

Students' Self-Reported Use of AI Chatbots in Vocabulary Learning: A Mixed-Methods Study in A Reading Course

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ABSTRACT

This study examines students' self-reported integration of AI chatbots into vocabulary learning in the Literacy for Academic Purposes course by reporting on the usage of various vocabulary learning tasks. An explanatory sequential mixed-methods design was adopted. Quantitative data were collected from 82 third-semester English Education students with an 18-item self-reported questionnaire. Descriptive statistics were used for data analysis in IBM SPSS Statistics version 23. The qualitative phase involved semi-structured interviews with six students and one course lecturer, and the interview data were analyzed using the Braun and Clarke thematic analysis. The quantitative data reported that finding meaning in context, generating the meaning of a word, and reading comprehension were the most regularly used AI chatbots, whereas vocabulary consolidation and vocabulary application were reported the least. The qualitative data reported that the study participants mainly used AI chatbots to aid their comprehension of vocabulary while reading and that the study participants used AI chatbots the least to reinforce vocabulary and to engage in the productive use of language. Joint display analysis indicated that AI chatbot use was task-centered, and qualitative data reported the task-specific use of AI chatbots in vocabulary learning tasks. The findings of the study reported that the use of AI chatbots in vocabulary retrieval should be extended to the use of AI chatbots in vocabulary consolidation, the productive use of language, and the critical use of AI chatbots.

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1. INTRODUCTION

The role of artificial intelligence (AI) in education is widespread and significantly changing language education, especially in higher education, where students often need to work more autonomously. Many AI tools dominate the space, but in English as a Foreign Language (EFL) learning, chatbots are increasingly popular for their ability to provide

countless opportunities for language input, offer feedback, and simulate conversation [1], [2], [3], [4]. In this context, AI chatbots are given names as conversational systems that are built with generative AI, such as ChatGPT, Google Gemini, and Microsoft Copilot, and that utilize large language models (LLMs) to understand the context of a situation and formulate responses in the form of human language. Unlike traditional chatbots that answer questions with a fixed response from a script, generative AI chatbots can provide explanations, feedback, and language that is relevant to the context, especially for vocabulary and academic reading. These tools are especially popular with students because they encourage autonomous learning and can be used outside the classroom. These tools are especially popular with students because they encourage autonomous learning and can be used outside the classroom.

The importance of AI chatbots in teaching vocabulary likely stems from the significance of vocabulary in language learning. Vocabulary is the root of language learning and is essential in reading-mediated learning. The construction of meaning is dependent on learners' ability to identify, comprehend, and use the appropriate lexicon within the context [5], [6], [7]. In courses like Literacy for Academic Purposes, vocabulary knowledge combines comprehension and the construction of meaning and influences the way students interact with academic texts. In spite of the challenges, learning vocabulary is often disregarded due to the lack of opportunities to practice vocabulary in context and to receive feedback in a timely manner, especially within traditional classroom settings [8], [9]

The constraints of face-to-face instruction do give room for AI chatbots. The key strength of AI chatbots is the students' ability to engage with and receive feedback for their exploration of language word usage and meaning beyond what traditional instruction is able to offer [10], [11]. Unfortunately, this provides a framework for the use of chatbots in a learning context, and potentially useful frameworks tend to overlook the placement of such constructs in the different learning situations.

The majority of studies have focused on the acceptance and perception of students towards the AI chatbots and many have claimed that students perceive the use of AI chatbots as easy, useful, and helpful [12], [13] While this study adds to the understanding of the prevalence of AI chatbots in education, it provides a limited framework for the understanding of the extent to which AI chatbots are useful in the students' vocabulary learning activities. The different vocabulary learning activities are for understanding word meaning, context interpretation, and supportive activities for reading comprehension and vocabulary consolidation and usage, as well as the critical discussion of AI outputs. Knowing the framework for the various activities listed is to know the extent to which AI chatbots are useful in academic contexts for supportive activities for reading comprehension and vocabulary consolidation.

This study defines patterns of usage as consistent ways that students describe their employment of AI chatbots in various tasks related to vocabulary learning. These patterns describe students' ways of working with AI for a variety of activities including finding definitions, clarifying meanings in context, aiding reading comprehension, strengthening and using vocabulary, and assessing AI responses. These reveal the intents behind the use of chatbots and the degree of students' engagement in AI-supported learning. This study

believes that patterns of usage when integrated into reading tasks are combinations of learning behaviors that are important and meaningful, and it avoids counting the simple habit of utilizing chatbots.

Further, the issues that previous research has pointed out have made the assumption of simple effectiveness problematic. Concerns about the accuracy of responses, insufficient sensitivity to context, and the simulation of a human presence point to the fact that the effectiveness of AI chatbots cannot be divorced from the ways in which they are employed [14], [15]. These issues highlight the need to understand the use of chatbots in the context of learning activities rather than through the lens of expressed beliefs.

In the context of higher education in Indonesia, the accompanying literature remains limited. Although there is a growing trend of using AI chatbots among university students, there are only a small number of studies that address how such chatbots are used in specific learning activities, especially in reading courses [16], [17]. Considering that reading courses, such as Literacy for Academic Purposes, highly require adequate vocabulary knowledge, it warrants investigation of how students engage various resources, including AI chatbots, for learning.

The present study aims to gain an understanding of how students use AI chatbots to assist them in learning vocabulary in the Literacy for Academic Purposes course. This study focuses on students in the English Education program who are in their third semester, and in whose program learning activities are centered on their engagement with academic texts. This study does not address the use of chatbots as a general learning behavior, but rather as a behavior that is focused on each learning task. This study, therefore, is focused on the following research question: How do students report using AI chatbots during vocabulary learning activities, and what patterns of use emerge across different learning tasks?

This study has three main objectives. The first goal is to expand Technology Acceptance Model research to show that students' vocabulary learning behaviors cannot be fully explained by the acceptance of learning technologies. The second aim is to fuse quantitative findings on the acceptance of learning technologies with task-oriented chatbot use and qualitative findings on thematic analysis to better describe learning vocabulary with AI by students. The last objective is to suggest possible teaching methods while using AI in Literacy for Academic Purposes to emphasize the role of teaching aids that promote learning vocabulary in context, the evaluation of AI responses, and the use of vocabulary for purposes beyond reading.

2. METHOD

Research Design

This study employed an explanatory sequential mixed-methods design, in which quantitative data were collected and analyzed first, followed by qualitative data to explain and elaborate on the quantitative findings [18]. This design made it possible to uncover self-reported patterns of AI chatbot use in Vocabulary Learning and to understand the factors that shaped this behavior during the performance of academic reading tasks. The integration of both datasets occurred during the interpretation phase, where joint display analysis enabled qualitative data to explain quantitative data.

Context and Participants

This study took place in the Literacy for Academic Purposes (Reading) course of an English Education program at a public university in Indonesia. The participants were 82 third-semester students and 1 course lecturer. All participants had prior experience using generative AI chatbots, such as ChatGPT, Google Gemini, or DeepSeek, in learning English. The lecturer took part in the qualitative phase to offer contextual insights into students' AI chatbot use from her perspective based on her classroom observation and teaching experience.

Quantitative Phase

The purpose of the quantitative phase was to find patterns among students' self-reported use of AI chatbots when completing vocabulary learning tasks within a Literacy for Academic Purposes course. Data were collected from 82 English Education program third-semester students, using an 18-item self-report questionnaire developed for this purpose. The data were processed using IBM SPSS Statistics version 23. The AI chatbot use of students was assessed with respect to six vocabulary learning constructs: Quick Meaning Retrieval (Q1–Q3), Contextual Clarification (Q4–Q6), Reading Comprehension Support (Q7–Q9), Vocabulary Consolidation (Q10–Q12), Vocabulary Application (Q13–Q15), and Critical Evaluation and Sustainable Use (Q16–Q18). The items were assessed using a five-point Likert scale.

For this study, and prior to data collection, the questionnaire was content validated using Aiken's *V* by two English language education and educational technology experts. The Aiken's *V* coefficients ranged from 0.83 to 0.95, which indicated good to excellent content validity. Reliability of the questionnaire was assessed using Cronbach's alpha. The questionnaire showed excellent reliability ($\alpha = 0.966$). Construct-level reliability varied from 0.570 to 0.909. Four constructs showed good to excellent internal consistency ($\alpha = 0.820$ – 0.909); one construct (Vocabulary Application) showed acceptable ($\alpha = 0.698$) and one construct (Vocabulary Consolidation) showed marginal reliability ($\alpha = 0.570$). Overall, the reliability of the questionnaire was excellent, and, despite Vocabulary Consolidation's marginal reliability, the questionnaire was deemed appropriate to assess students' self-reported AI chatbot use across vocabulary learning tasks.

The questionnaire was distributed during typical class sessions. Descriptive statistics, such as means and standard deviations, were used for the analytical treatment of the data that described students' self-reported use of AI chatbots for the six vocabulary learning constructs. Descriptive analyses were performed at both the construct level and the item level. This helped identify usage patterns, as well as which vocabulary learning activities students reported as the most frequent use of AI chatbots.

Qualitative Phase

The qualitative phase was carried out after the quantitative analysis. The purpose was to explain the identified patterns corresponding to the task-based self-reported questionnaire. For the qualitative phase, purposive sampling with the maximum variation strategy was

employed to capture the diversity of self-reported AI chatbot use and included six participants with high, moderate, and low usage categories (two from each category). This sampling strategy was designed to capture the diversity of self-reported AI chatbot use for vocabulary learning tasks. The willingness to participate in the interviews was also considered for participant selection.

Also, the course lecturer was interviewed using a semi-structured format. This added some contextual information to the participants' self-reported AI chatbot use in classroom learning. The lecturer's responses were supposed to add some context to the self-reported data of the students rather than to authenticate individual use or extent of use.

Semi-structured interviews investigated student use of AI chatbots in a range of vocabulary learning activities: finding definitions, assessing meanings in context, strengthening word knowledge, using words, and evaluating AI-generated answers. Interviews were recorded, and transcripts were produced and analyzed. Thematic analysis proposed by Braun and Clarke [19] was employed in data analysis.

Trustworthiness for qualitative findings was enhanced by member checking and sending interview summaries and extracted themes for respondents' agreement. This procedure was meant to demonstrate findings as close to participants' original intention as possible and was thought to enhance the credibility of qualitative findings.

Data Integration

After quantitative and qualitative analyses, Areas of complementarity and convergence between the two data sets as described by Fetters et al. [20] were addressed using meta-inferences. Quantitative findings, which described the frequency of students' self-reported uses of AI chatbots in different vocabulary learning activities, were compared with qualitative findings for areas of agreement, extension, and elaboration. Integration of findings resulted in meta-inferences, combining participants' learning experiences and the statistical findings.

3. RESULTS AND DISCUSSION

3.1. Results

1) Quantitative Phase

The quantitative phase focused on students in a Literacy for Academic Purposes course and their self-reported involvement with AI chatbots regarding vocabulary learning activities. Tri-staged analyses were implemented. The first stage analyzed the questionnaire's psychometrics to test the questionnaire's validity and reliability. The second stage, at the construct level, used descriptive statistics to determine AI chatbot usage patterns. The third stage, at the item level, reported the learning behaviors of the students.

a) Questionnaire Psychometric

Before the quantitative findings were interpreted, the measurement instrument's psychometrics were examined via content validity and internal consistency analyses and reliability. Psychometrics for the 18-item, self-report questionnaire are shown in Table 1.

Table 1. Psychometric Properties of the Self-Reported AI Chatbot Use Questionnaire

Construct	Items	Aiken's V	Cronbach's α	Interpretation
Quick Meaning Retrieval	Q1–Q3	0.83–0.95	0.892	Good
Contextual Clarification	Q4–Q6	0.83–0.95	0.869	Good
Reading Comprehension Support	Q7–Q9	0.83–0.95	0.909	Excellent
Vocabulary Consolidation	Q10–Q12	0.83–0.95	0.570	Marginal
Vocabulary Application	Q13–Q15	0.83–0.95	0.698	Acceptable
Critical Evaluation and Sustainable Use	Q16–Q18	0.83–0.95	0.820	Good
Overall Instrument	Q1–Q18	0.83–0.95	0.966	Excellent

Table 1 shows that all items in the questionnaire reached satisfactory to excellent levels of content validity, with Aiken's V ranging from 0.83 to 0.95. The questionnaire evidenced excellent overall internal consistency (Cronbach's $\alpha = 0.966$). Most of the constructs and dimensions of the questionnaire evidenced acceptable to excellent reliability at the construct level. This showed that the questionnaire was appropriate to assess students' self-reported use of AI chatbots in vocabulary learning tasks.

b) Construct-Level Patterns of AI Chatbot Use

After the psychometric assessment, descriptive statistics were used to assess the level of students' use of AI chatbots across the six vocabulary learning constructs, as evidenced in the table below

Table 2. Construct-Level Descriptive Statistics of Students' Self-Reported AI Chatbot Use

Construct	Items	Mean	SD	Interpretation
Quick Meaning Retrieval	Q1–Q3	3.80	0.64	High
Contextual Clarification	Q4–Q6	3.81	0.72	High
Reading Comprehension Support	Q7–Q9	3.78	0.68	High
Vocabulary Consolidation	Q10–Q12	3.67	0.41	High
Vocabulary Application	Q13–Q15	3.67	0.40	High
Critical Evaluation and Sustainable Use	Q16–Q18	3.74	0.59	High

Table 2 indicates that the frequency of AI Chatbots in word learning activities reached a high mean score, as all six constructs had a mean score in the high category. However, mean score distribution indicated variability in the use of AI Chatbots in different learning activities.

Means for Contextual Clarification ($M = 3.81$), Quick Meaning Retrieval ($M = 3.80$), and Reading Comprehension Support ($M = 3.78$) earned the most positive ratings. These scores show that students used AI Chatbots to help understand the meaning of vocabulary words when comprehending the reading of an academic text more than all the other learning activities. In contrast, Vocabulary Consolidation and Vocabulary Application received mean scores of ($M = 3.67$) and were rated more negatively. These mean scores show that students used AI Chatbots less to reinforce the vocabulary words or to use the vocabulary words in language activities. These findings indicate a tendency for the use of AI Chatbots to focus more on receptive vocabulary learning than on productive vocabulary learning.

c) Item-Level Patterns of AI Chatbot Use

To obtain a more detailed picture of students' reported learning behaviors, descriptive statistics were also calculated for each questionnaire item.

Table 3. Item-Level Descriptive Statistics of Students' Self-Reported AI Chatbot Use

Construct	Highest-Rated Item	Mean	Description
Quick Meaning Retrieval	Q3	3.866	Looking for synonyms or alternative meanings
Contextual Clarification	Q5	3.902	Distinguishing different meanings of the same word
Reading Comprehension Support	Q7	3.902	Explaining difficult parts of academic texts
Vocabulary Consolidation	Q12	3.793	Creating vocabulary exercises or quizzes
Vocabulary Application	Q15	3.780	Receiving feedback on vocabulary use
Critical Evaluation and Sustainable Use	Q17	3.817	Verifying AI-generated responses

According to Table 3, using AI chatbots to differentiate the meanings of the same word (Q5, $M = 3.90$) and to clarify the difficult components of academic reading texts (Q7, $M = 3.90$) were the most common AI chatbot applications. Here, AI chatbots functioned as contextual reading and vocabulary resources, allowing students to comprehend difficult vocabulary in the context of the academic discourse.

In the Quick Meaning Retrieval construct, the activity that received the highest score was searching for synonyms or alternative meanings of unfamiliar words (Q3, $M = 3.87$). This result shows that students used AI chatbots to search for different word meanings to develop an understanding of academic texts beyond the basic word meaning.

For the more advanced stages of vocabulary learning, the highest-rated activities were the creation of self-practice vocabulary exercises or quizzes (Q12, $M = 3.79$) and receiving feedback on the use of vocabulary in writing (Q15, $M = 3.78$). Even though these activities were reported less than the vocabulary comprehension activities, this indicates that a number of students used AI chatbots to enhance their vocabulary and to improve the quality of their written output.

In the Critical Evaluation and Sustainable Use construct, the activity that received the highest score was checking the accuracy of AI-generated responses (Q17, $M = 3.82$). This result shows that students are beginning to understand that AI-generated information has shortcomings and did not rely on chatbot responses.

The quantitative data shows that students made substantial use of the AI chatbot during most activities, and particularly during activities focused on vocabulary and academic reading. The qualitative data below shows the reasoning behind this engagement pattern during the students' use of the AI chatbot.

2) Qualitative Phase

The qualitative phase aimed to elaborate on the quantitative data in the task-based self-reported questionnaire by assessing the use of AI chatbots in vocabulary learning through students' experiences. Thematic analysis of the semi-structured interviews (6 students and 1 lecturer) produced 6 themes related to the vocabulary learning constructs

identified in the quantitative phase. The themes collectively shed light on the integration of AI chatbots into academic reading and showed the extent of AI's support for the various aspects of vocabulary learning.

a) Quick Meaning Retrieval

Students reported that they relied on AI chatbots to provide lexical support while they were reading. Instead of looking up the meaning of words by taking a break from reading to look up a traditional dictionary or a range of online resources, students opted for efficient reading support through AI chatbots. One of the students stated the following:

“I use AI chatbots because it is easier than searching by myself on the internet or in a dictionary.” (Int_S1)

The lecturer confirmed this pattern:

“Most students first consult AI chatbots when they encounter unfamiliar vocabulary in academic reading because obtaining word meanings is faster than using conventional dictionaries.” (Int_Lr)

The data implies that students decided to support reading with AI chatbots to enable reading without disruption.

b) Contextual Clarification

Beyond Students began utilizing AI chatbots to understand the function of vocabulary in a variety of contexts after acquiring word definitions. This was especially useful for words with multiple meanings or those found in complicated academic texts. One participant commented:

“I often ask the chatbot to explain the meaning of a word based on the context because dictionary definitions do not always fit the text.” (Int_S3)

The instructor noted students expanded their use of AI chatbots to contextual clarification for the more demanding reading texts. Taken together, this tells us that students considered AI chatbots to provide context-specific interpretation of vocabulary.

c) Reading Comprehension Support

Students were also more likely to indicate that AI chatbots promote understanding of reading texts, because they are easy to use, provide clarification of difficult and technical reading, and mesh well with their reading. One participant said:

“The chatbot helps simplify complicated sentences, making academic texts easier to understand.” (Int_S4)

The instructor noted that students seemed more confident tackling reading tasks after the use of AI chatbots. This suggests that the use of AI chatbots promotes reading comprehension in academic reading students

d) Vocabulary Consolidation

Students reportedly used AI chatbots to reinforce vocabulary in ways similar to how they used them to reinforce reading comprehension. Reported use was infrequent. More common uses were to create example sentences with new vocabulary or to practice vocabulary after finishing the assigned reading. One participant said:

“I ask the chatbot to generate example sentences so I understand how the word is actually used.” (Int_S4)

According to the lecturer, the small percentage of students who used the AI chatbot to practice or reinforce newly learned vocabulary illustrated that the use of AI chatbots was primarily focused on understanding the vocabulary and not on expanding the vocabulary systemically by practicing it.

e) Vocabulary Application

Interview data indicated that the use of newly learned vocabulary in the productive sense was less common than the use of vocabulary in the receptive sense. Reported opportunities for students to use newly learned vocabulary for productive referencing were largely limited to writing. Use of newly learned vocabulary for productive referencing was less common. One participant said:

“I usually use the new vocabulary in writing assignments.” (Int_S1)

The lecturer reported that most students stopped using the AI Chatbot after they had learned the unfamiliar vocabulary, indicating that most students lacked the initiative to use the AI for practicing speaking and writing skills. The findings indicated that the use of newly learned vocabulary for productive referencing was very limited during the reading course.

f) Critical Evaluation and Sustainable Use

Students exhibited an understanding that AI-generated information needs to be critically assessed prior to being integrated into academic work. Instead of accepting chatbot information as is, numerous students reported that they cross-checked important information using dictionaries or academic references. One student noted,

“If the word is important, I check dictionaries or journal articles first.” (Int_S1)

The lecturer stated that students should check the information generated by AI against a reliable academic source before including it in their assignment. Responsible AI use appears to be emerging, as students have acknowledged that while AI can be useful in generating vocabulary explanations, it is not always useful.

The qualitative data then complement the quantitative data by showing the reasons vocabulary learning emerged as the dominant pattern in the quantitative data. Students tended to describe AI chatbots as tools that provided easily accessible support for vocabulary in context and for reading comprehension, while the assistance provided for vocabulary consolidation and productive vocabulary was not as readily available and was therefore neglected. At the same time, the participants showed that they understood that information

generated by AI needed to be cross-checked with a reliable source. These findings then align the qualitative data with the quantitative data.

g) Integration Phase

In the integration phase, the combining of qualitative and quantitative data gave a multi-faceted perspective of students' use of AI chatbots for vocabulary learning tasks. The quantitative data built an overall framework of AI chatbots usage. The qualitative data explored the patterns of AI chatbots usage during academic reading activities and explained the whys. The integration was done using a joint display approach to data sets to interpret convergence, diversification, and the extent of the explanation within the two data sets [20]. The integrated findings are summarized in Table 4.

Table 4. Integrated Findings

Quantitative Findings	Qualitative Findings	Integrated Meta-Inference
Quick Meaning Retrieval (M = 3.80)	Students often relied on AI chatbots to get instantaneous word meanings to keep the flow of reading. The lecturer also noticed this behavior in reading tasks	Confirmation: In both data sets, AI chatbots are used as instantaneous lexical help to clear unknown vocabulary to not disrupt reading comprehension.
Contextual Clarification (M = 3.81)	Students asked AI chatbots to provide contextual meanings, word definitions, and numerous examples. The lecturer noted that students seemed to rely on AI more while reading complex academic texts.	Expansion: The qualitative data adds to the quantitative data to clarify that AI chatbots provide contextual examples and help beyond word definitions.
Reading Comprehension Support (M = 3.78)	Students used AI to simplify texts, explain technical vocabulary, summarize passages, and identify main ideas.	Confirmation: Both datasets suggest that AI chatbots reduce cognitive demands during academic reading by supporting vocabulary comprehension and text processing.
Vocabulary Consolidation (M = 3.67)	Students reported using AI to practice vocabulary, generate example sentences, and conduct review sessions	Explanation: The qualitative data helps to understand the relatively low mean score, indicating students chose to understand the text first, rather than reinforce and build their vocabulary over time.
Vocabulary Application (M = 3.67)	Students used AI-generated vocabulary in writing, but the practice and use in speaking vocabulary was even less. The lecturer reported similar observations	Expansion: AI played the role of a vocabulary learning aid, but the vocabulary use was mainly in a receptive manner, with little use to move the observations toward productive vocabulary use.
Critical Evaluation and Sustainable Use (M = 3.74)	Students compared AI outputs with dictionaries, textbooks, and other academic sources, and acknowledged the shortcomings and gaps in AI-based responses.	Confirmation: The agreement seen in the two datasets implies that students generally used AI in a manner that was critically and responsibly, and that they did not blindly accept AI outputs.

In terms of quantitative data and qualitative data, there was a strong agreement reporting the use of AI chatbots to aid the understanding of vocabulary during academic reading. The strongest agreement was seen in Quick Meaning Retrieval, Contextual

Clarification, and Reading Comprehension Support, which demonstrated the dominant use of AI chatbots to aid the learning of receptive vocabulary. In contrast, Vocabulary Consolidation and Vocabulary Application were given relatively low scores, and interview data indicated that the students reported that they extended the use of chatbots for practice and did not use chatbots for productive language practice. Lastly, both of the datasets showed that students typically fact-checked the AI outputs by referring to other sources, and hence viewed AI chatbots as learning aids and complementary to the learning process, rather than the final, authoritative, and sole answer.

3.2. Discussion

This study analyzed the self-reported data of students for the use of AI chatbots for vocabulary learning in a Literacy for Academic Purposes course. The findings suggest that the use of AI chatbots was different at different vocabulary learning stages, implying that learning activities were not the same. The use of chatbots was reported the most for the retrieval of meanings, retrieval of contextual meanings, and reading comprehension. The use of chatbots for the consolidation of vocabulary and the productive use of vocabulary was reported the least. The results imply that the use of AI chatbots was task-oriented, and students used AI the most for receptive vocabulary learning in the context of academic reading.

The use of chatbots for receptive vocabulary learning was the most due to the nature of academic reading. In the case where learners are presented with new vocabulary, which can disrupt the reading comprehension process [21], AI chatbots can provide instant contextual and lexical reading comprehension and can provide chatbots that convey the meaning of reading in a fluent manner without the need to use numerous external reading sources that are inconsistent. The use of AI chatbots in this case supports vocabulary learning, as shown in the previous studies that cover this area of research [1], [2], [3], and reinforces Nation's theory that vocabulary learning is through contextual meaning [22], and it supports Schmitt and Schmitt's theory that vocabulary knowledge is the key to reading comprehension [5]

Even if AI chatbots were effective for supporting vocabulary comprehension, their role in vocabulary consolidation and productive vocabulary usage was still limited. The qualitative results indicate that many students ceased using chatbots after unfamiliar vocabulary was comprehended, and they did not engage in productive vocabulary practice or review. The students' perception of the AI chatbots was that they serve to answer comprehension questions, but they do not aid in the long-term development of vocabulary. Nation[23] argues that to achieve durable vocabulary learning, multiple retrievals and productive use of vocabulary are needed, while Ebadi [7] argues that technology-enhanced vocabulary learning should also integrate vocabulary breadth and depth. This finding differs from intervention-based studies demonstrating that AI chatbots can improve productive vocabulary when learning activities explicitly incorporate retrieval practice, repeated exposure, and guided language production. The discrepancy suggests that the educational benefits of AI chatbots depend not only on the technology itself but also on the instructional design that guides students' interaction with AI[24], [25].

Another significant finding was that students were able to engage in a productive critique of AI responses. Participants were less likely to accept responses from the chatbot and reported that they commonly verified the unexplained vocabulary and/or defended the responses by consulting a dictionary, textbook, or other scholarly material. This behavior shows the first signs of AI Literacy, and a productive critique of the AI system. This finding was also expected, as many of the recent studies posit that when using AI in an educational context, learners should employ a critical lens toward AI responses and verify the information before utilizing it in a formal academic setting.

An important aspect of this study is recognizing the context-dependent AI chatbot usage for vocabulary learning. Most response studies examine learners' perceptions of AI chatbots, or discuss AI-supported vocabulary learning broadly, and do not examine the specific vocabulary learning tasks that different AI tools might be employed [2], [7], [11], [26]. In contrast, this study reveals that learners strategically adopted different AI chatbots based on the type of vocabulary learning task they were working on. There was a notable predominance of AI chatbot use for comprehension-based tasks, such as finding meanings of words, clarifying the contextual meanings of words, and reading comprehension support, compared to lesser use for vocabulary strengthening and productive language task use. This finding contributes to the growing body of research on AI vocabulary learning by demonstrating that the use of AI by students is influenced by the specific cognitive demands and task type of vocabulary learning, providing an additional frame for AI vocabulary learning.

Pedagogically, the results imply that, instead of treating AI chatbots merely as vocabulary finding tools, structuring learning activities with AI chatbots' inclusion in Literacy for Academic Purposes instruction is warranted. Since students tend to use AI to help understand things in real time, instructors should design activities that help learners use AI chatbots for vocabulary development and productive language use. This can be done through AI-based retrieval practice, building contextual sentences, drafting an academic text incorporating the new vocabulary, and critically analyzing the reasoning behind the AI response. This aligns with the literature on the role of frequent retrieval and vocabulary/application of the AI support in relation to AI and language learning literacy [16], [17], [22], [27].

4. CONCLUSION

Collecting students' self-reported data on the use of AI chatbots while completing vocabulary-learning tasks during the Literacy for Academic Purposes course via an explanatory sequential mixed-methods design was the aim of this study. As AI chatbots were mostly used to assist instant retrieval of meanings, offering contextual clarifications, and reading comprehension assistance, the findings revealed that this use was task-specific and that the students used AI chatbots less to assist vocabulary consolidation and productive application of vocabulary. The qualitative findings revealed that students used AI chatbots for instant comprehension and that students did not view AI chatbots as tools for the development of vocabulary.

The findings of this study extend the research on AI and vocabulary learning and show the task specificity of AI chatbots. This study revealed the use of AI chatbots during the receptive and productive phases of vocabulary learning and the use of chatbots for help with academic reading and as a comprehension aid, clarifying that the use of AI chatbots was not a homogeneous learning behavior.

The findings speak to the need for instructors to incorporate AI chatbots within vocabulary learning activities aimed at consolidation and productive use of vocabulary, as well as critical consumption of AI-generated content, within a framework of personal responsibility.

This study was restricted to one Indonesian university's Literacy for Academic Purposes course and was mainly based on self-reported data. Future studies may include the use of AI chatbots across varying educational settings, language capabilities, and proficiency levels. Additionally, the use of longitudinal studies and learning analytics may elucidate the development of AI vocabulary learning frameworks.

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