Ai-Assisted Instructional Strategies Employed By English Teachers In Public Secondary Schools Towards Learners' Vocabulary Learning

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Abstract : Artificial intelligence (AI) is transforming education by offering personalized learning and real-time feedback, which enhances student motivation and vocabulary acquisition (Yu, 2024; Kumar, 2019). This study explored AI-assisted instructional strategies in public secondary schools, focusing on their effectiveness in improving student vocabulary outcomes. The research aimed to identify commonly used AI tools by English teachers, evaluate various instructional strategies—categorized into visual, auditory, reading and writing, and kinesthetic—and assess their impact on vocabulary learning across social, metacognitive, cognitive, memory, and activation dimensions. Using a quantitative approach with a descriptive correlational design, the study surveyed 131 English teachers from seven schools in Pangasinan, analyzing data through frequency, percentage, mean, standard deviation, and Pearson's correlation coefficient. Key findings indicate that tools like Canva, Grammarly, and ChatGPT are frequently used for their effectiveness. AI strategies in reading and writing, visual, auditory, and kinesthetic modalities significantly enhance vocabulary learning, particularly in cognitive, social, and activation areas. The study confirms a positive relationship between AI strategies and vocabulary improvement, underscoring the value of incorporating diverse AI tools to boost social interaction, cognitive engagement, and memory retention. Future research should explore the specific impacts of these strategies on different aspects of vocabulary learning and examine how integrating multiple AI tools influences educational outcomes across varied settings and learner demographics.

Keywords:*Artificial intelligence, English Teachers, Instructional Strategies, Vocabulary Learning*

INTRODUCTION

In an era of rapid technological advancement, the integration of artificial intelligence (AI) into educational settings has become increasingly prevalent, marking a significant shift in teaching and learning paradigms (Yu, 2024). AI-assisted tools hold immense potential to revolutionize education by offering personalized and adaptive learning experiences tailored to individual student needs and preferences (Meehirr, 2023).

Unlike traditional instructional methods, AI-powered systems can analyze vast amounts of data to identify students' learning styles, strengths, and weaknesses, allowing for customized learning pathways that optimize engagement and knowledge retention (Tan, 2021). These AI tools leverage machine learning algorithms and natural language processing techniques to adapt content delivery, pacing, and assessment strategies in real time, thereby enhancing the efficacy of instruction and improving learning outcomes (Garcia, 2020).

Moreover, AI technology has the capability to provide immediate feedback to students, fostering a continuous cycle of learning and improvement (Kumar, 2019). This personalized approach not only increases student motivation and confidence but also promotes self-directed learning skills essential for lifelong learning and success in the digital age (Chen, 2022). As such, the incorporation of AI in educational settings represents

a paradigm shift towards more student-centered, adaptive, and effective learning environments that cater to the diverse needs of today's learners (Xiao, 2023).

In the realm of English vocabulary instruction, traditional methods often fall short in meeting the diverse needs of students. However, personalized AI-driven tools offer tailored learning experiences, leading to improved outcomes (Mead, 2022; Klein, 2021). These tools adapt to individual strengths, weaknesses, and preferences, ensuring effective vocabulary acquisition (Wei, 2023). Additionally, as language acquisition is dynamic, adaptive strategies are crucial. AI tools provide real-time feedback and assessments, allowing teachers to intervene effectively (Tan, 2023).

Various countries worldwide have extensively studied the correlation between AI-assisted instruction and language proficiency. In New York City schools, the integration of AI technology into language learning programs has yielded promising outcomes in enhancing students' language proficiency. According to the study of Smith (2024) titled "The Impact of AI Integration on Language Learning: A Study in New York City Schools", it has concluded that through interactive software and virtual tutors, students receive personalized feedback and recommendations tailored to their unique learning styles and pace. This approach not only enhances linguistic skills but also cultivates cultural competence, preparing students for an increasingly interconnected world.

These studies have significantly demonstrated not only language proficiency but the enhancement of vocabulary learning. These tools adapt to individual strengths, weaknesses, and preferences, ensuring effective vocabulary acquisition (Wei, 2024). Additionally, as language acquisition is dynamic, adaptive strategies are crucial (Mead, 2022; Klein, 2021). AI tools provide real-time feedback and assessments, enabling teachers to intervene effectively (Tan, 2023). This approach supports continuous student development, thereby enhancing vocabulary learning.

In the Philippine setting, where diverse linguistic backgrounds and varied English proficiency levels are prevalent among students, AI-assisted tools hold particular relevance in the English Vocabulary subject. These tools can offer targeted support for learners facing language challenges, fostering a more inclusive and supportive educational environment (Gomez, 2022).

Additionally, the integration of AI in the English Vocabulary subject aligns with the 21st-century skills agenda, preparing students for the demands of a technology-driven society. Exposure to AI tools not only enhances linguistic proficiency but also cultivates digital literacy skills essential for future academic and professional success (Ramos, 2023).

For instance, a study conducted by Panugaling (2020) entitled "Integration of Multiple Intelligences and AI in Enhancing Language Learning of Tausug Students in Mindanao" concentrated on language acquisition among Tausug students in Mindanao, delving into the integration of multiple intelligences and AI. The study illuminated how this fusion bolstered language learning among Tausug learners. Another study by Sharma and Sharma (2020) entitled "Multiple Intelligences, Artificial Intelligence, and Language Learning: A Comparative Study" undertook a comparative analysis on multiple intelligences, AI, and language acquisition, contributing to the comprehension of the interplay between these elements.

In the Division of Pangasinan, a prevalent challenge in secondary schools is the notable struggle of students in vocabulary acquisition. The limited proficiency in vocabulary among students not only hinders effective communication and comprehension but also poses obstacles in their academic performance, particularly in English subjects (Afzal, 2019). This study was prompted by the growing reliance on the enhancement of AI-assisted instructional strategies in the domain of English education within public secondary schools. This is through investigating the utilization and effectiveness of strategies employed in utilizing AI tools in English teaching. This will be examined through the AI tools used by English teachers in their instruction.

Additionally, it evaluated the impact of AI-assisted strategies on students' vocabulary learning and the relationship between AI strategies and students' vocabulary learning outcomes. Finally, the study aimed to develop a framework for integrating AI into English teaching to enhance vocabulary learning. Understanding the impact of the employed strategies in AI assisted instruction on student vocabulary learning is imperative to improve the vocabulary proficiency of students in secondary schools.

Statement of the Problem

The study aimed to explore the utilization of AI-assisted instructional strategies in public secondary schools, particularly within the domain of English education, with a central focus on their effectiveness in fostering improved student vocabulary learning outcomes.

Sub-problems

1. What AI tools does the English Teachers used in their instruction?
2. What are the AI-assisted instructional strategies employed by the English Teacher in their classroom in terms of:
2.1. visual;
2.2. auditory;
2.3. reading and writing; and
2.4. kinesthetic?
3. What is the effect of AI-assisted instructional strategies on the student's vocabulary learning in terms of:
3.1. social;
3.2. metacognitive;
3.3. cognitive;
3.4. memory; and
3.5. activation?
4. Is there a significant relationship between the AI strategies employed by the teachers and the vocabulary learning of the learners?
5. Based on the findings of the study, what framework of integration of AI in English teaching can be developed to promote vocabulary learning of learners?

METHODOLOGY

Research Design

The study employed a quantitative method via a descriptive correlational research approach. This design primarily involved collecting and analyzing numerical data to provide a detailed overview of the phenomena under investigation. It encompassed correlations among various aspects across different groups or conditions (Bhandari, 2020).

The study collected data on the respondents' use of AI tools in instruction, AI-assisted instructional strategies, and their impact on students' vocabulary learning. It utilized a descriptive correlational research approach to describe these characteristics and phenomena while also examining correlations between the AI strategies employed by teachers and students' vocabulary learning. Through these approaches, the study aimed to develop a framework for integrating AI into English teaching to enhance vocabulary learning outcomes for students.

Instrumentation and Data Collection

The study employed a researcher-made instrument designed to capture comprehensive data on various aspects related to the integration of AI in English teaching and its impact on student vocabulary learning. The development of the instrument involved careful consideration of existing literature, theoretical frameworks, and input from experts in the field to ensure validity and reliability.

The instrument was divided into three sections. The first section of the survey questionnaire was designed to identify the AI tools used by the respondents. This section employed information gathering and checklist methods.

The second section of the survey questionnaire evaluated the AI-assisted instructional strategies utilized by English teachers in their classrooms, focusing on visual, auditory, reading and writing, and kinesthetic approaches. This section utilized a 5-point Likert scale, with options ranging from "Always" (5) to "Never" (1).

The third section was used to assess the effect of AI-assisted instructional strategies on the students' vocabulary learning in terms of social, metacognitive, cognitive, memory, and activation. This section utilized a 5-point Likert scale, with options ranging from "Strongly Agree" (5) to "Strongly Disagree" (1).

Furthermore, the instrument was subjected to validation by three research experts, including a Principal with a doctorate degree, a Head Teacher VI, a Master Teacher II, a Master Teacher I, and a Teacher III in the English subject. The reliability of the instrument was measured through a pilot test with thirty (30) respondents using Cronbach's alpha.

The research process began with the researcher securing ethical clearance from Lyceum Northwestern University. Subsequently, the researcher sought approval from the research advisor to proceed with the study. Upon obtaining this approval, letters of permission were sent to the Schools' Division Superintendent and the respective principals of public high schools in SDO I Pangasinan, seeking their consent for data gathering.

After securing consent from these authorities, the researcher requested teachers' contact information, with a strong emphasis on confidentiality. The test was administered by visiting their respective schools. The survey, accessible through Google Forms, included a cover letter and a section for informed consent. Once teachers provided their consent, they proceeded to answer the survey questions, which took approximately five to ten minutes. Throughout the data collection process, the researcher strictly adhered to research ethics policies, maintaining the privacy and confidentiality of respondents' information. Subsequently, data analysis and interpretation of quantitative data followed. The study was conducted during the academic year 2023-2024.

Tools for Data Analysis

The data gathered by the researcher underwent various statistical treatments to address each statement of the problem. First, in addressing Statement of the Problem 1, which focused on the AI tools used by the respondents, the assessment involved the utilization of frequency percentages analysis.

$$\text{Frequency Percentage} = \left(\frac{\text{Frequency of a specific category}}{\text{Total Frequency}} \right) \times 100$$

Where:

Frequency of a specific category- The number of occurrences of a specific category in the data set.

Total Frequency- The total number of occurrences across all categories.

Moving on to Statement of the Problem 2, which centered on the AI-assisted instructional strategies utilized by English teachers in their classrooms, with a focus on visual, auditory, reading and writing, and kinesthetic approaches, mean analysis and standard deviation were utilized.

$$\text{Mean}(\bar{x}) = \frac{\sum_{i=1}^{n} x_i}{n}$$

Where:

$\bar{x}$ = Mean

x_i = Each individual value

n = Total number of values

In terms of Statement of the Problem 3, which examined the effect of AI-assisted instructional strategies on students' vocabulary learning, weighted mean analysis was specifically employed.

$$\text{Weighted Mean}(\bar{x}_w) = \frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$$

Where:

$\bar{x}_w$ = Weighted Mean

x_i = Each individual value

w_i = Weight assigned to each value

n = Total number of values

Finally, Statement of the Problem 4, which sought to ascertain the significant relationship between the AI strategies employed by teachers and the vocabulary learning of learners, utilized Pearson's correlation coefficient. Each statistical treatment provided valuable insights into the respective research questions, contributing to a comprehensive understanding of the study's objectives.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where:

r = Pearson correlation coefficient

n = Number of paired scores

x = First variable scores

y = Second variable scores

$\sum xy$ = Sum of the product of paired scores

$\sum x$ = Sum of the first variable scores

$\sum y$ = Sum of the second variable scores

$\sum x^2$ = Sum of the squares of the first variable scores

$\sum y^2$ = Sum of the squares of the second variable scores

RESULTS AND DISCUSSION

This chapter presents the analyzed data from the study participants' responses. To properly display the results of the data that were analyzed in the research, the data are presented in tables. Moreover, the data are organized based on the order of the statement of the problem.

Part I. AI Tools in Instruction

Table 2

AI Tools used by English Teachers in their Instruction

AI Tools	Frequency	Percentage
ChatGPT	76	21.84
Curipod	1	0.29
Gradescope	1	0.29
Grammarly	79	22.70
QuillBot	47	13.51
Canva	92	26.44
ClassPoint AI	13	3.74
Formative AI	3	0.86
Lessonplans AI	17	4.89
OpenAI	4	1.15
Others	15	4.31
Total	**348**	**100**

Based on the data in Table 2, the most frequently used AI tool among English teachers in their instruction is Canva, with a frequency of 92 and accounting for 26.44% of the total responses. Canva's high usage is attributed to its versatile design capabilities, which enable teachers to create visually engaging and effective instructional materials. This is followed closely by Grammarly, with a frequency of 79 and representing 22.70% of the total. Grammarly's prominence reflects its utility in providing real-time grammar and style feedback, which is essential for improving writing skills. ChatGPT is the third most used tool, with a frequency of 76 and accounting for 21.84%. ChatGPT's significant usage underscores its role in generating interactive and personalized learning experiences, enhancing student engagement and instruction. QuillBot comes next with a frequency of 47, representing 13.51% of the responses.

Other tools used include Lessonplans AI (17; 4.89%), ClassPoint AI (13; 3.74%), OpenAI (4; 1.15%), Formative AI (3; 0.86%), Curipod (1; 0.29%), and Gradescope (1; 0.29%). Some respondents also listed other tools (15; 4.31%) which include PowerPoint, Cici, Copilot, Adobe Firefly, Hyperdocs, Magic School AI, Adobe Express, Flipgrid, Padlet, Kahoot, Quiziz, and Quizlet. This lower adoption rate could be attributed to

their less developed features or the absence of substantial evidence demonstrating their effectiveness in enhancing teaching and learning processes.

The study's findings provide a comprehensive view of how AI-assisted instructional strategies impact vocabulary learning, aligning well with several theoretical and conceptual frameworks. According to Rogers' Diffusion of Innovations Theory, the prevalent use of AI tools like Canva, Grammarly, and ChatGPT highlights their effectiveness and ease of integration, reinforcing the idea that innovations that demonstrate clear benefits are more readily adopted.

Part II. AI-Assisted Instructional Strategies

Table 3

AI-Assisted Instructional Strategies employed by the English Teacher in their classroom in terms of Visual

Visual	Mean	SD	Description
As an English Teacher, I…			
Utilize AI-generated vocabulary flashcards featuring images to aid in word retention and association.	2.95	1.07	Sometimes
Visually highlight frequently used words in a text or topic using AI-generated word clouds.	2.89	1.11	Sometimes
Organize and connect vocabulary words using AI-powered mind maps.	2.89	1.06	Sometimes
Display AI-generated vocabulary exercises and word games on interactive whiteboards.	2.90	1.10	Sometimes
Incorporate AI-generated infographics to present vocabulary usage statistics and examples.	3.00	1.06	Sometimes
Utilize AI-powered educational videos and animations to illustrate vocabulary words in context.	3.08	1.07	Sometimes
Create multimedia presentations that incorporate AI-generated vocabulary words to deepen understanding.	3.33	1.14	Sometimes
Employ AI-generated graphic organizers, such as concept maps and mind maps, to visually represent word meanings and relationships.	3.27	1.02	Sometimes
Depict the interrelationships between vocabulary terms with AI-generated concept maps.	2.99	1.02	Sometimes
Immerse students in vocabulary-rich environments through AI-powered 3D models.	2.87	1.09	Sometimes
Overall Mean	**3.02**	**1.08**	**Sometimes**

Legend: 4.21-5.00 Always; 3.41-4.20 Often; 2.61-3.40 Sometimes; 1.81-2.60 Rarely; and 1.00-1.80 Never

The mean analysis of AI-assisted instructional strategies employed by English teachers in their classrooms shows that the statement with the highest mean is "Create multimedia presentations that incorporate AI-generated vocabulary words to deepen understanding," with a mean of 3.33 and an SD of 1.14, indicating that teachers sometimes utilize this strategy. This higher mean suggests that teachers find multimedia presentations to be a valuable tool for enhancing vocabulary comprehension, likely due to their ability to combine visual and auditory elements, which can cater to different learning styles and make abstract vocabulary concepts more concrete. Supporting literature includes Yu (2024) and Meehirr (2023), who emphasize the transformative potential of AI in providing personalized and adaptive learning experiences. This approach is also supported by Garcia (2020) and Kumar (2019), who discuss how AI tools enhance engagement and knowledge retention through real-time feedback and interactive content.

On the other hand, the strategy with the lowest mean is "Immerse students in vocabulary-rich environments through AI-powered 3D models," with a mean of 2.87 and an SD of 1.09, also indicating occasional use. The lower mean could be attributed to the potential complexity and resource intensity of creating and implementing AI-powered 3D models in regular classroom settings, which may not be as readily accessible or practical for many teachers. This observation is consistent with Chen (2022), who highlights the challenges in integrating advanced AI tools due to practical constraints.

Overall, the strategies analyzed have an overall mean of 3.02 and an SD of 1.08, falling into the "Sometimes" category. This suggests that while teachers occasionally use AI-assisted visual instructional strategies, these practices are not yet consistently integrated into their teaching routines. Factors influencing this might include varying levels of familiarity with AI tools, differences in access to technology, and the time required to create and implement these resources.

Table 4

AI-Assisted Instructional Strategies employed by the English Teacher in their classroom in terms of Auditory

Auditory	Mean	SD	Description
As an English Teacher, I…			
Pronounce vocabulary words clearly and repeatedly during instruction, supported by AI-generated pronunciation guides.	3.27	1.12	Sometimes
Provide AI-generated audio recordings of word pronunciations for students to listen and repeat.	2.95	1.11	Sometimes
Enhance auditory memory with songs and chants containing vocabulary words, facilitated by AI-generated audio tracks.	2.97	1.15	Sometimes
Engage students during vocabulary activities with AI-generated sound effects and voice modulation.	2.99	1.08	Sometimes
Recommend AI-powered online pronunciation guides for independent practice.	3.05	1.14	Sometimes
Reinforce vocabulary through auditory cues in quizzes and games, supported by AI-generated audio prompts.	2.98	1.11	Sometimes
Contextualize and reinforce vocabulary in narratives through oral storytelling sessions, supported by AI-generated prompts.	2.97	1.08	Sometimes
Practice speaking skills through dialogues and role-plays involving vocabulary usage, facilitated by AI-generated scripts.	3.11	1.17	Sometimes
Assign AI-generated audiobooks or podcasts related to vocabulary topics for listening comprehension.	2.83	1.13	Sometimes
Discuss vocabulary concepts and usage in AI-generated podcasts or audio lectures.	2.81	1.15	Sometimes
Overall Mean	**2.99**	**1.13**	**Sometimes**

Legend: 4.21-5.00 Always; 3.41-4.20 Often; 2.61-3.40 Sometimes; 1.81-2.60 Rarely; and 1.00-1.80 Never

Table 4 demonstrates the mean analysis of AI-assisted instructional strategies employed by English teachers in their classrooms in terms of auditory methods. The strategy with the highest mean is "Pronounce vocabulary words clearly and repeatedly during instruction, supported by AI-generated pronunciation guides," with a mean of 3.27 and an SD of 1.12, indicating that teachers sometimes use this method. This higher usage may be due to the direct impact clear pronunciation has on vocabulary acquisition, making it a practical and easily integrated strategy.

Conversely, the strategy with the lowest mean is "Discuss vocabulary concepts and usage in AI-generated podcasts or audio lectures," with a mean of 2.81 and an SD of 1.15, suggesting occasional use. The lower mean could be due to the potential challenges teachers face in creating or finding relevant AI-generated podcasts or audio lectures, as well as the time required to integrate these into the curriculum effectively. This contrasts with findings from Dubois (2022) and Suzuki (2021). Both studies emphasize the effectiveness of AI and gamified auditory tools in engaging students and enhancing vocabulary learning. The limited use of AI-generated podcasts in the current study suggests potential challenges in integrating such resources, as highlighted by Espinosa et al. (2023), who discuss the need for more accessible and relevant AI resources in educational settings.

Table 5

AI-Assisted Instructional Strategies employed by the English Teacher in their classroom in terms of Reading and Writing

Reading and Writing	Mean	SD	Description
As an English Teacher, I…			
Expose students to new vocabulary in context through extensive reading of authentic texts, supplemented by AI-generated explanations and examples.	3.23	1.12	Sometimes
Maintain AI-generated vocabulary journals to record new words and definitions.	3.02	1.17	Sometimes
Stimulate use of newly acquired vocabulary with AI-generated writing prompts.	3.05	1.07	Sometimes

Collaboratively create stories or essays using vocabulary words in writing activities, facilitated by AI-generated suggestions.	3.02	1.14	Sometimes
Fill in missing vocabulary words within reading passages through cloze exercises, supported by AI-generated hints.	2.99	1.16	Sometimes
Provide AI-generated vocabulary worksheets and handouts for independent practice.	3.11	1.12	Sometimes
Facilitate written communication through online forums and discussion boards, supported by AI-generated prompts.	2.97	1.10	Sometimes
Assess understanding of vocabulary in context through reading comprehension exercises, with AI-generated questions.	3.10	1.08	Sometimes
Guide students in deciphering meanings of unfamiliar words with AI-generated scaffolding techniques.	3.02	1.15	Sometimes
Improve vocabulary usage in writing through peer editing and feedback sessions, with AI-generated suggestions.	3.07	1.06	Sometimes
Overall Mean	**3.06**	**1.11**	**Sometimes**

Legend: 4.21-5.00 Always; 3.41-4.20 Often; 2.61-3.40 Sometimes; 1.81-2.60 Rarely; and 1.00-1.80 Never

Table 5 depicts the mean analysis of AI-assisted instructional strategies employed by English teachers in their classrooms concerning reading and writing methods. The strategy with the highest mean is "Expose students to new vocabulary in context through extensive reading of authentic texts, supplemented by AI-generated explanations and examples," with a mean of 3.23 and an SD of 1.12, indicating that teachers sometimes use this approach. This higher mean reflects the value teachers place on contextual learning and the supplementary role AI can play in providing explanations and examples to deepen students' understanding of vocabulary within authentic texts. The high mean score for exposing students to new vocabulary through extensive reading with AI-generated explanations aligns with Meehirr (2023), who highlights the value of contextual learning and personalized AI tools in enriching vocabulary acquisition. Similarly, Chen (2022) and Garcia (2020) discuss how AI can provide personalized feedback and content, supporting the moderate use of AI-generated vocabulary journals and writing prompts.

The strategy with the lowest mean is "Facilitate written communication through online forums and discussion boards, supported by AI-generated prompts," with a mean of 2.97 and an SD of 1.10, suggesting occasional use. This lower mean might be due to challenges related to integrating online forums into the curriculum, such as ensuring student engagement and managing online discussions effectively. The lower mean for using AI in online forums and discussion boards contrasts with Smith (2024) and Suzuki (2021), who discuss AI's potential in enhancing virtual learning environments, suggesting that managing these platforms effectively remains a challenge.

Table 6

AI-Assisted Instructional Strategies employed by the English Teacher in their classroom in terms of Kinesthetic

Kinesthetic	Mean	SD	Description
As an English Teacher, I…			
Engage tactile learners with AI-generated vocabulary games and puzzles.	3.08	1.05	Sometimes
Manipulate tactile materials, such as AI-generated letter tiles or word cards, to practice vocabulary.	2.93	1.01	Sometimes
Encourage physical expression of word meanings through AI-generated gesture-based activities.	2.95	1.05	Sometimes
Motivate active learning and teamwork with AI-generated vocabulary relay races or competitions.	3.02	1.08	Sometimes
Incorporate vocabulary exploration and discovery into outdoor activities, supplemented by AI-generated prompts.	2.91	1.08	Sometimes
Provide creative outlets for reinforcing word meanings with AI-generated vocabulary-based crafts or art projects.	2.95	1.07	Sometimes
Involve physical movement and interaction in AI-generated role-playing exercises.	3.00	1.10	Sometimes
Promote active learning and exploration through AI-generated vocabulary scavenger hunts.	2.92	1.07	Sometimes

Enact word meanings physically through AI-generated vocabulary charades or acting games.	2.98	1.07	Sometimes
Allow hands-on exploration of vocabulary concepts through AI-generated interactive simulations or experiments.	2.89	1.08	Sometimes
Overall Mean	**2.96**	**1.06**	**Sometimes**

Legend: 4.21-5.00 Always; 3.41-4.20 Often; 2.61-3.40 Sometimes; 1.81-2.60 Rarely; and 1.00-1.80 Never

Table 6 provides the mean analysis of AI-assisted kinesthetic instructional strategies employed by English teachers in their classrooms. The strategy with the highest mean is "Engage tactile learners with AI-generated vocabulary games and puzzles," with a mean of 3.08 and an SD of 1.05, suggesting that teachers sometimes use this approach. This higher mean indicates a positive response to interactive and engaging vocabulary activities that cater to tactile learners, reflecting a preference for kinesthetic methods that involve hands-on interaction with vocabulary content. It also aligns with findings from Schmitt (1997), who emphasizes the importance of engaging students through interactive activities that cater to their learning preferences. This approach resonates with the literature on kinesthetic learning, where hands-on activities and physical engagement are critical for reinforcing vocabulary acquisition (Gupta, Bostrom, & Huber, 2019).

Meanwhile, the strategy with the lowest mean is "Allow hands-on exploration of vocabulary concepts through AI-generated interactive simulations or experiments," with a mean of 2.89 and an SD of 1.08 which reflects a lesser degree of adoption, which is consistent with concerns raised by Tan (2023) about the challenges in integrating advanced AI tools into the curriculum. This lower mean points to less frequent use of high-tech, interactive simulations, possibly due to limited access to or familiarity with such advanced AI tools, or challenges in integrating them into the curriculum.

While, the overall mean for kinesthetic strategies is 2.96 with an SD of 1.06, indicating that these methods are used occasionally. This moderate frequency reflects that while kinesthetic approaches are recognized and applied to some extent, there may be limitations in their consistent implementation. Teachers might be exploring how best to integrate these strategies or may face practical constraints in utilizing AI for kinesthetic learning. This finding supports the observations of Chen (2022) and Xiao (2023), who highlight the potential benefits of AI in enhancing engagement through kinesthetic activities but also point out the need for additional resources and training to maximize their effectiveness.

Table 7

Summary Table of AI-Assisted Instructional Strategies

Indicators	Mean	SD	Description
Visual	3.02	1.08	Sometimes
Auditory	2.99	1.13	Sometimes
Reading and Writing	3.06	1.11	Sometimes
Kinesthetic	2.96	1.06	Sometimes
Overall Mean	**3.01**	**1.10**	**Sometimes**

Legend: 4.21-5.00 Always; 3.41-4.20 Often; 2.61-3.40 Sometimes; 1.81-2.60 Rarely; and 1.00-1.80 Never

Table 7 summarizes the AI-assisted instructional strategies used by English teachers, with indicators ranked from highest to lowest mean. The strategy with the highest mean is "Reading and Writing," which has a mean of 3.06 and a standard deviation (SD) of 1.11, indicating that this approach is used sometimes. This suggests that AI tools supporting reading and writing are relatively well-integrated into teaching practices, reflecting a moderate but consistent application of strategies like AI-generated writing prompts and vocabulary journals.

Following closely is "Visual," with a mean of 3.02 and an SD of 1.08. This indicates that visual strategies, such as AI-generated vocabulary flashcards and infographics, are also used sometimes. The relatively high mean suggests that visual aids are a common component of instructional practices, though perhaps not as frequently employed as reading and writing strategies.

The "Auditory" strategies rank next, with a mean of 2.99 and an SD of 1.13. This score reveals that auditory methods, including AI-generated pronunciation guides and audio recordings, are used occasionally. The slightly lower mean compared to visual and reading/writing strategies may indicate that auditory methods are less prevalent, possibly due to challenges in effectively implementing AI-driven audio tools or varying teacher preferences.

Lastly, "Kinesthetic" strategies have the lowest mean at 2.96 with an SD of 1.06. This suggests that kinesthetic methods, such as AI-generated vocabulary games and interactive simulations, are used somewhat less frequently. This finding is consistent with observations by Sharma and Sharma (2020) and Oracion (2020), who identified challenges in integrating kinesthetic learning tools within AI-assisted environments,

potentially due to practical limitations or less emphasis on physical interaction in digital contexts. This lower mean may reflect practical challenges or less emphasis on incorporating physical and interactive activities into the curriculum.

Part III. Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning

Table 8

Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning in terms of Social

Social	SD	Description
Provides a platform for students to share their knowledge and insights about vocabulary topics with their peers.	0.95	Agree
Enhances collaborative learning environments where students engage in peer-to-peer discussions about vocabulary concepts.	0.99	Agree
Encourages active participation in group activities, promoting social interaction and communication skills.	0.96	Agree
Fosters teamwork and cooperation as students collaborate on vocabulary-related projects and activities.	0.93	Agree
Promotes inclusivity by providing opportunities for students to interact with diverse perspectives and experiences.	0.92	Agree
Builds a sense of community and belonging within the classroom through shared vocabulary learning experiences.	0.96	Agree
Facilitates peer tutoring opportunities where students can teach and learn from each other using AI-assisted resources.	0.96	Agree
Encourages empathy and understanding as students collaborate to solve vocabulary-related challenges.	0.95	Agree
Cultivates leadership skills as students take on roles within group activities, such as leading vocabulary discussions or presentations.	0.99	Agree
Creates a supportive learning environment where students feel comfortable expressing their ideas and asking questions about vocabulary.	0.96	Agree
Overall Mean	**0.95**	**Agree**

Legend: 4.21-5.00 Strongly Agree; 3.41-4.20 Agree; 2.61-3.40 Neutral; 1.81-2.60 Disagree; and 1.00-1.80 Strongly Disagree

Table 8 displays the mean analysis of the effect of AI-assisted instructional strategies on students' vocabulary learning in terms of social aspects. The statement with the highest mean is "Encourages active participation in group activities, promoting social interaction and communication skills," which has a mean of 3.77 and a standard deviation (SD) of 0.96. This indicates that AI-assisted instruction significantly supports students' social engagement by fostering active participation and enhancing communication skills during group activities. The relatively high mean reflects the positive impact of AI tools in facilitating social interactions and collaborative learning experiences.

In contrast, the lowest mean is observed for the statement "Provides a platform for students to share their knowledge and insights about vocabulary topics with their peers," with a mean of 3.58 and an SD of 0.95. Although this score still falls within the "Agree" range, it suggests that while AI-assisted instruction does offer opportunities for sharing knowledge, it may be less effective in creating platforms specifically designed for this purpose compared to other social benefits.

Whilst, the overall mean for social aspects is 3.67 with an SD of 0.95, indicating a general agreement that AI-assisted strategies positively affect students' social learning experiences. This suggests that, on average, these strategies successfully promote collaborative learning, teamwork, and social interaction among students. The consistent positive responses across various statements highlight the effectiveness of AI tools in supporting social aspects of vocabulary learning. The results indicate that AI tools significantly enhance social interactions and collaborative learning environments, aligning with the findings of Espinosa et al. (2023), who underscore the role of technology in fostering student engagement and interaction. This supports the high mean score for statements related to promoting active participation and teamwork, consistent with DepEd Order No. 16, s. 2023, which emphasizes the integration of technology to enhance learning experiences. Moreover, the findings align with Bernales et al. (2024), highlighting the importance of creating supportive learning environments through innovative methods, which is reflected in the high scores for fostering a sense of community and providing a supportive space for idea expression.

Table 9

Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning in terms of Metacognitive

Metacognitive	Mean	SD	Description
The AI-assisted instruction I implement as an English Teacher…			
Fosters autonomy and independence as students take ownership of their vocabulary learning process.	3.61	0.94	Agree
Encourages self-monitoring and evaluation of vocabulary acquisition techniques to identify areas for growth.	3.60	0.90	Agree
Develops self-awareness as students reflect on their vocabulary learning progress and set goals for improvement.	3.62	0.98	Agree
Enhances metacognitive regulation by providing tools and resources for students to track their vocabulary learning activities.	3.63	0.93	Agree
Encourages metacognitive awareness of learning strengths and weaknesses in relation to vocabulary acquisition.	3.55	0.91	Agree
Supports metacognitive reflection through opportunities for students to assess their understanding and comprehension of vocabulary concepts.	3.60	0.94	Agree
Promotes strategic thinking as students plan and implement personalized vocabulary learning strategies.	3.66	0.97	Agree
Facilitates problem-solving skills as students adapt their vocabulary learning approaches based on feedback and outcomes.	3.62	0.97	Agree
Cultivates metacognitive flexibility as students experiment with different vocabulary learning strategies to achieve their goals.	3.61	0.97	Agree
Provides scaffolding for metacognitive development by guiding students through the process of planning, monitoring, and evaluating their vocabulary learning experiences.	3.60	0.98	Agree
Overall Mean	**3.61**	**0.95**	**Agree**

Legend: 4.21-5.00 Strongly Agree; 3.41-4.20 Agree; 2.61-3.40 Neutral; 1.81-2.60 Disagree; and 1.00-1.80 Strongly Disagree

Table 9 presents the mean analysis of the effect of AI-assisted instructional strategies on students' vocabulary learning in terms of metacognitive aspects. The statement with the highest mean is "Promotes strategic thinking as students plan and implement personalized vocabulary learning strategies," which has a mean of 3.66 and a standard deviation (SD) of 0.97. This indicates that AI-assisted instruction is particularly effective in encouraging students to engage in strategic planning and personalized learning, reflecting a strong impact on metacognitive skills.

Conversely, the lowest mean is for the statement "Encourages metacognitive awareness of learning strengths and weaknesses in relation to vocabulary acquisition," with a mean of 3.55 and an SD of 0.91. While still within the "Agree" range, this lower mean suggests that AI-assisted instruction may be somewhat less effective in fostering students' awareness of their learning strengths and weaknesses compared to other metacognitive benefits. The result contrasts with the findings of Garcia (2020) and Xiao (2023), who report that AI technologies are particularly adept at providing real-time feedback and helping students become aware of their strengths and weaknesses.

Furthermore, the overall mean for metacognitive aspects is 3.61 with an SD of 0.95, indicating a general agreement that AI-assisted strategies effectively support metacognitive skills in vocabulary learning. This suggests that, on average, these strategies are successful in promoting autonomy, self-monitoring, and strategic thinking among students. The consistent positive responses across the statements highlight the role of AI tools in enhancing students' metacognitive abilities, although there is room for improvement in specific areas such as self-awareness of learning strengths and weaknesses. It also aligns with findings from various studies, including those by Gupta et al. (2019) and Tan (2023). Gupta et al. emphasize the effectiveness of AI in supporting metacognitive regulation through personalized feedback and progress tracking, which is reflected in the overall agreement on the effectiveness of AI tools in enhancing students' metacognitive skills. Similarly, Tan's research supports the idea that AI tools enhance metacognitive processes by providing adaptive learning experiences that cater to individual learning needs.

Table 10

Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning in terms of Cognitive

Cognitive	Mean	SD	Description
The AI-assisted instruction I implement as an English Teacher…			
Improves vocabulary acquisition by providing multiple exposure opportunities through AI-generated resources.	3.67	0.89	Agree
Enhances understanding of vocabulary concepts through interactive and engaging learning experiences.	3.67	0.94	Agree
Supports concept formation by connecting new vocabulary words to prior knowledge and experiences.	3.71	0.95	Agree
Encourages deep processing of vocabulary information through meaningful and purposeful activities.	3.71	0.97	Agree
Strengthens memory retention of vocabulary words through active engagement and practice.	3.67	0.95	Agree
Facilitates schema development as students organize and categorize vocabulary terms based on their relationships.	3.60	0.95	Agree
Promotes critical thinking skills as students analyze and evaluate vocabulary usage in different contexts.	3.71	0.94	Agree
Promotes transfer of learning by applying vocabulary knowledge to real-world scenarios and tasks.	3.70	0.96	Agree
Develops higher-order thinking skills as students apply vocabulary knowledge to solve complex problems.	3.72	0.98	Agree
Cultivates intellectual curiosity as students explore and inquire about the meanings and origins of vocabulary terms.	3.67	0.97	Agree
Overall Mean	**3.68**	**0.95**	**Agree**

Legend: 4.21-5.00 Strongly Agree; 3.41-4.20 Agree; 2.61-3.40 Neutral; 1.81-2.60 Disagree; and 1.00-1.80 Strongly Disagree

Table 10 shows the mean analysis of the effect of AI-assisted instructional strategies on students' vocabulary learning in terms of cognitive aspects. The statement with the highest mean is "Supports concept formation by connecting new vocabulary words to prior knowledge and experiences," which has a mean of 3.71 and a standard deviation (SD) of 0.95. This indicates that AI-assisted instruction is particularly effective in helping students relate new vocabulary to what they already know, enhancing their ability to form and understand concepts.

On the other hand, the statement with the lowest mean is "Facilitates schema development as students organize and categorize vocabulary terms based on their relationships," which has a mean of 3.60 and an SD of 0.95. Although still within the "Agree" range, this lower mean suggests that AI tools may be less effective in aiding students' ability to organize and categorize vocabulary compared to other cognitive benefits.

Meanwhile, the overall mean for cognitive aspects is 3.68 with an SD of 0.95, reflecting general agreement that AI-assisted instructional strategies positively impact cognitive processes related to vocabulary learning. This suggests that, on average, these strategies are effective in improving vocabulary acquisition, enhancing understanding, and supporting deep processing and critical thinking. The high means across statements indicate that AI tools significantly contribute to cognitive aspects of vocabulary learning, though there are some areas where their effectiveness could be further improved.

Table 11

Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning in terms of Memory

Memory	Mean	SD	Description
The AI-assisted instruction I implement as an English Teacher…			
Facilitates encoding of vocabulary words into long-term memory through spaced repetition techniques.	3.67	0.91	Agree
Improves memory consolidation by providing frequent opportunities for retrieval practice and review.	3.63	0.89	Agree
Supports memory recall by presenting vocabulary words in varied contexts and formats.	3.67	0.91	Agree
Enhances memory retention through multisensory experiences that engage visual, auditory, and kinesthetic modalities.	3.64	0.90	Agree
Promotes mnemonic strategies for remembering vocabulary words, such as acronyms or visual imagery.	3.62	0.92	Agree
Provides retrieval cues and prompts to aid in recalling vocabulary words during assessments or discussions.	3.64	0.91	Agree
Supports memory organization by categorizing and grouping related vocabulary terms for easier recall.	3.64	0.92	Agree
Encourages rehearsal and repetition of vocabulary words to reinforce memory traces and associations.	3.65	0.93	Agree
Fosters semantic elaboration by encouraging students to make connections between new vocabulary words and existing knowledge.	3.62	0.91	Agree
Utilizes adaptive learning algorithms to personalize memory enhancement techniques based on individual student needs and preferences.	3.62	0.92	Agree
Overall Mean	**3.64**	**0.91**	**Agree**

Legend: 4.21-5.00 Strongly Agree; 3.41-4.20 Agree; 2.61-3.40 Neutral; 1.81-2.60 Disagree; and 1.00-1.80 Strongly Disagree

Table 11 explains the mean analysis of the effect of AI-assisted instructional strategies on students' vocabulary learning in terms of memory. The statement with the highest mean is "Facilitates encoding of vocabulary words into long-term memory through spaced repetition techniques," which has a mean of 3.67 and a standard deviation (SD) of 0.91. This indicates strong agreement that AI tools effectively use spaced repetition to help students encode vocabulary words into long-term memory. Strong (2023) emphasizes that AI tools can enhance memory retention through techniques such as spaced repetition, which aligns with the high mean score for facilitating the encoding of vocabulary into long-term memory reported in the table. Similarly, Guerra (2023) highlights the role of personalized feedback and progress tracking in supporting memory consolidation, resonating with the positive feedback on AI's ability to improve retrieval practice and review.

The statement with the lowest mean is "Utilizes adaptive learning algorithms to personalize memory enhancement techniques based on individual student needs and preferences," with a mean of 3.62 and an SD of 0.92. This lower mean suggests that while AI tools are perceived as helpful in memory enhancement, their effectiveness in personalizing techniques based on individual needs is somewhat less pronounced.

The overall mean for memory-related effects is 3.64, with an SD of 0.91, reflecting general agreement that AI-assisted instructional strategies positively impact various aspects of memory. This includes facilitating encoding, improving consolidation, supporting recall, and enhancing retention through multisensory experiences and mnemonic strategies. The high means across statements indicate that AI tools are effective in supporting memory processes related to vocabulary learning, although there is room for improvement in personalizing these strategies.

Table 12

Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning in terms of Activation

Activation	Mean	SD	Description
The AI-assisted instruction I implement as an English Teacher…			
Stimulates interest and engagement in vocabulary learning through interactive and immersive experiences.	3.67	0.95	Agree
Promotes curiosity and exploration as students interact with AI-generated resources and activities.	3.70	0.92	Agree
Encourages initiative and motivation as students take an active role in their vocabulary learning journey.	3.65	0.99	Agree
Sparks creativity and innovation by providing opportunities for students to experiment with vocabulary usage.	3.66	0.91	Agree
Cultivates a growth mindset by celebrating progress and achievements in vocabulary learning.	3.64	0.98	Agree
Inspires confidence and self-efficacy as students experience success and mastery in acquiring new vocabulary words.	3.65	0.96	Agree
Fosters a sense of agency and empowerment as students realize their ability to control and direct their own learning.	3.62	0.97	Agree
Encourages risk-taking and resilience as students overcome challenges and setbacks in vocabulary acquisition.	3.64	0.98	Agree
Promotes persistence and perseverance as students work towards their vocabulary learning goals.	3.66	1.02	Agree
Instills a lifelong love of learning by fostering positive associations and experiences with vocabulary acquisition.	3.67	1.01	Agree
Overall Mean	**3.66**	**0.97**	**Agree**

Legend: 4.21-5.00 Strongly Agree; 3.41-4.20 Agree; 2.61-3.40 Neutral; 1.81-2.60 Disagree; and 1.00-1.80 Strongly Disagree

Table 12 displays the mean analysis of the effect of AI-assisted instructional strategies on students' vocabulary learning in terms of activation. The statement with the highest mean is "Promotes curiosity and exploration as students interact with AI-generated resources and activities," with a mean of 3.70 and a standard deviation (SD) of 0.92. This suggests strong agreement that AI tools effectively stimulate students' curiosity and encourage exploration through interactive resources.

On the lowest counterpart, the statement with the lowest mean is "Fosters a sense of agency and empowerment as students realize their ability to control and direct their own learning," with a mean of 3.62 and an SD of 0.97. This indicates slightly less agreement compared to other statements, suggesting that while AI tools support student engagement, there is less consensus about their effectiveness in empowering students to take full control of their learning.

It was discovered that the overall mean for activation-related effects is 3.66, with an SD of 0.97, reflecting general agreement that AI-assisted strategies positively impact student activation. This includes stimulating interest, promoting curiosity, encouraging initiative, and fostering creativity. The high means across the statements highlight the effectiveness of AI tools in engaging students and motivating them in their vocabulary learning journey.

Table 13

Summary Table of Effect of AI-assisted Instructional Strategies on The Student's Vocabulary Learning

Indicators	Mean	SD	Description
Social	3.67	0.95	Agree
Metacognitive	3.61	0.95	Agree
Cognitive	3.68	0.95	Agree
Memory	3.64	0.91	Agree
Activation	3.66	0.97	Agree
Overall Mean	**3.65**	**0.94**	**Agree**

Legend: 4.21-5.00 Strongly Agree; 3.41-4.20 Agree; 2.61-3.40 Neutral; 1.81-2.60 Disagree; and 1.00-1.80 Strongly Disagree

Table 13 summarizes the effects of AI-assisted instructional strategies on students' vocabulary learning, focusing on various indicators. Among these, Cognitive indicators have the highest mean of 3.68 with an SD of 0.95, indicating strong agreement that AI tools significantly enhance cognitive processes such as vocabulary acquisition, understanding, and critical thinking. Following closely, Social indicators have a mean of 3.67 and an SD of 0.95, reflecting agreement that AI strategies effectively foster social interaction, collaboration, and peer engagement in vocabulary learning. Wertsch (1985) and Rogoff (2020), who emphasize the importance of social interaction in learning. AI tools that foster collaborative environments and peer interactions can enhance vocabulary learning, as highlighted by the literature on AI's role in promoting collaborative learning experiences.

Activation indicators, with a mean of 3.66 and an SD of 0.97, suggest agreement that AI tools stimulate student interest and motivation, encouraging active participation and creativity. Memory indicators have a mean of 3.64 and an SD of 0.91, indicating agreement that AI tools support memory enhancement through various techniques like spaced repetition and multisensory experiences. Research by Strong (2023) and Pearson Languages (2023) highlights AI's capability in utilizing spaced repetition and mnemonic techniques to aid memory retention. However, the literature suggests that these techniques might need to be more robustly integrated into AI tools to fully address memory enhancement needs, reflecting the slight gap noted in the study. Lastly, Metacognitive indicators, with a mean of 3.61 and an SD of 0.95, show agreement that AI tools foster self-awareness, strategic thinking, and self-regulation in vocabulary learning. Literature by Zia (2023) and Hannay et al. (2023) indicates that AI can support metacognitive processes but might require more tailored approaches to effectively promote self-awareness and strategic learning.

Generally, the overall mean for all indicators is 3.65, with an SD of 0.94, reflecting general agreement that AI-assisted instructional strategies positively impact vocabulary learning across all aspects evaluated. This comprehensive analysis demonstrates that while AI tools are effective in cognitive, social, and activation aspects, there is slightly less emphasis on metacognitive and memory improvements. The findings highlight the effectiveness of AI in enhancing various facets of vocabulary learning but also suggest areas for potential refinement in supporting metacognitive and memory processes. Vygotsky's Sociocultural Theory is reflected in the positive effects of AI tools on social and cognitive dimensions, suggesting that these tools facilitate socially mediated learning and collaborative interactions. The alignment with Piaget's Theory of Cognitive Development and Gagné's Conditions of Learning is evident in the study's findings that AI tools adapt to various cognitive stages and learning conditions, supporting personalized and effective vocabulary instruction. Constructivist Learning Theory is also reflected in the results, as AI tools that promote interactive and immersive learning experiences align with the idea of learners actively constructing knowledge.

Part IV. Significant Relationship between the AI Strategies Employed by the Teachers and the Vocabulary Learning of the Learners

Table 18

Pearson's r Test of Relationship between the Teachers' AI Strategies and Learners' Vocabulary Learning

Indicators	r value	p-value	Decision	Impression at 0.05 level
Visual				
Social	.643**	0.01	Reject H$_o$	Significant
Metacognitive	.624**	0.01	Reject H$_o$	Significant
Cognitive	.644**	0.01	Reject H$_o$	Significant
Memory	.633**	0.01	Reject H$_o$	Significant
Activation	.636**	0.01	Reject H$_o$	Significant
Auditory				
Social	.679**	0.01	Reject H$_o$	Significant
Metacognitive	.672**	0.01	Reject H$_o$	Significant
Cognitive	.658**	0.01	Reject H$_o$	Significant
Memory	.662**	0.01	Reject H$_o$	Significant
Activation	.670**	0.01	Reject H$_o$	Significant
Reading and Writing				
Social	.665**	0.01	Reject H$_o$	Significant
Metacognitive	.623**	0.01	Reject H$_o$	Significant
Cognitive	.604**	0.01	Reject H$_o$	Significant
Memory	.617**	0.01	Reject H$_o$	Significant
Activation	.616**	0.01	Reject H$_o$	Significant
Kinesthetic				
Social	.607**	0.01	Reject H$_o$	Significant
Metacognitive	.611**	0.01	Reject H$_o$	Significant
Cognitive	.605**	0.01	Reject H$_o$	Significant
Memory	.615**	0.01	Reject H$_o$	Significant
Activation	.610**	0.01	Reject H$_o$	Significant

**. Correlation is significant at the 0.01 level (2-tailed).

Table 18 provides a comprehensive analysis of the relationships between AI strategies employed by teachers and their effects on learners' vocabulary learning. With the Auditory strategies, the highest correlations are observed across all indicators: Social (r = 0.679), Metacognitive (r = 0.672), Cognitive (r = 0.658), Memory (r = 0.662), and Activation (r = 0.670), with all p-values at 0.01. This indicates that auditory strategies have a significant and strong impact on vocabulary learning. The higher the use of auditory strategies, the higher the improvements in students' social interaction, cognitive processing, memory retention, and activation in vocabulary learning. The decision to reject the null hypothesis is based on these high and significant rho values, confirming a substantial positive relationship between auditory strategies and vocabulary learning.

Reading and Writing strategies also show strong correlations: Social (r = 0.665), Metacognitive (r = 0.623), Cognitive (r = 0.604), Memory (r = 0.617), and Activation (r = 0.616), with p-values of 0.01. This signifies that the use of reading and writing AI tools significantly enhances various aspects of vocabulary learning. The hypothesis that increased use of reading and writing strategies leads to improved vocabulary learning is supported, as these strategies are shown to positively affect students' social engagement, metacognitive skills, cognitive understanding, memory, and activation.

Visual strategies, while still significant, show slightly lower correlations: Social (r = 0.643), Metacognitive (r = 0.624), Cognitive (r = 0.644), Memory (r = 0.633), and Activation (r = 0.636), with p-values of 0.01. This indicates that visual tools are effective but to a lesser extent compared to auditory and reading and writing strategies, but slightly higher on kinesthetic strategy. The decision to reject the null hypothesis is based on these significant, though somewhat lower, correlation values, suggesting that while visual strategies positively impact vocabulary learning, their effect is less pronounced than that of other strategies. According to Mehirr (2023), visual aids are effective in creating engaging learning environments, although their impact may be somewhat less pronounced compared to auditory or interactive methods. This is consistent with the findings of Xiao (2023), who acknowledged the importance of visual tools but also noted that they may not be as impactful as other more interactive or personalized AI-assisted strategies.

Kinesthetic strategies demonstrate slight lower significant correlations with Social (r = 0.607), Metacognitive (r = 0.611), Cognitive (r = 0.605), Memory (r = 0.615), and Activation (r = 0.610), all with p-values of 0.01. These results suggest that kinesthetic methods also positively influence vocabulary learning. The hypothesis that the use of kinesthetic strategies corresponds to vocabulary learning outcomes is confirmed, highlighting their effectiveness in engaging students physically and mentally. The positive impact of kinesthetic strategies on vocabulary learning, as shown by the correlations in this study, is supported by Gupta, Bostrom, and Huber (2019). Their research indicates that interactive and hands-on learning experiences are effective in engaging students and reinforcing vocabulary acquisition.

In conclusion, the analysis confirms that all AI strategies—auditory, reading and writing, and visual, and kinesthetic—significantly impact learners' vocabulary learning. Auditory and reading and writing strategies are shown to be the most influential, while kinesthetic strategies, though still important, have a slightly lesser impact. The findings support the hypothesis that the more diverse and comprehensive the use of AI strategies, the greater the improvements in vocabulary learning outcomes, emphasizing the importance of integrating multiple AI-assisted instructional strategies to enhance educational effectiveness.

Summary

The general objective of this study was to explore the utilization of AI-assisted instructional strategies in public secondary schools, particularly within the domain of English education, with a central focus on their effectiveness in fostering improved student vocabulary learning outcomes. The research objectives included identifying the AI tools commonly used by English teachers, assessing the various AI-assisted instructional strategies employed—categorized as visual, auditory, reading and writing, and kinesthetic—and evaluating their effects on students' vocabulary learning across social, metacognitive, cognitive, memory, and activation dimensions. Additionally, the study sought to determine the significant relationships between these AI strategies and students' vocabulary learning outcomes and to propose a framework for integrating AI in English instruction to better support vocabulary acquisition. Utilizing a quantitative research method with a descriptive correlational approach, the study surveyed 131 public junior and senior high school English teachers from seven selected schools within the Division of Pangasinan. Data was collected through random sampling and analyzed using frequency, percentage, mean analysis, standard deviation, and Spearman's rho to address the study's objectives and derive meaningful insights.

The following key findings emerged from the analysis:

The result of the study indicates that Canva, Grammarly, and ChatGPT are the most commonly used three AI tools having a frequency of 92 (26.44%), 79 (22.70%), and 76 (21.84%), reflecting their effectiveness and ease of use.

The AI-assisted instructional strategies commonly used by English teachers are Reading and Writing (3.06), Visual (3.02), Auditory (2.99), and Kinesthetic (2.96) suggesting that AI tools supporting these areas and are relatively well-integrated into teaching practices. The overall mean of 3.01 provides that AI-assisted strategies are sometimes utilized with moderate frequency across various modalities.

For instance, the effects of AI-assisted instructional strategies on students' vocabulary learning, focusing on Cognitive (3.68), Social (3.67), Activation (3.66), Memory (3.64), and Metacognitive (3.61) highlights a strong agreement among teachers that AI tools significantly enhance various facets of vocabulary learning. Having an overall mean of 3.65, reflecting that AI tools are effective in cognitive, social, and activation aspects, there is slightly less emphasis on metacognitive and memory improvements.

Auditory and reading and writing strategies are shown to be the most impact, while kinesthetic strategies, though still important, have a slightly lesser influence. Therefore, the higher the use of AI strategies, the higher the improvements in students' social interaction, cognitive processing, memory retention, and activation in vocabulary learning. Moreover, the result rejects the null hypothesis as confirmed by p-values lower than 0.01 level of significance. In conclusion, the analysis confirms that all AI strategies—auditory, reading and writing, kinesthetic, and visual—have a significantly positive correlation on learners' vocabulary learning.

Conclusions

Based on the findings, the following conclusions were drawn:

1. The study reveals that popular AI tools like Canva, Grammarly, and ChatGPT are frequently used by English teachers due to their effectiveness and ease of integration. Conversely, tools with less frequent use suggest limited relevance or lack of awareness, indicating a need for increased exposure and training on emerging AI tools.

2. Among the various AI-assisted instructional strategies, those focused on Reading and Writing, Visual, Auditory, and Kinesthetic modalities are commonly employed. This reflects a diverse approach to integrating AI into teaching, although the overall utilization is moderate, indicating potential for more consistent application across different instructional methods.

3. AI-assisted strategies positively influence students' vocabulary learning, particularly in cognitive, social, and activation domains. Despite the strong benefits observed, the impact on metacognitive and memory aspects is somewhat less pronounced, suggesting that while AI tools enhance overall learning, there is room to strengthen their role in developing reflective and memory-related skills.

4. The study confirms a significant positive relationship between the use of AI strategies and improvements in students' vocabulary learning. This outcome supports the rejection of the null hypothesis and emphasizes the value of incorporating various AI strategies to enhance social interaction, cognitive engagement, memory retention, and overall vocabulary acquisition.

Recommendations

In light of the conclusions drawn, the following recommendations are formulated:

1. It is recommended that teachers expand their use of popular AI tools like Canva, Grammarly, and ChatGPT, which have proven effective and user-friendly for enhancing vocabulary instruction. Additionally, teachers should explore and incorporate less utilized tools potentially through professional development and training sessions, to diversify their AI toolset and optimize instructional strategies.

2. To enhance the effectiveness of AI-assisted instructional strategies, school heads and the Department of Education should prioritize the integration of AI tools that support reading and writing, visual, auditory, and kinesthetic modalities. This includes providing targeted professional development for teachers and ensuring that schools have access to relevant AI resources. Such initiatives will help optimize instructional practices, improve student engagement, and foster more effective vocabulary learning outcomes.

3. Students should actively engage with the various AI-assisted instructional strategies provided in their English classes, focusing on cognitive, social, activation, memory, and metacognitive aspects. By utilizing these AI tools and participating in interactive activities, students can enhance their vocabulary learning experience, deepen their understanding, and improve their retention and application of new words.

4. Future research should further investigate the differential impacts of specific AI-assisted instructional strategies on various dimensions of vocabulary learning, such as social interaction, cognitive processing, memory retention, and activation. Studies could explore the nuanced effects of these strategies across different educational settings and learner demographics and examine how integrating multiple AI tools simultaneously influences vocabulary development outcomes.

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