Investigating Technology-Based Vocabulary Teaching Strategies among ESL Primary School Teachers in Terengganu

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ABSTRACT

Vocabulary mastery at an early age is essential in shaping students' overall language competence and academic achievement. Hence, the notion of encouraging ESL primary school teachers to strengthen students' vocabulary development proposes the idea of not only exposing them to the variety of vocabulary teaching strategies (VTS) but also making informed decisions on selecting the most effective and appropriate ones based on differing abilities of the students, particularly in today's technology-driven educational environment. This study focuses on the implementation of technological tools in vocabulary teaching while investigating the use of technology-based VTS among ESL primary school teachers in Terengganu and the relationship of the strategies used based on their gender. A quantitative research approach has been employed in which survey design is chosen to be applied. A questionnaire consisting of demographic profile and 33 items adapted from various resources have been distributed to 315 respondents from ESL primary school teachers in Terengganu. The findings revealed that Powerpoint and Google Classroom are the most frequent technological tools employed by the teachers for vocabulary teaching. Besides, ESL primary school teachers in Terengganu are moderate users of technology-based VTS where cognitive strategy has been pointed out as the most preferable strategy while social strategy is the least preferable strategy. The independent sample T-test performed in this study also proved that there is no significant difference of technology-based VTS used between gender. Future research is suggested to use a wider range of demographic factors and employ alternative research design in order to offer fresh perspectives on the ideas, attitudes or experiences related to technology-based vocabulary teaching strategies.

Keywords: vocabulary, teaching strategies, ESL primary school teachers, academic achievement, educational technology

INTRODUCTION

Teachers, researchers, and students have begun to place a high value for effective ways to improve vocabulary learning due to its paramount importance in the contribution to the language development especially for second language users. One of the options include employing vocabulary learning strategies (VLS). Schmitt (1997) has constructed a comprehensive taxonomy in learning vocabulary which is known as Vocabulary Learning Strategies (VLS) which include various strategies that can cater to the learners' differentiated needs in learning. Considering its importance, teachers play a major role in scaffolding and modelling the strategies through Vocabulary Teaching Strategies (VTS) which is the deliberate method to facilitate vocabulary learning. In other words, VLS reflects what and how students learn vocabulary, while VTS represents what teachers do to encourage the growth of those learning strategies.

In the Malaysian context, VTS is strongly aligned with the Common European Framework of Reference for Languages (CEFR), which guides the national English syllabus. The CEFR places vocabulary at the center of the language proficiency and encourages teachers to focus on both receptive and productive vocabulary development. Furthermore, the implementation of technology as an online learning tool has been emphasized by the Malaysian Education Blueprint 2015-2025 to customize the learning experiences of students and implies the focus of the government towards outcomes instead of input by applying the process of active learning. It aligns

with the broader National Digital Policy, which envisions the transformation of teaching and learning through digital innovation. Hence, language teachers are encouraged to explore the use of VTS digitally not only to enhance their language competency but also to transfer their knowledge in their own classroom practices. Nurmala et al. (2023) asserts that technology equipped learners with various options to practice English and involves themselves in an authentic learning environment. Therefore, the current paper discussed further on identifying the integration of technology in vocabulary teaching strategies implemented by ESL primary school teachers in Terengganu.

PROBLEM STATEMENT

According to Bouknify and Meryem (2025), students frequently struggled to determine the correct meaning of words and were even more perplexed when it came to applying the word in the correct context which eventually affects their academic performance. This is corroborated by Khamis et. al (2024) which asserted in their study that most learners, particularly Malay learners, frequently opposed the efforts to construct an English conversation due to variety of reasons, such as lack of vocabulary knowledge and possession. Besides, their mother tongue interference also affected their vocabulary development as their interactions with their peers, parents and community as a whole is predominantly in Malay.

Furthermore, a recent qualitative study by Andriyati et al (2025) explored teachers' perception of teaching vocabulary. Several difficulties have been identified by the teachers dealing with the preparation of materials involving vocabulary, time limitations and pronunciation activity of the vocabulary. The most common difficulty encountered is that there are still students who are not familiar with the words during their teaching process resulting in misunderstanding of information delivered regarding the definition. Therefore, it is also of utmost importance for teachers to understand students' learning preferences in order for them to acquire the vocabulary knowledge sufficiently to continue to prosper in other language skills by designing the most appropriate strategies in the teaching and learning session.

Much research aimed at investigating the relation of vocabulary learning to the online learning tool available (Patra et al. 2022; Quiroz et al. 2021; Simonnet et al. 2025). Nevertheless, the studies often concentrate on secondary and tertiary education settings. Some studies also primarily looked into the vocabulary learning strategies implemented by ESL learners (Abbasnejad & Kamali 2019; Rabadi 2016; Siti Nur Sakina Baharudin 2019). However, there has been limited evidence on the studies that has been conducted related to the implementation of technology in VTS specifically by ESL primary school teachers in the classroom-based setting where early vocabulary instruction is crucial to long-term language proficiency. As a result, there is a clear gap in research on how primary school teachers implement VTS using digital tools. Besides the pivotal role of teachers in vocabulary instruction, the matter is crucial to be discussed as Hao et al (2021) reported that vocabulary learning assisted by technology is more advantageous compared to non-technology assisted vocabulary learning. Hence, this study seeks to address the gap by investigating technology-integrated vocabulary teaching strategies used by ESL teachers at the primary level.

LITERATURE REVIEW

In order to validate and better understand the model of VLS, a line of studies have been conducted. A study conducted by Al-Khresheh & Al-Ruwaili (2020) investigated the application of vocabulary learning strategies around Saudi undergraduates majoring in English Languages. It is a quantitative dissertation whereby 219 students were randomly selected to answer the questionnaire. The finding showed that the strategy preferred by the students is Memory strategy followed by Determination and Social strategy. This is in accordance with the result from Abbasnejad and Kamali (2019) in their study whereby Memory strategy is found to be the most frequently used strategy among others despite the difference of participants' demography in both studies. This suggested the prevalence of integrating Memory strategy for the students in their vocabulary acquisition.

The aptitude of teachers to make well-informed pedagogical decisions on the use of strategies is crucial to the efficiency of vocabulary instruction, especially in ESL classrooms where vocabulary acquisition is a fundamental aspect of language fluency. Teng (2021) conducted a narrative inquiry to investigate EFL teachers'

perceptions on vocabulary training, with an emphasis on their beliefs and real-world teaching strategies. The study found that teachers frequently construct their vocabulary teaching strategies on their own personal ideas, which are influenced by their professional development, prior learning experiences, and the contextual classroom constraints. Teng's findings demonstrated that teachers generally favoured detailed teaching instruction, contextualized vocabulary presentation, and frequent recycling of vocabulary items which underscores the significance of aligning instructional methods with pedagogical goals and learners' competence levels. Schmitt's (1997) vocabulary strategies framework, which emphasizes form, meaning and usage as core elements of vocabulary knowledge, aligns with the current study's focus. Teng's research supports the idea that teacher cognition is crucial in the selection and application of vocabulary teaching strategies by illustrating that teachers' pedagogical decisions in vocabulary teaching are not just technical but also heavily impacted by contextual knowledge and reflective practices of the teachers.

Besides, studies have proven the significant improvement of utilizing technology in vocabulary learning as demonstrated by My Duong et al (2021) in their study targeted at 240 non-English major students studying in Ho Chi Minh University of Technology (HUTECH) which revealed high achievement levels and increased use of the tools over time. Comparably, a qualitative study by Govindasamy et al (2019) which explored on the use of mobile phones for vocabulary acquisition that was conducted in Malaysia setting has presented valuable insights whereby the capabilities of mobile phones surpassed that of traditional methods like printed dictionaries in expediting language learning outcomes particularly in vocabulary acquisition. Moreover, innovative approaches like employing Minecraft in elementary classrooms have shown promising results in improving English vocabulary mastery, as evidence by improved scores and positive student feedback on its efficacy and engagement benefit (Sudarmaji & Yusuf, 2021). Collectively, these studies highlight the pivotal role of technology in enhancing language learning outcomes and shaping modern pedagogical practices.

Although there are a number of studies conducted surrounding the use of vocabulary learning strategies in various context, there is a limited of evidence that explored on the utilization of technology-based in the context of vocabulary teaching strategies among ESL primary school teachers as most of the studies are too broad and primarily focused on the ESL learners. Additionally, the study on the relationship of the strategies used based on the most and least favoured strategies may shed light on a new perspective surrounding the instruction of the vocabulary in the classroom setting. Thus, this paper centred around the use of technology-based vocabulary teaching strategies among teachers in the classroom as it can help them to continuously enhance their professional development through the strategy implemented.

RESEARCH OBJECTIVES

1. To identify the technological tools used by ESL primary school teachers in Terengganu for vocabulary instruction.
2. To identify the technology-based Vocabulary Teaching Strategies (VTS) implemented by ESL primary school teachers in Terengganu.
3. To identify any differences of strategies used between gender among ESL primary school teachers in Terengganu.

RESEARCH QUESTIONS

1. What are the technological tools used by ESL primary school teachers in Terengganu for vocabulary instruction?
2. What is the technology-based Vocabulary Teaching Strategies (VTS) implemented by ESL primary school teachers in Terengganu?
3. Are there any differences of strategies used between gender among ESL primary school teachers in Terengganu?

RESEARCH HYPOTHESIS

Null Hypothesis: There is no difference in strategies used between gender among ESL primary school teachers in Terengganu.

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METHODOLOGY

This study is a quantitative research which employed survey as the research design. The population of this study include ESL primary school teachers in Terengganu consisting of 315 respondents. Cluster random sampling technique has been employed to ensure fair representation and logistical feasibility. In this approach, each government primary school in Terengganu is treated as a cluster. A random selection of schools is made using a computer-generated list, based on the full list of 352 government primary schools provided by the Terengganu State Department of Education (JPNT). Once the schools are selected, all ESL teachers within those selected schools are invited to participate in the study. Hence, 30 respondents are involved in the pilot study while the remaining respondents participated in the real study.

The instrument is adapted and adopted from various published researches (Alakrash & Norizan Abdul Razak 2021; My. Duong et al 2024; Nurmala et al 2023; Tahir et. al 2023). Section A deals with the demography of the respondents while section B includes technological tools employed by the respondents in vocabulary teaching and all 33 items related to technology-based VTS. Each item in the questionnaire employed the Likert Scale, given with five values. The instrument is validated by the subject matter expert (SME) and a master's degree holder in order to ensure each of the item is pertinent, understandable and suitable for the study's target respondents and goals. Cronbach's Alpha is most widely known statistical method to evaluate internal consistency in a quantitative research whereby George & Mallery (2019) stated in their study that a Cronbach's Alpha value of 0.7 or higher is typically regarded as acceptable, suggesting that the instrument has accurately assessed the desired construct. In this study, the reliability of the adapted questionnaire is evaluated by analysing responses gathered from the pilot study, using Cronbach's Alpha to determine the consistency of items across each section of the instrument which has shown a value of 0.96. Therefore, this further proves that the questionnaire is reliable to be used to collect the real data.

Data Collection Procedures

The questionnaire is converted into an online questionnaire using Google Form. Representatives from each ESL primary school teachers in Terengganu have been contacted through Whatsapp after getting the permission letter to administer the questionnaires by providing the URL to the Google Form in their respective schools. The data has been successfully collected in about two months.

Data Analysis Procedures

The data from the questionnaire is transmitted to SPSS software to be analysed. The first and second research questions are analysed using descriptive analysis in which the mean and standard deviation is examined by referring to the mean score interpretation introduced by Oxford (1990). The third research question is analysed using inferential analysis by employing t-test to compare the mean between variables which are the male and female ESL primary school teachers in Terengganu.

Ethical Consideration

This research project is conducted by strictly maintaining the ethical guidelines throughout the studies. Informed consent is essential to be included. Hence, participants of this study are provided with a thorough information in the questionnaire related to the objectives, methods and any possible risks or benefits prior to their involvement. The opportunity for them to voluntarily consent or engaged in the study is presented while ensuring their awareness of their rights and that they are able to withdraw without any penalties given. This whole process is conducted by respecting their own autonomy in decision-making.

Additionally, the importance of privacy and confidentiality has been taken into consideration of this study. In order to ensure their anonymity, all of their personal data and information are kept safe and removed before discussing the data analysis and dissemination. Thus, this approach helps to guarantee the contributions of the participants are valued and kept confidential from the external parties in addition to protecting their privacy.

FINDINGS AND DISCUSSION

What are the technological tools used by ESL primary school teachers in Terengganu for vocabulary instruction?

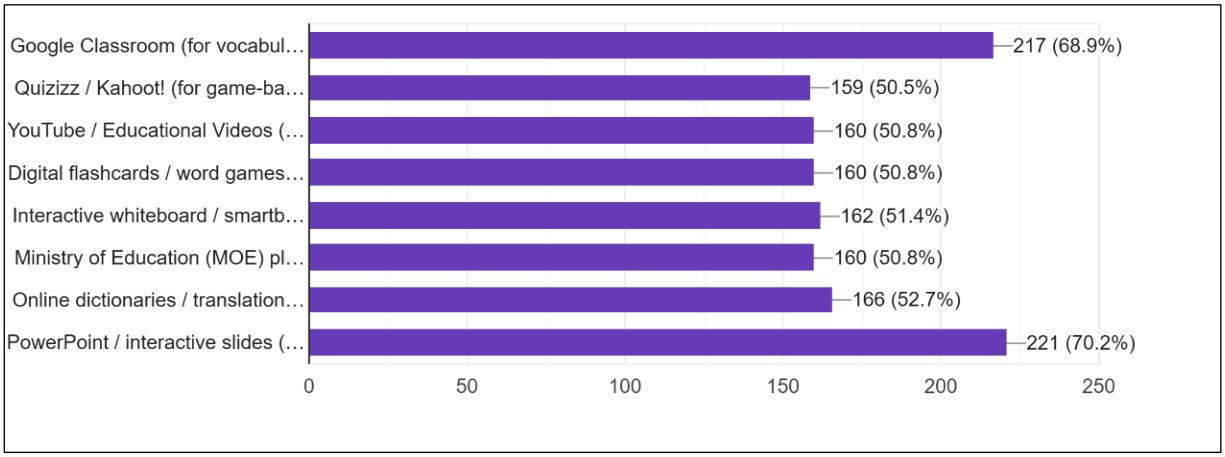

Figure 1: Technological Tools Employed by ESL Primary School Teachers in Terengganu in Vocabulary Instruction

As indicated in Figure 1, Powerpoint or interactive slides (70.2%) and Google Classroom (68.9%) were the technological tools that are frequently utilized by ESL primary school teachers in Terengganu to assist their vocabulary instruction. This is in accordance with the previous findings by Ahmad et al (2022) where teachers are reported to held favourable view of using Powerpoint to support the teaching and learning of second language, supported by Akbar and Kartika's (2023) studies where it proved the effectiveness of utilizing Powerpoint to teach vocabulary as it can give positive effect on their mastery of new words. Additionally, the widespread implementation of Google Classroom also aligns with Malaysian studies that shows positive views of its usefulness in primary ESL settings (Yie & Mohamad, 2023) though Husain et al (2022) emphasise that teacher readiness and infrastructure is still in moderate actual usage. These studies help provide insightful explanation on teachers in Terengganu who showed their preference in presentation-based and classroom management tools as both of the tools are perceived as useful and accessible.

The tool that has been reported to be the lowest tool employed by the teachers based on the data is revealed to be Quizizz/Kahoot with a percentage of 50.5% which consisted of 159 respondents altogether, with the finding shows that roughly half of the respondents integrate game-based learning tools for vocabulary teaching and learning. Local empirical work proposed the idea that while educators recognize the advantages of game-based platforms, they are exposed to practical impediment such as limited teacher training on effective classroom implementation of the gamified platforms, concerns on their classroom management during live games, internet stability and time constraints limit their routine use in primary classrooms (Munuyandi et al., 2021). Hence, this could influence them to resort to the simple presentation and classroom management tools as the main digital platforms to be implemented in the teaching of vocabulary.

What is the technology-based Vocabulary Teaching Strategies (VTS) implemented by ESL primary school teachers in Terengganu?

Table 1: Mean Value of Technology-based Vocabulary Teaching Strategies used by ESL Primary School Teachers in Terengganu

Strategy	N	Mean	Std. Deviation	Interpretation
Social	315	2.9782	0.42145	Moderate
Memory	315	3.0020	0.45895	Moderate
Cognitive	315	3.0088	0.43897	Moderate
Metacognitive	315	3.0020	0.43673	Moderate
Overall	315	2.9977	0.24826	Moderate

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Table 1 revealed the overall statistics for the technology-based vocabulary teaching strategies used among ESL primary school teachers in Terengganu. Based on the findings, the mean score for the overall use of VTS by 315 respondents is 2.99 while the standard deviation is 0.25. This result indicates a moderate use of the strategies among the respondents which suggested that the extent of its use is somewhat limited despite the fact that the teachers primarily employed the technology tools in their classroom. This could be affected by varying factors such as teachers' digital literacy, technological resources and familiarity with the online tools related to vocabulary.

Besides, the descriptive analysis of technology-based vocabulary teaching strategies namely Social, Memory, Cognitive and Metacognitive with their respective mean and standard deviation value implemented by ESL primary school teachers in Terengganu were also presented in the table. The mean score range is from 2.97 to 3.01, indicating moderate level of use across all strategy types.

According to the table, the results showcases that ESL primary school teachers in Terengganu moderately use all four of the categories of the technology-based vocabulary teaching strategies in the classroom practices based on the Oxford's (1990) mean score interpretation. Nevertheless, cognitive strategy emerged as the strategy that received a high score of mean value which is at 3.01. Memory and metacognitive strategies followed closely through a mean value of 3.00, while social strategy obtained the lowest score which is at 2.98.

This pattern shows that the teachers are more inclined to use cognitive-oriented digital tools such as online quizzes, spelling games and digital reading tasks that can directly engage learners in their vocabulary practices and application. These findings align with the reports from the My Duong et. al (2021) and Tahir et al. (2023) which claims that teachers prefer interactive and readily accessible technological activities to facilitate vocabulary acquisition.

In addition, the moderate use of the strategy types may be attributed to several factors including technological facilities, accessibility, familiarity and varying level of digital literacy among the teachers. The practices of vocabulary teaching through digital tools may not yet fully recognizable and integrated into their classroom although they are aware of the implementation of the tools in vocabulary teaching.

In conclusion, the results demonstrated a balanced albeit moderate degree of digital integration of vocabulary teaching strategies underscoring the necessity for targeted training and professional development in order to foster a more consistent and innovative technology utilization in ESL vocabulary teaching.

Table 2: Descriptive Statistics of Each Item in Cognitive Strategy

	Cognitive Strategy			
	Item	N	Mean	Std. Deviation
C1	I integrate vocabulary quizzes using Quizizz/Kahoot! for repeated practice	315	3.16	1.267
C2	I guide students to practice pronunciation using online tools (Google Translate, e-dictionaries)	315	2.90	1.258
C3	I support vocabulary writing through Microsoft Word or Google Docs	315	2.95	1.196
C4	I assign online reading materials (e-books, web pages) for vocabulary learning.	315	3.00	1.268
C5	I encourage students to practice spelling through online games.	315	3.14	1.219
C6	I integrate vocabulary apps that allow students to store and revisit words.	315	2.94	1.232
C7	I ask students to use online dictionaries to check vocabulary while reading.	315	2.98	1.272
C8	I assign sentence-building tasks using online platforms.	315	3.00	1.263
C9	I ask students to complete vocabulary worksheets or exercises uploaded on digital platforms.	315	3.01	1.173

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Table 2 showed specified item in cognitive strategy where the frequent implementation of digital quizzes like Quizizz and Kahoot! which are online games and sentence-building tasks to enhance their students' vocabulary retention received the highest mean score which is at 3.16. This finding is in line with Zainudin and Zulkiply (2023), who found that gamified learning through Quizizz significantly enhance students' motivation and engagement in vocabulary learning. Similarly, Nordin (2023) also reported that the implementation of Quizizz in Malaysian schools improved vocabulary retention in rural learners. These studies support the idea that game-based cognitive strategies are preferred as they are interactive, motivating and easy to implement particularly when teaching vocabulary to young learners.

On the other hand, the lowest mean score in this category falls under item C2 "guide students to practice pronunciation using online tools (Google Translate, e-dictionaries)" in which the mean value is at 2.90. This result allows for the interpretation that pronunciation practice of vocabulary is less frequently being emphasized in digital environments, possibly due to the teachers focus in other areas of receptive skills like reading and writing or limited awareness of pronunciation-based digital tools.

Table 3: Descriptive Analysis of Each Item in Social Strategy

Social Strategy				
Item		N	Mean	Std. Deviation
A1	I use e-websites to engage students in listening, writing, reading, and speaking.	315	3.03	1.207
A2	I collaborate with other teachers via online platforms for vocabulary activities.	315	2.93	1.295
A3	I encourage students to share vocabulary with peers using WhatsApp, Telegram, or Padlet	315	3.06	1.205
A4	I conduct online discussions/forums with students about vocabulary	315	2.95	1.249
A5	I ask students to create group vocabulary projects using Google Docs or similar tools.	315	2.95	1.199
A6	I encourage students to ask questions about vocabulary through online platforms	315	2.91	1.193
A7	I ask students to give peer feedback on vocabulary tasks using digital tools.	315	2.99	1.170
A8	I use online polls/surveys to check students' understanding of new vocabulary.	315	3.01	1.239

In contrast, social strategy recorded the lowest mean score which indicates a lower relative usage of the strategy. Table 3 showcased the mean score of each item for social strategy. While teachers use WhatsApp, Telegram, and Padlet to facilitate peer sharing of vocabulary (3.06), they are less frequently to encouraged students to ask questions or discuss vocabulary learning online with themselves (2.91). This mirrors the findings of Rahman and Yunus (2022), who observed that Malaysian ESL teachers often rely on social media platforms for content sharing but are less likely to employ them for sustained interaction and collaborative reflection. The lower use of social strategies may stem from teachers' limited confidence in moderating online discussions or monitoring student participation outside class hours. Besides, the findings also suggested that teachers are comfortable in encouraging students to use social media platforms for interactive vocabulary sharing. It also requires minimal monitoring and allows for the independent learning among the students as it is more informal, and fits naturally into their digital habits. Contrastingly, teachers also prefer direct one-to-one physical interactions with their students which allows for in depth clarification and sustained engagement particularly in vocabulary teaching in the classroom.

Table 4: Descriptive Analysis of Each Item in Memory Strategy

	Memory Strategy			
	Item	N	Mean	Std. Deviation
B1	I use internet-based visuals (pictures, videos) to reinforce vocabulary meaning	315	2.96	1.234
B2	I ask students to group/categorize vocabulary using digital tools.	315	2.97	1.241
B3	I use digital flashcards (Quizlet, Wordwall) for revision in the classroom.	315	3.03	1.228
B4	I use digital mind maps to help students organize vocabulary.	315	3.12	1.278
B5	I connect new vocabulary with similar English words using online sources	315	3.02	1.241
B6	I use multimedia (pictures, audio, video) to support vocabulary recall.	315	2.91	1.235
B7	I ask students to match words with pictures using online platforms	315	2.98	1.230
B8	I ask students to create vocabulary posters or infographics using digital tools.	315	3.02	1.214

The highest mean score for Table 4 is obtained at 3.12 for item B4 "I use digital mind maps to help students organize vocabulary" suggesting that the teachers rely heavily on visualization through mind maps to improve students' vocabulary possession which help them to organize and store the words meaningfully. This is consistent with the result from Nam and Trinh (2012), who demonstrated that digital mind maps enhance vocabulary recall and learner interest. Contrastingly, item B6 "use multimedia (pictures, audio, video) to support vocabulary recall" recorded the lowest mean score of 2.91 which reflects the teachers' lack of tendency to use the visualization means to review and recall activities. This may be influenced by classroom time limitations or the teachers' focus on other forms of reinforcement. Overall, the result suggest that teachers adopt visually oriented, technology-supported strategies to help students remember and organize vocabulary, although the frequency of use remains moderate.

Table 5: Descriptive Analysis of Each Item in Metacognitive Strategy

	Metacognitive Strategy			
	Item	N	Mean	Std. Deviation
D1	I use songs from websites or apps to teach vocabulary.	315	2.89	1.170
D2	I use movies or videos with subtitles for vocabulary learning.	315	3.04	1.212
D3	I encourage students to monitor their vocabulary progress using apps.	315	2.94	1.214
D4	I assign reflective tasks (e.g., online journals, video reflections) on words learned.	315	3.11	1.187
D5	I encourage students to set vocabulary goals using digital tools.	315	3.04	1.174
D6	I monitor students' vocabulary achievement through Google Classroom or online analytics.	315	2.86	1.195
D7	I ask students to plan their vocabulary learning using digital planners or apps.	315	3.06	1.252
D8	I encourage students to self-assess their vocabulary knowledge through online quizzes.	315	3.09	1.266

Based on Table 5, the highest mean value recorded is for item D4 "assign reflective tasks (e.g., online journals, video reflections) on words learned". This suggests that teachers are gradually incorporating reflective and self-evaluative digital tasks that promote learner awareness of vocabulary progress. However, fewer teachers reported using reflective tasks or digital analytics to track progress, indicating that self-regulated and data-informed vocabulary teaching remains limited. This finding aligns with Tahir et al. (2023), who highlighted that while Malaysian ESL teachers recognise the value of reflection and assessment in digital teaching, such practices are often underdeveloped due to lack of training in pedagogical technology design.

Overall, these results illustrated that Terengganu ESL primary school teachers are in the process of integrating technology for vocabulary teaching, with a stronger focus on practice-based cognitive strategies rather than social or reflective approaches. This pattern supports the national trend documented in Malaysia's Digital Education Policy and the English Language Education Reform (CEFR-aligned), where technology integration is improving but remains uneven across pedagogical areas. Teachers' selective use of digital tools highlights both progress and remaining gaps where they are confident using familiar, engaging tools for vocabulary drills but require further support to design higher-order, collaborative, and reflective vocabulary learning experiences.

1. Are there any differences of strategies used between gender among ESL primary school teachers in Terengganu?

Table 6: Respondents' Gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Female	**168**	**53.3**	**53.3**	**53.3**
Male	**147**	**46.7**	**46.7**	**46.7**
Total	**315**	**100.0**	**100.0**	**100.0**

Table 7: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
VTS	Equal variances assumed	3.549	0.061	1.620	313	0.106	0.04529	0.02797	-0.00973	0.10032
	Equal variances not assumed			1.589	267.587	0.113	0.04529	0.02850	-0.01082	0.10141

Based on Table 6, female ESL primary school teachers in Terengganu who are 168 in total contributed to the percentage of 53.3% while male ESL primary school teachers which consists of the remaining respondents (147) received a percentage of 46.7%. This shows that the majority of the respondents are from female teachers compared to male teachers. According to the Ministry of Education (2021), primary school teachers in Malaysia is typically female-dominated based on the national teacher demographic trend. However, the difference of percentage in both genders is only about 7% which suggested a fairly balanced distribution between both genders. Hence, this distribution offers a fair approach in analyzing the related data to represent the population of ESL primary teachers in Terengganu.

Pripp (2015) asserts that a result is deemed significant if the p-value is 0.05 or below and non-significant if it is higher than 0.05. The t-test analysis based on the Table 7 disclosed that $p>0.05$ which is $p=0.11$. Hence, it can be concluded that there is no significant difference on the use of technology-based vocabulary teaching strategies between male and female ESL primary school teachers in Terengganu and thus, the null hypothesis failed to be rejected. This finding aligned with the several studies that also reported to have no significant difference of strategies used between male and female teachers particularly in the application of educational technology. For instance, a study conducted by Munawwarah (2015) found that both male and female teachers exhibited similar attitudes and levels of technology integration in their lesson delivery. Likewise, Wong and Hamzah (2020) also revealed that both genders demonstrated similar engagement with digital tools for vocabulary instruction, which is equivalence with the Digital Education Transformation Plan (2019 – 2025) and CEFR-aligned curriculum that prioritize equal technology use across all teacher demographics. This served as more evidence that both genders used the same technology-based VTS and that differences in their gender are not the contributing factors in the variations of technology-based VTS usage.

CONCLUSION, SUGGESTIONS AND IMPLICATIONS

The implementation of technology-based VTS in second language learning should be taken into consideration for the betterment of the students' language proficiency as well as for the teacher's professional development. Therefore, it is imperative for more studies to be carried out pertaining to the enforcement of technology-based VTS execution in language learning. Future studies are recommended to concentrate on applying the same methodology to new sorts of data collection, such as gathering information from other states and countries. This can also be accomplished by conducting a comprehensive and large-scale survey with schools in various states. The results of the research can be analysed and compared to the outcomes of this research.

Additionally, future study can also be expanded by using a wider range of demographic factors through elements such as respondents' educational levels and socio-cultural backgrounds which may provide a profound insight in conjunction with their use of technology-based VTS. Besides, further studies can investigate on the ways educators from different subject areas employed the strategies to support their vocabulary teaching as their experiences may offer a distinct perspective and valuable viewpoint. Apart from that, comparing the utilization of technology-based VTS among respondents from urban, suburban, and rural regions would help educators better understand how contextual variations affect strategy implementation. Such comparisons may be able to yield important ramifications for adapting the strategies to different learning environments. Ultimately, the findings of this study serve as the starting point for subsequent investigations.

Furthermore, it is also recommendable to employed alternative research design or methodological research approaches as this may provide fresh perspectives on the ideas, attitudes or experiences related to technology-based VTS. A qualitative approach, for instance, could be used to explore various dimensions of studies as it involves non-numerical data and emphasis on obtaining the data through open-ended and conversational communication. A case study design involving prominent figure in the field of education, such as an expert of second language ESL teacher can obtain deeper insights into the psychological, environmental, and sociocultural factors influencing the use of the strategies.

Overall, the study confirms that technology is present and functional in ESL vocabulary teaching but remains supplementary rather than transformative. Hence, it is of utmost importance to strengthen teacher's pedagogical knowledge of digital vocabulary strategies, together with sustained professional development and infrastructural support to further improve the quality and impact of technology-enhanced vocabulary learning in Malaysian primary schools.

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