sub-themes extracted from the interview transcripts, along with supporting extracts. In general, all 12 interviewed students displayed positive feelings towards the Smart Interactive Whiteboard (SIW) for vocabulary teaching.

These positive perceptions arose firstly from the opportunity to utilise the Internet when using the SIW. Five students expressed personal enjoyment in learning vocabulary through the SIW that is connected to the internet. The students could employ search engines, such as Google, to find additional meanings and to further understand the usage of difficult words. Secondly, the SIW had many interesting features, such as vibrant colours and sound. The colours attracted attention and highlighted taught vocabulary. Colours also allowed students to focus effortlessly on salient words, thus allowing immediate recall of recently learnt vocabulary and sentences. In addition, the presence of sound was favoured by the students, who appeared to find this more engaging than the teachers' voices. Thirdly, students reacted well to the videos and animations shown in the SIW. The students enjoyed learning with these features, which engaged the students in learning vocabulary and provided enjoyable learning by creating an informal and relaxing learning environment. Fourthly, the Visualiser feature could clearly display words and pictures on the board. This helped students sitting at the back of large classrooms to easily read the displayed words.

Next, the interviews revealed that the SIW could assist vocabulary learning in a number of ways. Firstly, students could learn essay writing from video content, especially relating to essay ideas. Simultaneously, students could learn vocabulary from the video subtitles, which was enjoyable as watching videos was relaxing yet engaging. Secondly, as the main objective was to learn vocabulary for essay writing, students were more confident with the SIW as a teaching technique if they were able to master some vocabulary successfully at the end of the lesson. Thirdly, students attested that the pictures promoted effortless vocabulary recall and recognition. Without pictures, the students encountered difficulties in recognising the vocabulary. Fourthly, the students displayed higher vocabulary recall, including word spelling and meanings, when the teacher taught the words using the SIW's sound system and music functions. Students experienced a sense of achievement when learning this way because they could apply the learnt vocabulary in essay writing, with good vocabulary recall. Furthermore, students stated that moral values could also be internalised during the learning process using the SIW, which could help them develop a constructive personality.

Next, students preferred learning with the SIW because it helped them to acquire correct sentence structures, which were useful for essay writing. The method was more efficient than learning vocabulary on its own as the students would be required to compose complete sentences rather than spelling the words.

Another significant factor influencing the students' preference for the SIW was listening to the pronunciation of words through the Internet or the internal learning system of the SIW. In addition, the students could practise pronunciation after listening to the word pronunciation, which significantly improved the students' pronunciation and vocabulary recall for essay writing after the lesson.

Lastly, students found the Internet to be a highly valuable tool for learning, especially when students could use the SIW to seek word meanings. The Internet is recognised for promoting and aiding self-learning whereby students can manage their own personal learning processes.

Several students expressed positive sentiments towards learning vocabulary through flashcards, for several reasons. Firstly, students could visualise bright and colourful pictures on the flashcards, which encouraged visual learning. Students could also discern the words and pictures effortlessly as the flashcard materials did not reflect light. Furthermore, the vibrant colours of the pictures assisted students in remembering the vocabulary effectively due to the high salience of the colours. According to some students, colours were an effective stimulus to linguistic acquisition as students would concentrate on the colours before receiving other learning inputs. A second reason for positive perceptions of flashcards was the fact that vocabulary definitions were shown in dual languages. Since every student who participated in this study was also learning Mandarin, the method was effective when Mandarin meanings were displayed as well as Malay ones. Thirdly, the size of the flashcard pictures was sufficient for students sitting at the back of the classroom to see.

Despite these positive perceptions of flashcards, some students expressed negative feelings towards them, which directly influenced their preferred choice of vocabulary learning method. In particular, flashcards were considered tedious as the teacher needed to flip the flashcards to introduce each word with a picture. Some students stated that they needed to sit in front of the class to see the words and pictures. In addition, students considered flashcards to be a waste of paper and therefore bad for the environment. Furthermore, several students reported low vocabulary recall, improvement, or engagement from the four learning sessions using flashcards.

Finally, the students gave two major factors influencing their preference for flashcards as a vocabulary learning method. Firstly, colourful and attractive pictures on the flashcards aided recall of learnt vocabulary in different lessons. Notably, colourful pictures could play a significant role in assisting students to learn vocabulary effectively. Conversely, a lack of colourful stimuli would create obstacles in sustaining personal attention for learning.

Students could also construct correct sentences with the learnt vocabulary. In addition, students understood new word meanings and could remember the words effortlessly. As such, flashcards assisted students in learning additional vocabulary for essay writing, which the students considered successful, and some of them preferred the flashcards as a learning tool upon achieving their learning goals.

Discussion

The current findings demonstrated that the Smart Interactive Whiteboard was more effective than flashcards in primary-level vocabulary teaching, which is consistent with Alfahadi (2015) and Şen and Ağır (2014). These findings provide some quantitative and qualitative support for hypothesis H1. Specifically, the mean post-test scores of the experimental group (using the Smart Interactive Whiteboard) were higher than those of the control group (using the flashcards). This suggests that students in the experimental group exhibited significant improvement in guided writing. The use of flashcards on the other hand did not improve vocabulary usage in guided writing, a finding that corresponds to Leny (2006).

Although the visuals were more attractive and colourful in this study, smaller and less legible flashcards negatively affected learning. Students exposed to flashcards interpreted the vocabulary inaccurately and did not manifest significant improvement in guided writing.

Despite this, there were a few positive comments about using flashcards, primarily on the use of dual languages to display meanings. Some students were also content with the images, which they deemed colourful and legible. This finding is in line with Bellani (2011), who found that flashcards improved the memory retention of learnt vocabulary and enhanced synaptic connections, as a flashcard would allow students to focus on the images and the related vocabulary that is being taught.

The Smart Interactive Whiteboard meanwhile enabled the students to focus on learning vocabulary by acting as a physical mediator (artefact), according to Vygotsky's (1978) social view of learning. Wertsch (1993) argued that the connection between meaningful artefacts and students' brains could mediate cognitive processes. Similarly, Dunkel (2002) posited that the Smart Interactive Whiteboard is a technological innovation for increasing students' language proficiency.

Baddeley (1986, 1999) proposed a visuospatial sketch pad as a component of working memory in the brain to maintain and manipulate pictures and a phonological loop to store and rehearse the pronunciation of vocabulary items. The phonological loop could facilitate learning by sustaining learnt vocabulary in working memory until students entirely mastered the learnt words.

The positive feedback on the Smart Interactive Whiteboard in this study supported the multimedia learning principles (Mayer, 2005), in particular the modality principle, in that students could enhance learning with different modes rather than only using a single one. Multimedia tools can therefore help students to acquire additional knowledge, especially when words and attractive pictures are displayed concurrently during the lesson.

The findings of this study also confirmed those of Morgan (2008), who investigated the impact of the Smart Interactive Whiteboard on student task engagement. The increase in the mean post-test scores after applying the Smart Interactive Whiteboard indicated a significant elevation in student task engagement, which is crucial in the teaching and learning process. Morgan concluded that the Smart Interactive Whiteboard was a decisive teaching tool to enhance student academic performance and engagement. In addition, the Smart Interactive Whiteboard could stimulate active participation in the classroom by encouraging reluctant students to participate in the lesson activities.

In the current study's post-tests, the students from the experimental group managed to form numerous correct sentences via suitable vocabulary when examples of each vocabulary item were provided before writing essays. This supported the language chunk concept proposed by Lewis (1993). The instances assisted the students to construct correct sentences instead of forming a sentence solely based on the learnt vocabulary. During the intervention, 40 vocabulary items were introduced, resulting in students selecting appropriate vocabulary. Notably, some students with limited English proficiency preferred flashcards to learn vocabulary, owing to the bright pictures and transferability in producing grammatically suitable and meaningful sentences. However, the interviews revealed that the Smart Interactive Whiteboard

was an effective tool that can successfully enhance the learning of guided writing as well as vocabulary acquisition.

Conclusion

This study examined two interventions to improve guided writing vocabulary. The interventions were flashcards (a traditional approach) and the Smart Interactive Whiteboard (a modern technological approach). The findings demonstrated that the Smart Interactive Whiteboard significantly improved students' ability to construct sentences through suitable vocabulary. To answer the first research question, pre- and post-test results were compared. Subsequently, semi-structured interviews were administered to collect qualitative data to supplement the quantitative findings while addressing the second and third research questions. The results revealed significant improvement in guided writing between the pre- and post-tests, which was ascribed to the effect of employing the Smart Interactive Whiteboard to teach vocabulary. The findings also showed that students could construct correct and appropriate sentences with suitable vocabulary based on displayed pictures. Furthermore, the semi-structured interview results were gathered and categorised into different themes based on students' opinions to further support the quantitative findings.

The second research question focussed on the students' intervention preferences for learning vocabulary. Significant writing improvement in the experimental group suggested that the Smart Interactive Whiteboard was highly effective for vocabulary teaching. Students asserted that the Smart Interactive Whiteboard was satisfactory due to its attractive and practical features for engaging students to learn effectively. The main features were Internet access, bright pictures, videos, a visualiser, convenience, and a sound system, which managed to actively engage students in the lessons. The system also allowed students to internalise vocabulary, grammar, moral values, and pertinent ideas in guided writing.

The third research question investigated the factors influencing students' preferences for either intervention. The Smart Interactive Whiteboard was shown to fulfil students' learning needs and to achieve specific objectives through suitable methodologies, as the tool is aligned with the academic and professional needs of the target community. As a result, the Smart Interactive Whiteboard was effective in engaging students in the learning process, and they agreed that the Smart Interactive Whiteboard could promote fun learning and effective vocabulary acquisition from lower to higher proficiency levels. Finally, the Smart Interactive Whiteboard provided the students with sufficient opportunities to practise the language by reading the instructions displayed on the whiteboard and listening to the pronunciations. Weak students could learn the vocabulary through pictures, videos, animations, or other media instead of solely reading one type of explanation for the introduced vocabulary.

Ethics Approval Statement

Research ethics approval was obtained from the University Human Research Committee, Sultan Idris Education University, Malaysia. Reference Number: 2021-0454-01.

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