A Literature Review on EFL Students' Integration of Al-Based Tools in English Learning and The Perceived Impact on Autonomy

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https://doi.org/10.54855/ijaile.24123

ABSTRACT

AI in education has been extensively studied in terms of its adaption; specifically, studies on its impact and capacity have brought remarkable findings considering the overall effectiveness of language proficiency and perceived impacts. However, few exploratory studies have been conducted to summarize and conclude to reach an understanding regarding the potential of AI-based tools to facilitate EFL high school students' autonomy. This study investigates the previously conducted research across multiple EFL contexts and educational backgrounds to elucidate the current trend in the adoption of AI and their perceptions of its use to reveal the impacts on learners' autonomy. The discussions affirm the common findings of previous work regarding adopting AI across different levels of education, positively affecting EFL learners' linguistics skills and knowledge. Further findings also demonstrate learners' ability to be more autonomous and self-regulated in their studies as a result of AI integration. Regardless, there is a persisting concern for the over-dependence of students, especially without proper teachers' guidance.

Keywords: AI, autonomy, EFL, autonomous learning

Introduction

Background of the study

In times of technological developments and innovation driven by the latest advancements in the industry, teaching and learning have become the beneficiary and the subject of extensive approaches (Nguyen, 2021). AI-powered tools have risen and received multiple adoptions, which has resulted in a major shift in the approach to students' experience with language learning. Following that trend, a considerable number of research dedicated to understanding the underlying effects of AI integration have been conducted globally. In terms of grammatical knowledge and accuracy, Park (2019) indicated a positive outcome in students making fewer grammatical mistakes in their written work upon adopting AI as a means of inspection. Other work by Shemshack and Spector (2020) recognized Duolingo and Babbel are among many

tools receiving attention and use, thanks to the awareness of their capacity in making personalized recommendations for improvement and are built to provide flexible learning experiences that align to the students demands and personal needs. Apart from the traditional language learning apps, writing assistants such as Grammarly in the study of Firtria (2021) are recommended for use due to their proven ability to enhance the students' writing skills. Similarly, previous works have concluded the result of implementing AI tools in education and in the recognizable facilitation of the language learning of EFL students through the tools' provision with language practices (Son et al., 2023).

In terms of global perceptions, the perceived positive effects of AI are also highly concerned and expressed similarly to that of the regional EFL contexts, with that being said, the pressing issue is that there are global underexplored challenges in terms of its adaptation to education, the concerns are (Silva et al., 2023). Within the mentioned areas, the aspect that received significant consideration is autonomy in language learning, upon which the influence of AI-powered effects is deemed as necessary to elucidate. Therefore, it is obvious that there are controversies regarding the effectiveness of AI-powered tools on language learners, whether they are autonomous or overly dependent. In that sense, scholars suggest that AI tools can help students become individualized and autonomous in learning but is also considered a potential lead to overdependence, especially for those who consider AI a shortcut to solving language-related problems (Darvishi et al., 2024). Other than that, AI-based tools are also noted to be beneficial because they provide constant and tailored responses, giving EFL learners the advantages needed to support their self-regulated learning process (Afzaal, 2021).

Moreover, it is critical to look at the existing limitations of AI that are worth considering as threats to the learning process and, overall, a discouraging experience, subsequently seeking reasonable solutions. Not only discussed the benefit of providing a non-restricted and personalized pace to studies and acquiring knowledge but Yang and Li (2022) also suggested AI help with learning activities beyond the confinement of classroom practices, promoting learning autonomy, subsequently noted the concerns for the development of dependence on AI instruction, this is considered as significantly dangerous to the language development. Similarly, in the Vietnamese context of EFL education, the previously mentioned considerations are also found to be present as students have the tendency to use AI-based tools to facilitate their language learning, aiming to promote their proficiency (Nguyen, 2024). As a result, their overall confidence and fluency have been enhanced due to AI's capacity to provide tailored and immediate responses, targeting the aspects of language knowledge, such as pronunciation, vocabulary, and grammar.

Besides the obvious advantages of language learning, the concerns are also worth mentioning as its usage is becoming more frequent. Consequently, the impact on autonomy is considered among the long-term effects if Vietnamese EFL students become overly dependent on these tools. Preliminary work from Nguyen (2024) revealed the positive impacts that are shown in EFL learners' competence upon AI facilitation; however, in case there is a lack of AI support, the learners admit several difficulties in applying their existing knowledge. In the same vein, the idea that learners' autonomy can be significantly benefited as part of AI utility during its use in the classroom was shown in the work of Pham et al. (2024). Regardless, the usage can

diminish students' learning autonomy when they use the tool as a comprehensive guide to work on their homework and assignments without understanding the foundations.

The mentioned work extensively studied the use of AI and its impacts on learners' autonomy for language learning. However, the unanswered question lies within its power to either promote EFL students' ability to self-regulated their learning through its feature of tailored and personalized experiences or eliminate the chance for their thinking to solve problems and be critical when it comes to thinking when they develop the behavior to rely on the tools. The study for the answer lies within the context of Vietnam.

The researcher, as a teacher, has also experienced and observed from a similar point of view in terms of students' reliance on AI tools in education, resulting in concerns for a similar problem, for that reason, the researcher developed the framework for her study at Nguyen Binh Khiem High School, whose students in grades 11 and 12 the researcher is teaching. As part of her work, she acknowledged and concluded that the students at the school were at CEFR level A1 to A2, which was described to be in a beginner state of English competence. This explains their constant effort in English learning and the difficulties in their study, mostly on works targeting language skills: listening, reading, speaking, and writing, and linguistics knowledge of vocabulary, grammar, and pronunciation. Subsequently, they are driven to use AI–tools as support and guidance to work on the persistent problem in English learning, most commonly their school work. This tendency and reliance on AI in their work and learning process raise concerns, which the researcher aims to provide insight to explain if AI-power tools can promote students to become more autonomous for language acquisition or increase the tendency to rely on this tool in their language learning.

Problems in learner's autonomy

As a focus in the study of education and its related subjects, autonomy in language learning concerns the self-driven motivation of learners in order to conduct their own study, governed by their responsibility and self-regulated behaviors to plan, manage, and assess their learning goals in the pursuit of education (Muhammad, 2020). Considering it is significant in the field of education, the notion of autonomy has been coined under different terms in language education extensive to the self and independence, most commonly referred to as self-directed, self-instruction, self-access learning, independent learning, and learner independence.

In the context of EFL education, learners' autonomy is perceived to maintain a highly considered role in the process of language learning. Therefore, the idea of autonomous learning has been targeted for extensive study and deemed fundamental to enhance the learning experience (Khaidir et al., 2020). From the global perspective of EFL education, studies in various contexts reflect the current discussion on autonomy. Specifically, a study by Almusharraf (2020) in Saudi EFL education noted learners in their context are under the influence of a teacher-centered paradigm of language learning, providing less opportunity for self-regulated behaviors. Alternatively, learners are dependent and based on teaching instruction in the classroom. Therefore, having less self-orientation and autonomy results in their low achievements in the English language.

Similar findings in the global research world also reach the similar conclusion of EFL learners

being frequently instructed in most of the classroom procedures from the teachers, therefore, they are in lack of the capacity to develop self-directed behaviors when it comes to practicing under the environment, also have the tendency to be less aware of the role of self-learning (Oveshkova, 2018). As part of the consequence of teachers' instruction from the teacher-centered approach, learners in those backgrounds are passive and lack motivation, resulting in the incompetence to control and direct their learning.

Such conclusions reached in the discussion from the mentioned backgrounds from the global perspectives are aligned to that of the regional situations in Turkey and China, in which the classroom practices and the regional cultural facets mostly influence learners' motivation and, subsequently, their sense of responsibility in their study is insufficient (Çetin & Çakır, 2021; Hu & Zhang, 2017).

In Vietnamese circumstances, the current trend for research in EFL education focuses on elucidating learners' autonomy, considering it a popular subject. The current teaching paradigm in Vietnam experienced a shift from teacher-centeredness to student-centeredness. Therefore, numerous exploratory studies have been conducted over the span of adoption, and together, they have shared a general conclusion that the learners in Vietnamese education are in a critical situation for their autonomy.

From the mentioned point of view, scholarly works suggest in Vietnamese EFL education, learners of the English language lack of motivation to be self-assessed and capable of adjusting their learning habits through actively seeking knowledge in additional materials and works on problems beyond what is offered in the classroom (Le, 2018). However, for general learners whose learning process also regards the need for autonomy, a case study conducted by Nguyen and Habók (2020) at Tra Vinh University noted key aspects of learners' autonomy that are beneficial to promote learners' awareness of being autonomous, implying potential remedy to provide necessary support from teachers to ensure autonomy.

The extensive efforts in investigating the new teaching paradigm in Vietnamese education are acknowledged in the works of various scholars studying Vietnamese EFL learners and education in general. For that reason, the conclusion asserts the moderate and reasonable level of self-regulated learning habits in EFL learners. With that being said, works also suggest consistent additional supports to maintain and promote autonomy, considering current practice in the classroom and the current ability posing the need for further guidance (Duong, 2021).

Problems in language learning

Beyond the discussion on learner autonomy, language ability is also a subject of research both globally and nationwide, serving the sole purpose of explaining the ever-persisting problems in language learning and education that EFL students face. In terms of global perceptions, it is acknowledged in the scope of global language education that vocabulary is among the aspects of language knowledge that most learners exhibit weaknesses and mostly struggle to target. Specifically, in terms of vocabulary acquisition, the aspects of pronunciation, spelling, and lexical resources are mostly perceived as difficult to properly acquire (Tran, 2024). Therefore, students are observed to have a hard time making accurate applications (Hasan, 2024). Focusing on language knowledge that encompasses aspects of vocabulary, grammar, and pronunciation,

problems regarding EFL learners' experiences arise, as noted in the work by Purwati et al. (2023). The work revealed that speaking ability was the most challenging aspect due to learners' tendency to avoid mistakes.

Similar works to investigate the current EFL practices and the learners' current problem in a global context elucidate the everlasting problem in language learning; those mentioned are with translating difficulties with the lexis and reading and writing capacity in English. Furthermore, in terms of language knowledge of pronunciation, reports indicated the problem in students' experiences and memorizing English sentences. Work by Tukan (2024) further consolidates the current factors affecting students' performance in learning writing, as noted in his work, which: lexical insufficiency, spelling, and the tendency to use translation methods in writing. Accessibility with the language learning tools and platforms to promote proficiency is also a target of multiple exploratory studies, seeking explanations other than solely of linguistic knowledge and language skills. The result indicated that another contributing factor to less engagement with language and lower capacity lies within the constraints EFL learners experience when using the systems.

In the current state of EFL education in Vietnam, the current disadvantages of English learners motivate and result in the need to study EFL learners extensively. For that reason, advanced students attending gifted high school expressing the need for instruction beyond curricular material, those outside the traditional approach containing tailored and incorporated advanced knowledge to allow sufficient contribution and alignment with learners' needs, considering their proficiency levels, as shown in the study by Do and Nguyen (2021). On the other hand, in the investigation of non-English-major students, their lack of exposure to the English language is the cause of their inability to language acquisition (Nguyen et al., 2023). In the same vein, the conclusion on the learning process of Vietnamese EFL students reveals they are less likely to be autonomous due to the experiences with the teaching approach in the classroom that places the center role on the teacher. Therefore, they have gravitated to be dependent based on the classroom orientation.

From the mentioned perspective and the observed difficulty in the language learning setting, students exhibited difficulty grasping the aspects of grammar and vocabulary in language. The reason leading to this disadvantage lies within the lack of exposure to relevant material and low level of motivation that ignites the interest in language practice. As a contributing factor, the relatively moderate capacity to be creative and the low ability to structure and plan for written products are also defined as bringing significant difficulty.

Literature Review

In terms of AI provision in education, it has been acknowledged to be resourceful and able to provide its users with tailored practice for classroom circumstances. With that being said, it is thoroughly studied in various contexts and of distinct education backgrounds to reach a conclusion regarding its current level of integration into language education to facilitate learners' goal in the acquisition and improvement of their linguistic knowledge and skills (Zawacki-Richter et al., 2019).

Among previous discussions, numerous works coincide in terms of providing insights into learners' being benefited upon the use. In more detail, AI is revealed to receive perceptions on promoting language learners' ability to recall vocabulary and using syntactic structures (Hsu et al., 2023); (Huang et al., 2020), similar for improvements in speaking ability as discussed by Wei (2023), similar positive effects also impacts reading comprehension ability as discussed in Daweli and Mahyoub (2024), beyond linguistics skills, cognitive ability to be critical thinking and the capacity for self-regulation are also improved (Chen et al., 2021).

Considering the multitude of backgrounds and the conclusions drawn from the research, AI's perceived impacts on education are positive in terms of its provision for developing various aspects of language proficiency. Beyond the focus on language capacity of knowledge and skills, numerous studies have also focused on learning AI's further provision. With that being said, AI's adoption is receiving remarkable consideration in facilitating the self-regulated behaviors of learners in their learning (Holmes et al., 2021), most of which resulted from their capability to provide significant support in big data analysis, simplifying complex structures and constantly giving recommendations according to needs (Dutta et al., 2024).

More specifically, AI's ability to give almost instant feedback to have appropriate adjustments has contributed to the learners' retention of vocabulary (Zhelyazkov, 2024). Another work by (Gokcearslan et al., 2024) asserted the resulting learners' appropriate responsive and adaptive environment upon receiving tailored practices. The study concluded that adoption is seen to be present and at an extensive rate, subsequently providing clear positive impacts

Alongside the effects on the learners' capacity with linguistics knowledge and skills, autonomy in language education is also under focus from the research community, in which AI adoption is perceived to pose effects on this property of the EFL learners. This is concluded from various studies by Popenici and Kerr (2017) and Jin et al. (2023) that discussed how learners benefited from the tailored feedback from AI to increase self-regulated learning behaviors, which is essential for autonomy. However, concerns are also present in terms of persisting issues of over-dependence and limitations on critical thinking and problem-solving skills (Zhai et al., 2024).

Students' Adoption of AI in English Learning

The current trend in the research world reviews the extensive focus from various backgrounds to explore the perceived effects of AI on language proficiency and overall learning experience. Regardless of various concerns for the use of AI, its related empirical studies reveal its ability to provide related and personalized responses that contain the necessary information for the positive acquisition of L2 from learners in EFL contexts. Consequently, the associated aspects of language development include linguistic skills of listening, speaking, reading, and writing and language knowledge of vocabulary, grammar, and pronunciation (Woo & Choi, 2021).

One study conducted by Duong and Suppasetseree (2024) in the Vietnamese context aimed to explore the capacity of Artificial Intelligence Voice Chatbots to promote the English-speaking skills of 30 undergraduate EFL learners. In order to examine the potential of the tool in enhancing the learners' speaking, a pretest-treatment-posttest design was conducted together with a questionnaire and a semi-structured interview for qualitative and quantitative data collection. The treatment process involved a period of 8 weeks of student training to use the

chatbot. The result revealed an improved speaking capacity as recorded from a $p < 0.05$ in the posttest session, exhibited in the use of appropriate hedging terms, grammatical rules, and lexis. The findings asserted the role of AI voice chatbots in education to facilitate educational curricula and teaching activities.

An exploratory study carried out in Egypt's EFL context by Ghoneim and Elghotmy (2020) investigated EFL students' listening capacity in primary education upon receiving AI-based program instructions. The study involved 80 students from the 6th grade attending a quasi-experimental research design in which they were equally divided into 2 groups: the controlled and the experimental. Subsequently, to the pretest, the experimental group underwent an AI-based program, and a posttest was conducted following an eight-week procedure for T-test and SPSS (Version 19) analysis on the participants' scores. The efficacy of the AI program intervention was also measured using Eta squared (η^2). The results indicated a clear improvement in listening ability among the participants in the experimental group; the research also highlighted the enhancement of phonology knowledge and a comprehensive understanding of lexis and grammar in comparison with the control group.

Another quasi-experimental study by Hidayat (2024) was conducted in the same vein to explore the effectiveness of AI-based platforms aimed at providing personalized reading experiences for high school students in Indonesia. The study involved 85 students, among which 43 in the experimental group received exposure to ReadTheory as mediation for the treatment process, and the other 42 were placed under a conventional approach in classroom instructions. The students initially attended the pretest of Degrees of Reading Power (DRP) and a posttest after the eight-week intervention using the same test. The collected data underwent a t-test analysis to reveal the statistical differences. The result revealed a better performance in the test from students receiving training with ReadTheory compared to those who were not using the tool group, suggesting the capacity of the tool to improve students' reading comprehension ability.

An exploratory study examining the effectiveness of the AI tools Gencraft and ChatGPT was conducted by Pratama and Hastuti (2024) on Indonesian EFL learners' performance in terms of their writing skills. The investigated subjects involved 30 high school students around Kalideres RPTRA, Jakarta Barat, Indonesia. The method involved a mixed-method approach in which the participants were involved in a pretest-posttest research design and questionnaires for qualitative and quantitative data collection. The collected data underwent SPSS 23 for statistical analysis using paired sample t-tests, normality tests to evaluate data distribution and correlation analysis. The result indicates a positive outcome based on the recorded difference in the scores between the pretest and posttest, considering the sig value is 0.000, showing a clear improvement in their writing skills upon interacting with the AI platforms. The students also exhibited a positive attitude towards the tool, and perceived effectiveness was considered when integrating the tool with writing instructions in the classroom.

Wang et al. (2024) conducted a study exploring the efficacy of AI-based tools, including language learning platforms, especially the UNIPUS AIGC platform, and mobile language learning applications, particularly iTEST mobile application, on strengthening learners' vocabulary considering their acquisition, retention, and language abilities due to the tools' provision of tailored and guided feedback as well as learning itinerary. One hundred ten second-

year learners from different majors at a Chinese university participated in this study. The collected data underwent analysis using the combination method of both empirical analysis and the Apriori algorithm in association rule mining, subsequently giving results affirm the capacity to promote learners' outcome and vocabulary proficiency of the AI tools and mobile assessment applications

Also being conducted in the Indonesian context, the study by Abimanto and Sumarsono (2024) explored the effectiveness of AI speech-recognition technology, especially the Google Read Along App, on enhancing the pronunciation skills of 70 students at the beginning level at Indonesian's AMNI Maritime University. A quasi-experimental design was employed in this study, separating the participants into two groups, with the treatment group using the Google Read Along App in their learning process. All the participants were required to complete the pre-posttests, questionnaires, and interviews. Subsequently, the researchers employed SPSS, including t-test and N-Gain score analysis, to identify the differences in scores between the 2 mentioned groups. As a result, students in the treatment group were found to be progressing, considering their pronunciation skills in English learning, thanks to the intervention of the Google Read Along App's constant feedback and greater engagement.

Chen and Lin (2023) explored the effectiveness of an AI chatbot learning system specifying grammar on facilitating self-efficacy and offering grammatical tenses instructions for 116 EFL first-year learners who were at a low English proficiency level at a Taiwan university. The study was designed based on a quasi-experimental approach, in which the participants were divided into 2 groups, with the experimental group employing an AI chatbot grammar learning system in their learning content. Before the experiment, all the learners were required to take a pretest, a standard TOEIC test, regarding their English comprehension ability. Following the experiment, they took a posttest to give the results, which were subsequently analyzed and compared using SPSS and ANCOVA. The findings revealed that integrating AI for participants in the experimental group helped them perform grammar tenses better, reduce their anxiety, and become more confident in language learning.

Research gap 1

The discussions regarding the level of AI integration into education and as a complementary practice beyond traditional instruction allow opportunities for EFL learners to progress with language capacity. The overall findings and insights provided support the idea of AI tools, in general, being prominent in the classroom and the particular tool being highly considered in the research context for its effectiveness. Considering the preliminary works, the researcher recognized the provision within each paper in terms of their subjects for the study being mainly concentrated on adult learners of English and university undergraduates corresponding to each research context, while some exploratory works as of Pratama and Hastuti (2024) and Hidayat (2024) investigated high school students in Indonesian education. Moreover, in terms of the adoption of the tools for younger English, few works focused on elaborating on the circumstances in Vietnam, leaving undiscussed gaps to acquire high school learners' perceptions on the current state of AI adoption for their learning experience and whether the case is similar to those of others level in education. As the discussed papers focused on exploring the tendency and frequency of classroom use according to the learning needs, few

were able to point out which tools, in particular, are currently popular amongst the deployment in the context of research for high school students. Consequently, the researchers found the need to investigate the AI tools that are most commonly used and the motivations following the selection.

AI Effectiveness on Students' Autonomy

For students delving into English learning, autonomy is indispensable to becoming more motivated, engaged, and academically successful (Han, 2021). Recognizing the benefits that AI has provided for learners in their language acquisition, including both knowledge and skills and the significance of being autonomous in learning, numerous studies have been conducted to explore the efficacy of AI on learners' autonomy in various EFL contexts. Most of the studies indicated that some advantages of AI-powered tools, such as providing learners with tailored and immediate support and feedback, have greatly affected and tremendously enhanced students' language learning autonomy (Zou et al., 2023; Wei, 2023).

In the context of Taiwan, Yang et al. (2022) conducted a study following the empirical approach to explore how intelligent personal assistants (IPAs), particularly Google Assistant (GA) encouraged 34 college EFL learners to become independent in their language acquisition regarding speaking and listening. The participants were split into two groups; in the 6-week period, both received an email with new voice requests that required them to explore them through Google Assistant, and one group was also guided by teachers through weekly assessment forms, requiring them to evaluate how efficient each command was. The study also employed the pre-posttest approach to precisely assess the participants' speaking and listening abilities. The results revealed that there is a remarkable enhancement, considering the autonomy of the above-mentioned skills, in learners who were provided with the weekly evaluation forms. Though students received additional guidance from teachers for accuracy: " greater performances in terms of speaking competence, there was no significant difference in both groups' listening abilities.

Mahendra et al. (2023) conducted a study to explore 35 freshmen majoring in English Language Teaching at a university in Bali who perceived the impact of an AI-based App called Mondly when it was utilized as a Learning Aid on their learning autonomy. Specifically, the research aims to investigate the perceived utility of the tool as a mediator in classroom practices for students' experience with self-directed learning and the overall development of their autonomy for the language learning process. Furthermore, the collected data from the questionnaires and semi-structured interviews aim to reveal the learners' overall perception of the level of autonomy being promoted via the teacher's roles and from themself as an underexplored aspect. The results indicated a remarkable acknowledgment and shift in students' perceptions of autonomous learning through AI adoption. However, it is considered that regardless of the adoption of artificial intelligence, the teachers' roles in providing assistance are necessary for the learners' progress with autonomous learning.

Agustini (2023) executed a study to explore the effectiveness of ChatGPT on six high school students aged 16 to 18 enrolled in Kurikulum Merdeka Belajar (KMB) - a learning program in the Indonesian context. Being selected following the purposive sampling method, the selected

participants were students using ChatGPT to improve their English proficiency. In this study, the researcher relied solely on qualitative data gathered through semi-structured interviews in Zoom, which was subsequently investigated based on thematic analysis. As a result, ChatGPT is perceived to be an engaging and interactive tool that facilitates students' autonomy in English learning as it provides learners with a friendly and non-judgmental environment and constant feedback when they face grammatical errors. These advantages made learners more willing and confident to utilize language and helped them reach higher levels of their vocabulary and grammar usage as well as speaking and writing skills.

Considering students in Pakistan, Tahir and Tahir (2023) conducted a study in which AI-based Virtual Assistants, particularly Alexa, were explored in terms of their efficacy in motivating ESL learners' autonomy in English learning. 30 EFL 9th-grade students from a private sector school in Multan were involved in this study. The research was designed based on a mixed-method approach, in which students were required to accomplish questionnaires, interviews, and informal conversations. As a result, AI-based Virtual Assistants, especially Alexa, were evaluated as helpful by providing learners with tailored and immediate responses, helping them perform better regarding their pronunciation and grammar. Additionally, it is reported that students become more confident, autonomous, critical in thinking, and engaged in taking learning assignments. Despite its advantages, some students still require extra assistance from lecturers in order to be completely independent in their language acquisition.

To determine how AI-mediated language instruction influenced English academic achievement, stimulation, and self-regulated learning, Wei (2023) investigated 60 Chinese EFL learners at a university in China. To ensure the homogeneity of the study, these participants were assessed to be at intermediate English proficiency levels and split into two groups: the control group received a traditional teaching method, while AI instructed the experimental group. They were required to complete a test that included vocabulary, grammar, reading comprehension, and writing before and after the 10-week period. To explore how students were motivated and self-autonomous in learning, 14 students selected from the experimental group were required to complete the self-report questionnaire (SRQ) and the semi-structured interviews. The findings reveal the control group's better outcome, indicating the positive impact on learners' ability in their learning process. Furthermore, AI-incorporated usage in the classroom significantly promotes the motivations for L2 practices and extends to self-regulated learning.

Research gap 2

From the previous studies, it is observable that most of the studies demonstrated great results related to English learning autonomy in learners regardless of their educational levels and contexts thanks to the assistance of AI, reported through the favorable effects of Google Assistant on college EFL learners in Taiwan (Yang et al., 2022), Mondly on 35 university freshmen in Bali (Mahendra et al., 2023), ChatGPT on Indonesian high school students (Agustini, 2023), AI-based Virtual Assistants on Pakistani 9th-grade students (Tahir & Tahir, 2023), and AI-mediated language instruction on Chinese EFL learners (Wei, 2023). However, in the studies by Tahir and Tahir (2023) or Mahendra et al. (2023), the results revealed besides receiving the benefits from AI tools, students still need teachers' additional aid to become completely autonomous in their English learning process. Regardless of the extensive practices

in various backgrounds, the context of EFL education in Vietnam is currently receiving less concentration on the topic of autonomy. This leaves gaps on whether AI could help Vietnamese students be autonomous in their English learning and if AI can independently fully develop Vietnamese high school students' English learning autonomy because of differences related to Vietnamese educational settings, demands, and learning preferences. Furthermore, the small sample size in most of the previously mentioned studies, such as 6 students (Agustini, 2023) or 30 EFL learners (Tahir & Tahir, 2023), creates a gap there needs to be larger-scale research that could provide readers with more thorough and pertinent insights into how effectively AI-based technologies improve high school students' autonomy in English learning.

AI Tools usage in education

Given the significance of AI in education, particularly its ability to improve EFL learners' English proficiency and learning autonomy, additional research on particular AI tools in multiple educational settings is required to help readers gain more insights into their efficiency, especially what these tools can provide learners to better them in the field of linguistic skills, knowledge, and other aspects related to English learning.

Songsiengchai et al. (2023) conducted a study evaluating the AI models' perceived ability, especially ChatGPT, on 120 Thai pre-service first-year students, aged 19 to 20 in Bangkok, compared to the traditional methods. These participants were selected based on stratified random sampling considering their English proficiency was split into two groups: the control group experienced a traditional teaching approach and the experimental group utilized ChatGPT for 30 minutes daily in their language learning. Both groups were required to complete a standardized English test before and after 8 weeks of the experimental period and completed focus group interviews with field notes. The results from pre-posttests and focus group interviews with field notes were analyzed using SPSS and content analysis. The results suggested that the effective assistance of ChatGPT facilitated students in their linguistic performance, compared to students who received traditional methods thanks to the tool's provision, including a more tailored learning experience, interactive and interesting tasks, fostering motivation, self-confidence, and a positive attitude in language learning.

Gayed et al. (2022) conducted an exploratory study examining the perceived effects of AI KAKU on Japanese EFL learners' fluency and word choices. 10 participants reaching CEFR B1/B2 were divided into two groups: the control group experienced the traditional word processing method provided by Google Docs and the experimental group received assistance from AI KAKU. After the intervention, both groups were required to take the writing assignments, which were restricted to three hundred words and lasted for 30 minutes. They also had to complete a Likert scale questionnaire about their perceptions of obstacles when implementing the writing tasks. The Text Inspector tool and koRpus package in R were employed to analyze the results collected from students' writing assignments, while the Cronbach Alpha and Mann-Whitney U tests were used to deal with statistical data from the survey. From the analyzed statistics, the researchers indicated that although AI KAKU did not influence students' writing fluency much, it offered enhanced cognitive techniques in terms of a varied vocabulary for writing.

Pham et al (2023) conducted a study to explore how Vietnamese students in a public university interact and perceive POE utilization (Platform for Open Exploration) in their vocabulary learning for four weeks. 31 Vietnamese tertiary English-majored students were involved in this study. The researchers designed the study employing a mixed-method approach as the data were collected from questionnaires and interviews, subsequently analyzed by thematic analysis and ANOVA (RMA), respectively. After analyzing the collected data, the researchers concluded that there were positive perspectives on the tool due to the benefits it provided for students in their vocabulary learning, particularly in improving their engagement in terms of behavior, emotions, and cognition.

Çelik et al. (2024) carried out a study to investigate how ChatGPT and its ability to simplify texts influenced the inferencing skills and anxiety levels of 105 Turkish EFL university students aged 18-24 at CEFR B1 level at a public university in Türkiye when completing reading comprehension exercises. When conducting the research, the method involved deploying a within-subject design to allow participants' exposure to both versions of ChatGPT-simplified and original text; following the test design, a normality test was conducted to evaluate data distribution, the data collected from the one-shot intervention were used to conclude the achievements and reading anxiety, all underwent statistical analysis using SPSS. As a result, ChatGPT was demonstrated to significantly enhance EFL participants' reading comprehension, especially inference skills in reading practice due to its provision with simplified authentic texts. Despite this, its impact on EFL learners' reading anxiety was reported with no observable change.

Schmidt-Fajlik (2023) conducted a study to explore and compare the efficacy of three AI tools, including ChatGPT, Grammarly, and ProWritingAid, in checking grammar, especially determining and fixing grammatical errors, for 69 first-year university students at Ibaraki University in Japan. All the participants were informed about the utilization of AI in grammar checking and were required to fill out a questionnaire reflecting their overall satisfaction when experiencing ChatGPT as an assistant in their paragraph-writing task. After that, the participants were required to finish a brief text that Grammarly, ProWritingAid, and ChatGPT subsequently assessed. The findings indicated that all participants perceived ChatGPT as a friendly, helpful, and the most outstanding tool among the three tools, considering its capacity to offer valuable explanations and useful approaches to solving grammatical issues. Furthermore, The comparison between Grammarly and ProWritingAid provided insights for readers, confirming the effect of these tools in improving the writing skills of Japanese learners at lower levels.

Research gap 3

It is apparent through the investigation of the preceding studies that few offer exhaustive comparisons for different AI-powered tools. The majority of studies in terms of the use of AI tools in education target specific AI tools such as ChatGPT, AI KAKU, and POE, but there is a lack of studies comparing the efficacy of AI tools to figure out which one best fulfills students' demands for enhancing their English language proficiency. Considering the comparative studies investigating the effectiveness of AI above, the study by Schmidt-Fajlik (2023) is the sole exception delving into and contrasting the benefits ChatGPT, Grammarly, and Pro-WritingAid provided students in their grammar checking. From this reality, more comparative studies must

be conducted in which the advantages of numerous AI tools are examined and compared thoroughly, especially in the Vietnamese context, to identify the most helpful tool for students' English language acquisition. This concept serves as a basis for contributing to the researcher's idea to carry out a study examining and comparing the usefulness of multiple AI tools to determine which tool has the greatest impact on learners' English learning autonomy, particularly on Vietnamese high school students.

Discussion

Discussion on the participants

After gaining an overview of the studies related to the three themes above, the matter of study participants needs to be considered to get a sense of the circumstances and applicability of the investigations. From the aforementioned literature review, it can be noticed that the studies share some parallels and variations across the research. First and foremost, most of the study participants are EFL learners from diverse contexts such as Taiwan, Thailand, Japan, Turkey, Vietnam, etc. Additionally, there is an extensive variety of academic backgrounds among the learners participating in the studies, involving primary school students (Ghoneim & Elghotmy, 2020), high school students (Augustini, 2023; Hidayat, 2004; Pratama & Hastuti, 2024; Tahir & Tahir, 2023), university learners (Çelik et al., 2024; Wei, 2023), undergraduate students (Duong & Suppasetseree, 2004), and adult learners (Songsiengchai et al., 2023; Gayed et al., 2022). Furthermore, despite the diversity of English proficiency among participants, most researchers conducted studies with the subjects being learners at the intermediate level (A2-B1). Lastly, the variations in population size are also captured across the studies. Some researchers use small sample sizes, reflecting through some examples like 6 high school students (Agustini, 2023) or 10 adult learners (Gayed et al., 2022), while other researchers employed larger-scale studies like Pratama & Hastuti (2024) with 30 high school students, Wei (2023) with 60 EFL learners, Ghoneim and Elghotmy (2020) with 80 6th-grade pupils and Hidayat (2024) with 85 high school students. Considering a substantial number of participants, the studies by Çelik et al. (2024) with 105 Turkish EFL learners and Songsiengchai et al. (2023) with 120 Thai pre-service teachers appear.

Discussion on the research methodologies

To gain insights into the studies and identify the reliability and validity of the studies, besides looking into the participants, researchers need to analyze the methodologies applied. First and foremost, it is evident that two main approaches, including quasi-experimental or mixed-method, were mostly utilized in the majority of aforementioned studies for the three themes. Some studies like Pratama and Hastuti (2024), Yang et al. (2022), Wei (2023), Tahir and Tahir (2023), and Pham et al. (2023) were designed following a mixed-method approach, in which the researchers collected quantitative data from pre-posttests and qualitative data from open-ended questions to examine whether AI facilitates students' linguistic skills, knowledge, and autonomy in learning English. On the other hand, with the application of a quasi-experimental approach, some studies such as Duong and Suppasetseree (2024), Hidayat (2024), Gayed et al. (2023), and Ghoneim and Elghotmy (2020) gathered results by comparing the scores between

the control group and the experimental one based on their pre-posttests. Furthermore, some studies were designed primarily utilizing a qualitative approach (e.g., Agustini, 2023), in which results from semi-structured interviews and focus group discussions were gathered and analyzed to determine the purpose of the studies.

Following the analysis of the research approaches utilized across the studies, it is also necessary to investigate the analysis tools employed to analyze the results. Some researchers, including Hidayat (2024), Ghoneim and Elghotmy (2020), and Tahir and Tahir (2023), exploited SPSS to examine the quantitative data from questionnaires or quizzes while in other quasi-experimental studies such as Duong and Suppasetseree, (2024) and Songsiengchai et al. (2023), T-test and ANOVA were employed to compare and analyze the scores prior to and following the experimental period.

Subsequent to the qualitative approach of data collection, one common analysis approach seen to be used in most research is the thematic analysis that interprets the content following group discussions and semi-structured interviews conducted in the study of Agustini (2023). Another strategy that was used to analyze the data is the content analysis approach, specifically in the studies by Songsiengchai et al. (2023) and Tahir and Tahir (2023), where the researchers aimed to categorize and provide a systematic overview of the gathered feedback. The needs also extend to investigate the correspondence between the current practices and results following the interventions, as found in the study by Hidayat (2024) through using advanced analysis methods such as inferential statistics or by using Structural Equation Modeling (SEM) in the work of Wang et al. (2024).

Discussion on the results

In the revision of results/findings of the studies across three themes, there are several notable similarities and differences. All the studies presented in the first theme, The Adoption of AI in Students' English Learning, reveal consistent results: the effectiveness of general AI and particularly AI-based tools on students' linguistic knowledge and specific skills regardless of their various educational levels and contexts. To be more elaborate, AI has been demonstrated to be effective on sets of language skills, such as speaking skills (Duong & Suppasetseree, 2024); listening skills (Ghoneim & Elghotmy, 2020); reading comprehension (Hidayat, 2024); structuring of written works and comprehensive use of language (Pratama & Hastuti, 2024); vocabulary acquisition (Wang et al., 2024), pronunciation skills (Abimanto & Sumarsono, 2024); and grammar comprehension and anxiety reduction (Chen & Lin, 2023).

Preliminary works investigate the impacts of AI on students' autonomy in the EFL context; research reveals a wide range of effects on learners' being autonomous, motivated, confident, self-regulated, and able to express critical thinking under AI provision, as shown in studies by Yang et al. (2022), Tahir and Tahir (2023), Mahendra et al. (2023), Agustini (2023), Wei (2023). From these consistent findings, it is affirmed that AI-powered tools' capacities to offer learners tailored and real-time feedback have a major impact on improving students' English learning autonomy. Specifically, some tools, such as ChatGPT or Duolingo, with their abilities to offer customized and instant support, facilitate learners' autonomy regarding particular skills. Broader AI-based tools, like Google Assistant, may affect learners' various aspects of autonomy,

making them self-regulated, motivated, and confident in language learning.

Though AI in general and specific AI-based tools have been demonstrated to benefit students in diverse contexts, their advantages differ depending on learners' age, English levels, and specific tools utilized. For example, in the study by Tahir and Tahir (2023) investigating the efficacy of AI on ninth-grader's English autonomous learning, the results revealed the efficacy of AI in strengthening learners' autonomy, but learners still need additional assistance from instructors to become completely autonomous in English learning. This finding implied that though AI has been demonstrated to be beneficial to learners from various backgrounds, including their ages or educational levels, university learners or mature learners having experience in being autonomous in their learning tend to benefit from AI more in terms of autonomy. On the contrary, younger students who have no or less ability to learn independently may require more aid from teachers to be entirely autonomous in English learning.

By reviewing the findings of previously mentioned studies in the last theme, it can be recognized that all the studies showed remarkable advantages of AI-based tools in improving learners' abilities and other English learning-related factors. In particular, Pham et al. (2023) demonstrated that AI tools' abilities, such as providing learners with immediate, thorough feedback and customized learning experiences, engaged students in many aspects, including their behaviors, feelings, and cognition. These advantages were also found in ChatGPT or AI KAKU, letting students work at their own pace and improve their grammar comprehension and writing organization, as have been determined in studies by Schmidt-Fajlik (2023) and Gayed et al. (2022). Çelik et al. (2024), in their study investigating ChatGPT's advantages, also indicated that despite no positive impact in decreasing university students' reading anxiety in Turkey, its ability to simplify the texts benefited students' reading comprehension and inferencing skills. These AI benefits also positively impacted Thai pre-service students as they became more motivated and self-confident in English learning (Songsiengchai et al., 2023), indicating the effectiveness of AI-based tools in terms of education on a global scale.

Discussion on the research gaps

Following the analysis of three terms in the previous studies, participants, methods, and results, some crucial research gaps are revealed. First and foremost, most studies on the utilization of AI in students' English learning have been conducted for university, college, or adult learners in various settings, including Pakistan, China, Japan, and Indonesia. Other studies, such as the ones by Pratama and Hastuti (2024) and Hidayat (2024), paid attention to high school students in Indonesian setting, creating a gap to see if Vietnamese high school students use AI for English learning, specifically which AI-based tools are being employed most often to assist their English learning. Secondly, the efficacy of AI has been proven in numerous studies (e.g., Mahendra et al., 2023; Wei, 2023; Tahir & Tahir, 2023; Yang et al., 2022) in diverse settings in Vietnamese high school settings; however, its effectiveness remains underexplored. Additionally, although the study by Tahir and Tahir (2023) emphasized that high school students' autonomy in English learning increased thanks to the implementation of AI-based tools, the researchers concluded that students still tended to be over-reliant on instructors' orientation to be completely autonomous in their English learning. These findings raise concerns regarding whether students' English learning autonomy, especially Vietnamese high

school students, can be fully developed thanks to the support of AI tools. Lastly, while plenty of studies have been made investigating a particular AI, like Chat GPT, POE, AI KAKU, Alexa, and GA, rare studies compared different AI-powered tools to determine which one best fosters students' autonomy. The only notable exception - a study by Schmidt-Fajlik (2023), was conducted to compare how efficiently three AI tools - Chat GPT, Grammarly, and ProWritingAid enhanced students' grammar understanding and checking.

Conclusion

Summarizing the Discussion

To elucidate the primary findings and allow readers to gain deeper insights into the role and efficacy of AI in students' English learning, particularly its impact on students' autonomy, the discussion in which the participants, methodologies, and results in three themes were examined above needs to be summarized.

Considering the similarities and differences of participants among studies, initially, it can be noticed that the participants are varied regarding their educational levels and contexts, including primary school (Ghoneim & Elghotmy, 2020), high school (Agustini, 2023; Pratama & Hastuti, 2024), and university or adults (Wei, 2023; Çelik et al., 2024) from diverse countries such as Vietnam, Egypt, Turkey, Indonesia, Taiwan, and Pakistan. In most of the studies in three themes - The Adoption of AI on Students' English Learning, The Effect of AI on Students' English Learning Autonomy, and The AI Tools Being Used in Education, the researchers tended to take a small sample size of participants like 10 EFL learners (Gayed et al., 2022), 6 high school students (Agustini, 2023), while in few studies, larger sample size of participants were involve, including 120 students (Songsiengchai et al., 2023), 105 EFL students (Çelik et al., 2024). Most of the research subjects are learners at levels A2-B1 of English proficiency.

In the discussion about methodologies among studies, quasi-experimental and mixed-method were the primary approaches employed in most mentioned studies. In the studies of Yang et al. (2022), Wei (2023), Pham et al. (2023), Tahir and Tahir (2023), and Songsiengchai et al. (2023), the researchers employed the mixed-method approach. In contrast, studies by Duong and Suppasetseree (2024), Hidayat (2024), Ghoneim and Elghotmy (2020), and Abimanto and Sumarsono (2024) relied primarily on a quasi-experimental approach. On the other hand, in the studies by Agustini (2023) and Gayed et al. (2022), the researchers mainly gathered data through focus groups and interviews, following a qualitative approach. In terms of the data analysis tools, a variety of statistical methods were employed to examine the gathered data and ensure the reliability of the results. Most aforementioned studies applied SPSS to perform complex statistical analyses, T-test to compare the means and explore significant differences between two groups, ANOVA to compare the means of three or more groups, and thematic analysis to identify, examine, and report patterns (themes) within the data. Additionally, other advanced tools were also observed in the previously mentioned studies, such as SEM in the study by Wang et al. (2024).

The above-mentioned studies have highlighted the success of AI-powered tools in improving students' language skills (e.g., Duong and Suppasetseree, 2024; Hidayat, 2024). By the same

token, AI-based tools have also demonstrated their efficacy in strengthening English learners' linguistic knowledge (e.g., Chen and Lin, 2023; Abimanto & Sumarsono, 2024). Furthermore, it has been demonstrated that AI-based tools offer a profusion of advantages to learners, for example, customized and instantaneous feedback (Gayed et al., 2022), the capacity to help learners work on their speed (Schmidt-Fajlik, 2023), the ability to engage and strengthen learners on their thoughts and emotions (Pham et al., 2023), motivation and self-confidence (Songsiengchai et al., 2023) in English learning.

Suggesting Future Research Based on the Research Gap

Based on the aforementioned research gap, several recommendations for future research related to AI aspects and autonomy exist. Besides focusing on the objects of EFL university students and mature learners, the studies should shift the focus to younger learners, particularly primary and high school students in various countries. This may provide educators with thorough insights into whether younger learners need additional support from teachers besides the assistance of AI to be fully autonomous in English learning. Furthermore, it can be noticed that a scarce amount of studies comparing the efficacy of AI tools in improving students' demands. For this reason, the researchers can conduct studies targeting this aim to indicate which AI-powered tools benefit students' specific needs in terms of English learning at the maximum. Ultimately, as most studies have been carried out with a small scale of participants, especially with students at primary and high school educational levels, future research should be conducted involving a larger scale of population to ensure the generality of the results regarding the AI-based tools affect learners' autonomy in English learning in diverse contexts.

Acknowledgments

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