International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Artificial Intelligence (AI) in Language Learning Autonomy (LLA): A Systematic Literature Review Uncovering Learning Autonomy

Asya Azhar[1], Amelia Abdullah[2]

[1]Research Scholar, School of Educational Studies, Universiti Sains Malaysia, Penang, Malaysia.
[2]Lecturer, School of Educational Studies, Universiti Sains Malaysia, Penang, Malaysia

Abstract:
Artificial Intelligence (AI) has stormed into the learning spaces and impacted the way students approach language learning significantly. Language Learning Autonomy (LLA) has seen a huge surge in recent years with increased use of mobile assisted applications bringing in drastic changes to the approaches taken by students and teachers and related research. This paper presents a systematic literature review (SLR) on the impact of Artificial Intelligence on Language Learning Autonomy (AILLA). The SLR analyses 21studies between 2013 and 2024 selected from global databases of Scopus, Springerlink and ERIC. The research articles highlight the benefits and limitations of AILLA in improving language acquisition skills. PRISMA model was used to analyse the research articles. The findings provide valuable insights for educators and developers to enhance the effectiveness of AI-based language learning tools. Global trends in AILLA research, AI technology applications used and intervention approaches adopted in research have been analysed based on the data from 21 research articles. The findings from the review suggest that there has been a surge in the study of Artificial Intelligence and use of AI in LLA. The findings of this research reveal that there is more emphasis on the working of the AI-driven technology or the application rather than the impact and potential benefits of AI in LLA.

Keywords: Artificial Intelligence, Language Learning Autonomy, Autonomous Learning, Technology in Education, PRISMA, Literature Review

1. INTRODUCTION:

Language is the key to communication, connection and to build bridges across the culturally diverse world. To be interconnected and independent, the ability to communicate across languages is a crucial skill to success. With over 7000 spoken and approximately 300 scripted languages, it is pivotal to understand the transformative effect it can have on an individual. Language learning has been placed at high importance since ancient times based on the fact that language proficiency opens up vast opportunities. Autonomy in language learning is crucial for learners to develop the skills and competencies necessary to navigate language-mediated socialization effectively in a multilingual world (Benson, 2012). Language Learning Autonomy (LLA) signifies a paradigm shift from traditional, teacher-centred instruction to a learner-centred method where individuals take control of their own didactic journeys. This self-directed learning framework places a strong emphasis on students' capacity to determine their own objectives, select suitable learning techniques, and track their development. Because learning a new language is essentially intimate

and social, autonomy is especially important in the context of language acquisition. Information overload that has resulted from the integration of computer technology, mobile assisted technology, social media and the internet in the field of education has led to a revolution in global connectivity making language learning more autonomous. Along with the fast changing technology and globalization continuing to bring diverse populations closer, the ability to communicate in multiple languages becomes a key asset, enhancing personal and professional opportunities in a global community. With the introduction of Artificial Intelligence (AI), the opportunities of language learning autonomy for multiple languages has been made possible.

AI driven technology has recently surged in the field of education driving significant interest from educators collectively. The introduction of AI in education has led to a paradigm shift from traditional teacher - centred approach to student- centred learning of languages enabling higher LLA. Pokulevska A. I. (2018) notes that AI has emerged as a powerful force in the education dominion, particularly in the area of spoken communication. According to Ahmad et al. (202), AI is highly influential in the educational field and in order to stay competitive in today's highly developed world, educational institutions must use AI technology for teaching and learning. With the growing demand for integration of AI-driven technology in education, language learning and enabling autonomy in language learning; it has become essential to study collectively the role AI based applications play in enabling autonomy in language learning. Artificial Intelligence (AI) has taken roots in every aspect of education and is fast changing the education scenario across the globe. Artificial Intelligence (AI) holds the capacity to revolutionise the field of education and impact the roles of all parties concerned (Nguyen et al., 2022).

AI technologies act as a supporting pillar to LLA by providing real-time feedback, personalized content, and interactive exercises that cater to the exclusive needs of individual learners. The integration of AI in LLA can transform traditional educational models, making learning more engaging, effective, and accessible. This paradigm shift towards AI-driven LLA holds significant promise, but it also raises important questions about its trends, applications, and implications. This study provides for valuable insights into the trends in the last decade, the emerging AI applications and the potential implications of these AI applications in LLA.

1.1 PROBLEM STATEMENT

Despite the promising potential of AI to enable LLA, related literature is inadequate and isolated only as a general aspect of AI in education without providing a complete and specific insight to the contributions of AI technologies in Language learning autonomy. Existing research focuses largely on specific AI tools and applications and their potential impact on specific areas of general education with rather less focus on LLA. The studies on how these AI applications collectively contribute towards LLA are largely unexplored. To address these gaps, a systematic literature review is essential to consolidate existing research, identify trends, explore various AI applications, and investigate for the purpose of using AI and implications of these in language learning autonomy. According to Zhang and Aslan (2021), practical research on AI technology in actual teaching and learning environments is necessary. According to Kabudi et al. (2021), there is a significant disparity between the promise of AIEd and their actual application in the field of education. This study will address the issues highlighted by the scholars and delve into understanding the empirical studies conducted on AI in the classroom teaching. By consolidating and analyzing existing research, this review seeks to identify key trends and various AI applications, and explore the research which studies AI in LLA. The primary research questions guiding this study are:

1.2 RESEARCH QUESTIONS

1. What are the research trends related to AI applications in LLA?
2. What AI technology and applications are used for LLA?
3. What intervention approaches have been adopted to enable AI in LLA?

1.3 SIGNIFICANCE

Integration of AI in LLA holds a significant promise for transforming the educational scenario with the rising demand for AI in language learning. By providing an insight into how AI has been harnessed, it shall provide for a better understanding to further strengthen the use of AI in LLA. This study shall collect evidence of best practices of integrating AI in LLA as found in around the world. This study shall bring out the AI-driven applications that are widely used among the language learners which aids in LLA. This study will also highlight the different AI applications used by the researchers in their studies, which enable LLA. The findings from this review can inform policymakers and educational leaders about the potential benefits and challenges of integrating AI in LLA. This information is crucial for developing policies and frameworks that support the effective and equitable use of AI technologies in schools and other educational institutions. The study is important because it will offer a comprehensive and nuanced understanding of how AI facilitates autonomous language learning. It will provide insightful analysis and useful recommendations that might improve teaching methods, guide policy choices, and encourage fair and efficient language acquisition for all. The new study contributes to the existing literature in a variety of ways. First and foremost, it addresses a key gap in the literature by providing empirical data on the particular impact of AI-assisted language learning tools on autonomy. Second, while earlier research has looked into the efficacy of AI-driven language learning aids, our work focuses on language learning autonomy, providing vital insights tailored to this particular case.

1.4 UNDERSTANDING LANGUAGE LEARNING AUTONOMY

Autonomy in learning a subject whether it be a language, natural sciences, applied sciences, social sciences, mathematical or logical subject, has great importance when it comes to acquiring new knowledge and skills apart from the syllabi prescribed. However, it is more applicable and important in language learning. Many scholars have attempted to define language learning autonomy with different perspectives. Elo and Kyngäs (2008) mentions the definition rendered by Richards & Schmidt (2010), which states as “the principles that learners should be encouraged to assume a maximum amount of responsibility for what they learn and how they learn it. This will be reflected in approaches to needs analysis, content selection, and choice of teaching materials and learning methods.” When learning a second or foreign language, "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations" are referred to as learning techniques" (Oxford & Nyikos, 1989, p. 8). Benson (2007), in his pioneering work suggests that Language learning autonomy is a multifaceted concept and there are various viewpoints on what it constitutes and gives one of the most widely recognized definitions for learner autonomy, “as learners’ ability to take charge of their own learning”. "A mode of learning; one in which the individual is responsible for all the decisions connected with her learning, and undertakes the implementation of these decisions" is what Dickinson (1987) defines autonomy as. Cotterall (1995) points out that autonomy stands for learners’ capacity to utilize a set of strategies for the sake of taking charge of their own learning. According to Kohonen (2001) as mentioned by Kim (2014), The key components of promoting learner autonomy include letting them make decisions about the learning materials and procedures they use, reflecting on their experience, acknowledging their successes, and identifying new needs. Autonomy in language learning is crucial

because it enables students to actively participate in the management of their education and choose the course of their studies (Onozawa, 2010).

1.5 THE USE OF TECHNOLOGY AND LEARNER AUTONOMY

Kim (2014) believes that when students use computers for learning, they have the greatest influence over their educational journey and can grow increasingly self-reliant of their teachers. Daflizar et al. (2022) suggests that without the requirement for instructor interaction, modern technological advancements have made it easier for students to engage in language learning. According to Kessler (2009), referenced in Daflizar et al. (2022), technology gives children the chance to apply language in real-world contexts. Technology has long been utilized to provide genuine audio and video texts for repeated practice in language acquisition. Pronunciation, spelling, and grammar exercises are common instances of utilizing technology as an aid for language acquisition. Instead of concentrating on elements of learner autonomy, research that looks at instructors' views frequently looks at how utilizing technology generally affects language acquisition. Melvina et al. (2021) assert that the incorporation of new technologies in English language education heralds the advent of self-directed language acquisition. The introduction of Computer assisted Language learning (CALL) during the early 1980's paved the way for enhanced autonomy for language learners. According to Benson (2007), computer programmes gave users a degree of control by giving them a choice of practice topics and materials, as well as the option to select between learning, practice, and testing modes. Additionally, he says that CALL gives students the option to "try again" after receiving an incorrect response, giving them complete control over the speed at which they learn and an infinite supply of opportunities for repetition.

With the introduction of internet and social media, the possibilities became endless for language learners as they were able to communicate directly with native speakers of the intended language of learning. social media platforms like Twitter, Facebook, and Instagram offer opportunities for learners to interact with native speakers, language experts, and fellow learners, which can help build confidence and fluency in using the target language. Social media helps learners become more autonomous in their language learning by giving them the tools, resources, and encouragement they need to take charge of their education and acquire the knowledge and abilities needed for self-directed learning. Mobile Assisted Language Learning (MALL) has significantly improved improvements and chances for language learning autonomy in addition to CALL, the Internet, and social media. According to Song and Xiong (2023), who cite Reinders & Benson (2017), mobile technology frequently enables students to continue their education outside of the classroom, allowing them the freedom to decide when, where, and how to study a second language.

1.6 AI IN LANGUAGE LEARNING

AI in education has transformed the learning environment by personalizing learning experiences, automating tasks, and improving accessibility. As artificial intelligence (AI) develops, so do its applications in education. These include potentially exciting options for personalized learning, dynamic evaluation, and meaningful involvement in online, mobile, and hybrid learning environments (Zhang & Aslan, 2021). According to Seo et al. (2021), unlike educational technologies that solely mediate interactions between instructors and students, AI systems have more control over how they analyze data, infer learning, and, in certain situations, make instructional decisions. According to Wei (2023), AI-mediated language instruction has the potential to improve language learning outcomes, motivate students, and promote student autonomy.

AI-driven language learning systems enable teachers to tailor training to a student's learning style, pace, and competency level. This manner, kids are challenged but not overwhelmed by the information they are

exposed to. According to Patty (2023), AI offers various benefits to language learners, such as progress tracking, interactive engagement, and personalized education. It also raises concerns about the shifting role of language teachers, the potential impact on learners' autonomy, and less human connection. Although there is a growing trend of employing AI in education and learning, there are several downsides to this strategy. UNESCO, in a study ("Guidance for Generative AI in Education and Research," 2023), sets recommendations for the use of Generative AI in education and underlines ethical considerations connected to human intellectual growth. Commenting that "GenAI systems in education may limit learners' autonomy and agency by providing predetermined solutions or narrowing the range of possible learning experiences".

2. METHODOLOGY

2.1 DATA SEARCH PROCESS

This study adopts a Systematic Literature Review design exploring and analyzing the research work done on AI in LLA. Systematic Literature Review (SLR) seek to incorporate all available data on a topic and assess its quality in order to synthesise scientific knowledge in a clear and reproducible manner to solve a specific research question (Lame, 2019). An SLR is a methodical research methodology that collects, categorises, and evaluates current research works (e.g., books, articles, conference proceedings, and dissertations) (Pati & Lorusso, 2017). The purpose of an SLR is to examine significant points of current knowledge on a topic related to research questions in order to identify topics for additional investigation (Kitchenham et al. 2009). To enhance credibility, consistency, and transparency, this SLR followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards and the four-phase flow diagram devised and proposed by Moher et al. (2009). According to Moher et al. (2009), the PRISMA statement intends to aid authors in improving the reporting of systematic reviews and meta-analyses, and the general principles and subjects covered by PRISMA are applicable to every systematic review. The technique for identifying the most relevant literature to answer the research questions was defined at this stage. This resulted in emphasizing the database that would be searched for relevant literature. Conference proceedings, Journals articles, book chapters, review articles, patents, editorials and short surveys are some of the academic literature that Scopus, ERIC and SpringerLink cover in great detail. These databases are particularly well-suited for interdisciplinary and transdisciplinary research, which is common in scientific education, due to its extensive indexing coverage. Therefore, large, international, scholarly and multidisciplinary databases of Scopus, ERIC and SpringerLink were used to search for the literature.

2.2 SEARCH METHOD

Boolean operators (Grewal et al., 2016) were used inside each database to search for relevant literature, with particular search keywords and limiters specified in Table 1. The search terms of “Artificial Intelligence” along with the acronym of “AI” and “language learning autonomy” were used. The search parameters were set as follows. Document types: Research Article; Language: English; Year range between 2013 - 2024 and the Discipline: Education. Search included article titles, abstract and keywords.

Figure 1. PRISMA Flowchart of Screening Procedures

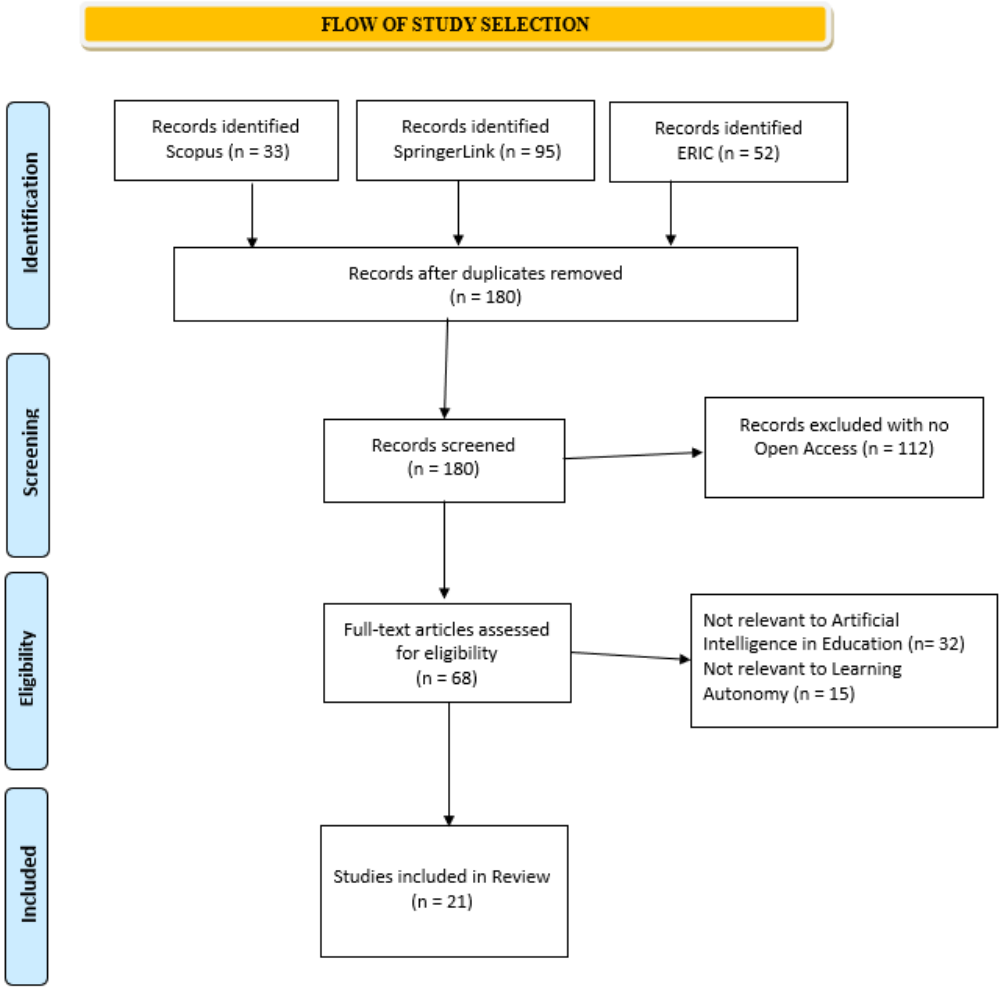

Table 1: Results of the initial search

Search Terms*	Search Limiters	Database	Primary results
("Artificial Intelligence" OR "AI") OR (“automated”) AND ("Language Learning Autonomy") OR (“self-study”) OR (“self-directed”) AND (“Learning”)	1. Document type – Research Article 2. Language - English 3. Year range - 2013 to 2024 4. Discipline - Education, General Education 5. Source - Teaching English with technology, English teaching	Scopus	33
		SpringerLink	95
		ERIC	52
		Total	180

2.3 ELIGIBILITY, INCLUSION AND EXCLUSION

Since gaining huge momentum and importance of AI in education, the field of AI has been a subject of a wealth of study. Along with AI in education, the field of learner autonomy has been studied by scholars

as a traditional subject and carries a huge wealth of research to its bag. For scholars who are looking particularly in language learning autonomy this becomes a significant obstacle that requires careful thought and clearly specifying the scope of the review to reduce any complex issue that may arise while analyzing the research articles. To ensure relevance of data is maintained in the study, only papers that identify themselves as being related to AI or learning or autonomy in their title, abstract, and keywords are considered eligible. Along with the aforementioned criteria, only peer-reviewed, fully published papers and academic publications written in English and including a title, abstract, or keywords were deemed suitable for this review research. From the initial search applying the Boolean search operators, a total of 180 journal articles were retrieved from the databases. Articles with open access were extracted at this stage, following which the articles were further screened based on the inclusion/ exclusion criteria as mentioned below. To address the main purpose of an SLR, studies were considered relevant if (1) Were open access so that the study can be read in its entirety, (2) Contained evidence of study on Artificial Intelligence and language learning autonomy, (3) Provided information in either qualitative or quantitative nature, (4) Studies collected data in the form of survey, interviews and systematic literature reviews, (5) Were published from 2013 to 2024, (6) Studies that provide sufficient information for answering the research question. Studies were excluded from the analysis if they had no information on Artificial Intelligence applications or tools or techniques and language learning autonomy. Figure 1 shows the screening process which removed duplicates and the non-relevant articles reaching to filter out the most relevant articles only to be used in this study. Finally, after screening the pool of 180 articles, 68 were identified to suit the purpose of the study which were further screened and excluded the papers that were unrelated to the scope of the study. 32 articles were eliminated as they were not relevant within the study's scope of Artificial Intelligence in Education and an addition of 14 articles were eliminated as they were not relevant to learning autonomy.

Based on the selection procedure described above, 22 articles were chosen for examination. Each article was evaluated and the data taken for tabulation. The papers are evaluated based on their study aims, methodologies employed, sample type, study location, degree of education, research design, research methodology, implementation strategies, AI technology, and AI tools used. The reviewed article and its extracted findings are offered in the next section for analysis and synthesis.

3. RESULTS AND DISCUSSION:

3.1 GENERAL TRENDS: To explore the general trends answering to Research Question 1: "What are the research trends related to AI applications in language Learning Autonomy?", the findings on the year of publication, country of publication, population of study and the research design have been analyzed and following are the findings:

3.1.1 YEAR-WISE PUBLICATIONS: Artificial Intelligence in Language Learning autonomy (AILLA) research has picked up very recently. The year-wise trend in publication is shown in figure 3.1 below. Although the data search parameters were set between 2013 to 2024, we can see that the first publication was not done until 2015. Initially a low percent of research was done with 2015 (n=1, 4.5%), 2017 (n=1, 4.5%) and 2020 (n=1, 4.5%). However, there was an increase in the research on AILLA in recent years which saw a huge shift and wide acceptance of technology in Education and language learning due to the restrictions imposed by covid-19 pandemic. The year 2021 (n=2, 9%) saw an increase in research and the following year 2021 (n=4, 18%) maintained the focus. However we see a slight decline in 2022 (n=3,

13.6%) and then we see a sharp rise in the year 2024 (n=9, 40%), which indicates that scholars are focusing more on research in AILLA as the demand rises for integration of AI.

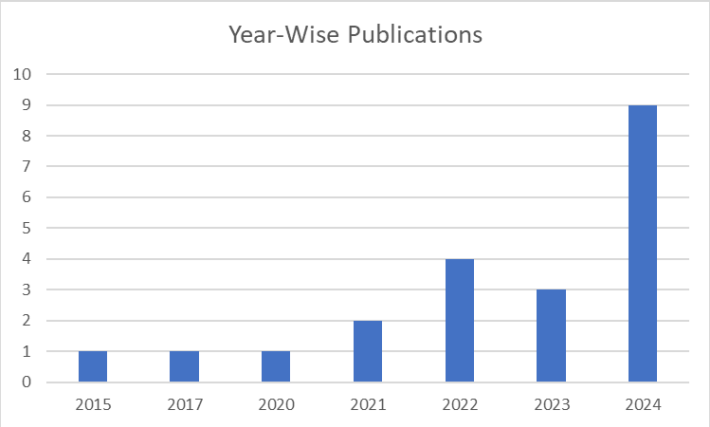

Figure 3.1: Year-wise distribution of research publications

3.1.2 COUNTRY-WISE PUBLICATIONS: AILLA study has been undertaken in several nations throughout the world. The 21 publications described AILLA research studies in 13 countries. (See Fig 3.2). China was found to be most productive, with four publications meeting all criteria applied in the study followed by Hong Kong, Japan, Saudi Arabia, Taiwan and United States of America with two research publications. Along with these countries, we can also see that one study at the least has been conducted in Australia, Brazil, Columbia, South Korea, Turkey and the United Kingdom. The distribution of research across the globe shows that countries all across are taking attention to the growing demand of AILLA and are focusing their research in better understanding the developments and advances in AI-driven technology. China seems to be developing and researching more in the field of AI compared to other countries.

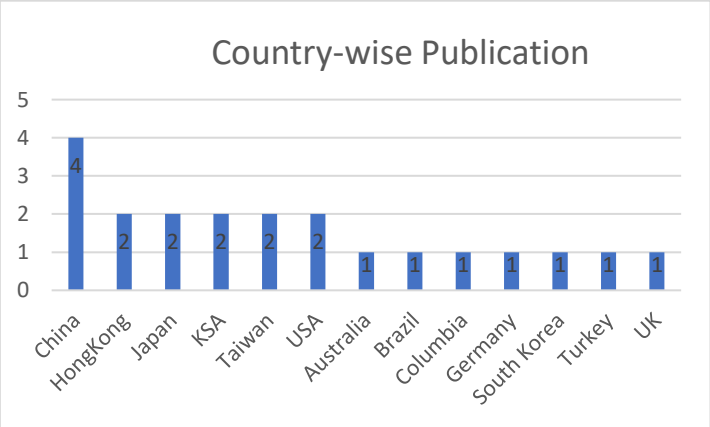

Figure 3.2: Country-wise distribution of research publications

3.1.3 EDUCATIONAL SETTING: The articles included in the study reported several research in both K-12 (n = 5, 24%) and higher education (n = 15, 71%) settings as shown in Fig 3.3 below. However, there was a study conducted in a non-academic Professional setting (n=1, 7%) as well. The data reveals that most of the research was conducted in Higher Education setting which shows the importance and relevance of AILLA in higher education. Autonomy in learning is considered to be more relevant for adult learners

and this reflects in the results of this SLR. The one study conducted in non-academic professional setting shows that autonomy of language learning is not only in an academic perspective but also for those who have moved out of the academic setting and are more independent learners and AI can be useful in improving professional competence as well.

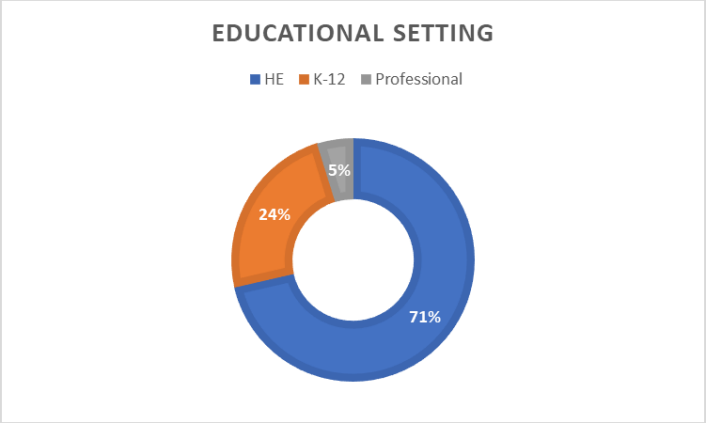

Figure 3.3: AILLA research articles by educational setting

3.1.4 PARTICIPANTS: The articles reviewed in this study reported to have conducted studies on students (n= 16, 76%), teachers (n= 3, 14%) , AI tools (n= 1, 5%) and documents related to AILLA (n= 1, 5%) (see fig 3.4 below). The results show that most of the research was conducted on learners which is primary data to understanding the impact of AI on LLA. The focus on teachers to be trained is a good step because if the teachers are trained on using AILLA they will be able to execute the same for their students. Along with understanding the human approach, the studies have also tried to understand the AI tools themselves and other secondary data, which helps in supplementing the findings of other research and add on to the growing conversation of AILLA.

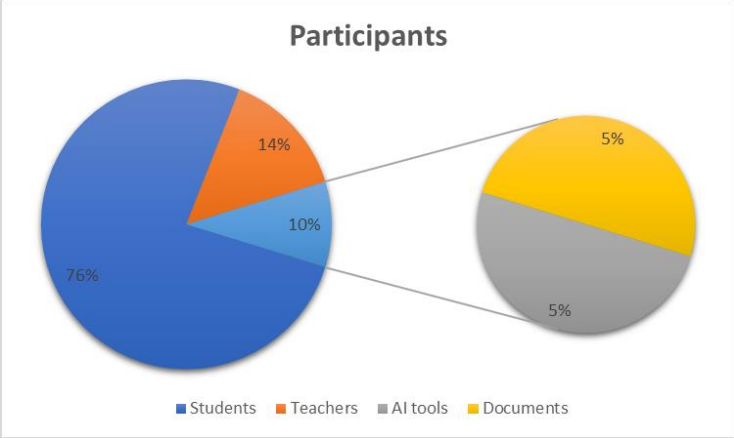

Figure 3.4: Participants in AILLA research

3.1.5 RESEARCH METHODS: The articles reviewed in this study reported to have conducted studies mostly Quantitative (n=6, 28%), followed by Qualitative (n=5, 24%) and then followed by mixed method (n=2, 9%) and Quasi experimental (n=2, 9%). The studies also utilized Action research (n=1, 5%), case study (n=1, 55), Conceptual articles (n=1, 5%), Delphi study (n=1, 5%), Field study (n=1, 5%) and a

literature review (n=1, 5%) (see fig 3.5 below). The findings suggest that most of the research has quantified data but not restricted to it, we see that scholars have tried to explore AILLA by adopting different research methods including that of Case study, qualitative research, quasi-experimental research, action research, conceptual findings, delphi study, field study, and literature reviews as well. The diverse approaches provide have a holistic view on AILLA.

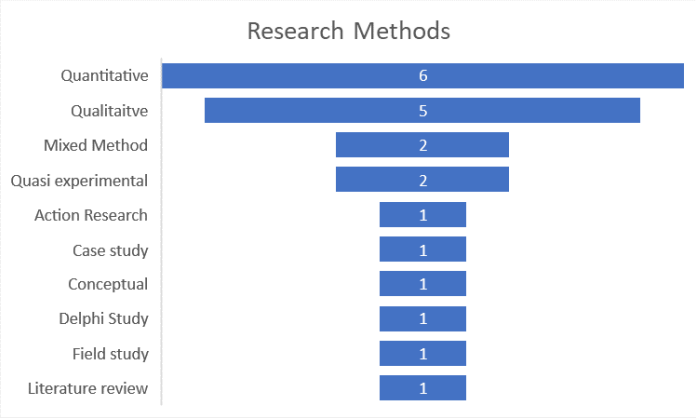

Figure 3.5: Research methods in AILLA research

3.1.6 LANGUAGES IN AILLA RESEARCH: The articles explored in this study also revealed that the AI technology was used in multiple languages and not restricted only to English. Although the majority of articles were conducted on English (n=13, 61.9%), Chinese (n=1, 4.7%) and Japanese (n=1, 4.7%) were also found. Some articles did not specify language learning but covered English and other subjects collectively (n=6, 28.5%). The results show a high inclination towards studying English language, however we also see that researchers have applied the AI-technology to autonomy of other subjects as well along with English as a subject of study, which suggests that scholars see that AI-driven technology is not only specific to English language acquisition, but acquisition of knowledge as a whole and also the influence of English lanaguge in the learning of other subjects. We also see that Japanese and Chinese languages have also been studies making LLA more diverse and not restricted to English language learning.

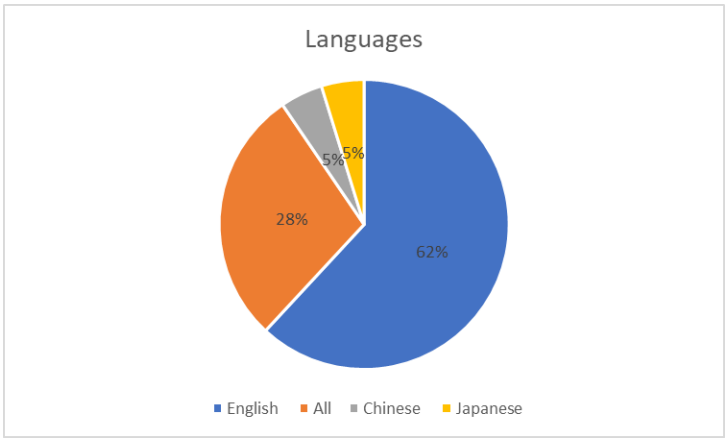

Figure 3.6: Languages in AILLA research

3.2 AI TECHNOLOGY IN LANGUAGE LEARNING AUTONOMY:

Exploring the AI technology and applications, to answer Research Question 2: "What AI technology and applications are used for Language Learning Autonomy?", the findings of the AI-driven technology and the applications used in the research studies have been presented in this section.

3.2.1 AI-DRIVEN TECHNOLOGY IN LLA

AI technology opens up nearly limitless potential for language learners. The 21 papers in this study examined a broad range of AI applications in language learning autonomy, encompassing the following a variety of educational technology as shown in Table 2 below. The technology which focuses on text-generation has been studies the most and followed by the development and implementation of Expert systems, not far behind are the AI intelligent agents or assistants. This shows that AI-driven technology that is more interactive in nature is being used for LLA. Chatbots and Machine learning have also taken stage however we can also see the emergence of Augmented Reality (AR) and Virtual Reality (VR) with the introduction of robotics in LLA. Overall, we can find that there are a variety of AI-driven technologies that are applied in enabling LLA.

Table 2: Summary of the AI-Driven Technology

AI-Driven Technology	N	Articles
1. AI text generator	6	1. Xia et al. (2023b)
		2. Chiu (2024)
		3. Evmenova et al. (2024)
		4. Cheng and Yim (2024)
		5. Özçelik and Ekşi (2024)
		6. Wang (2024)
2. Expert systems	5	1. Delgado et al. (2020)
		2. Lee et al. (2022)
		3. Wei (2023)
		4. Li and Kim (2024)
		5. Ramirez and Esparrell (2024)
3. AI Assistants or agents	4	1. Li, B., & Peng, M. (2022)
		2. Hobert and Berens (2023)
		3. Dizon et al. (2022)
		4. Khodary (2017)
4. Machine Learning	2	1. Fang and Morris (2021)
		2. Huang and Liao (2015)
5. Chatbot	2	1. Alsadoon (2021) 2. Xiaolei and Teng (2024)
6. General AI technologies	1	1. Chukwunemerem (2023)
7. Robot application system	1	1. Chen et al. (2022)

3.2.2 AI-APPLICATIONS IN LLA

With the above AI-Driven technology, there are many computer based and mobile based applications developed and researched by scholars in the articles explored in this study. The 21 papers in this study

have included the AI applications as listed in Table 3 below. From the numerous applications researched, the most widely studies AI application is Chatgpt (Xia et al. (2023), Chiu (2024), Evmenova et al. (2024), Cheng and Yim (2024), Özçelik and Ekşi (2024), Wang (2024), similarly Duoling was also studies twice Li and Kim (2024) and Wei (2023). Although most of the articles have mentioned the applications used in the study, some of the articles have not specified the application, they make a general analysis of generative AI in language learning Chukwunemerem (2023), Alsadoon (2021), Huang and Liao (2015), Li, B., & Peng, M. (2022), Chen et al. (2022), Lee et al. (2022), Hobert and Berens (2023). It is worthy to note here that one of the study has move beyond just AI-driven technology to a more advanced approach of using assistance of Robots Chen et al. (2022).

Table 3: Summary of the AI Applications used for research

AI-Driven Technology	AI Applications
1. AI text generator	ChatGPT
2. AI assistants or agents	Alexa, Quillbot
3. Expert systems	Duolingo, MyEnglishLab, SuccessMaker, Edmodo
4. Automated Feedback Systems	Voice Analyst, Grammarly, PaperRater website, ELSA, Speech Rate Meter, IELTSAce app, Liulishuo, MaiMemo, Versant English Placement Test, SpeakingPal, Write and Improve with Cambridge
5. Machine Learning	termbase, SDL tradowin align, Translation workbench, google translation toolkit, memoQ, Wordfast

Figure 3.7: Word Cloud representation of the AI Applications

3.3 INTERVENTION APPROACHES TO ENABLE AILLA

To test or evaluate Educational Technology, scientists use various intervention approaches in their research work. To answer Research Question 3: "What intervention approaches have been adopted to

enable AI in Language Learning Autonomy?", the findings of the intervention approaches that are adopted by the scholars of the reviewing articles are explored. A summary of the interventions in the articles is presented in table 4. The findings reveal that scholars have adopted the approach of training or educating the target population by implementing a module on the AI-driven technology and on AI applications that were used for LLA, alongside they have also provided with an opportunity to the target population by exposing them to the AI-technology and application that can used independently for LLA. Two of the researchers have also developed an entirely new learning system integrating LLA. We can also see that scholars have adopted the instructional method and utilized digital learning material which is AI based for LLA. Going a step further we can see that scholars have also adopted AR and VR in their intervention approaches to LLA. These diverse and yet very practical approaches to provide the target population with direct contact with the AI-driven technology suggest that the AILLA is a more technology driven approach with the least involvement of human interactions.

Table 4: Summary of intervention approaches to AILLA research

Intervention Approach	N	Articles
Module Implementation	7	Xia et al. (2023b) Fang and Morris (2021) Khodary (2017) Chukwunemerem (2023) Li and Kim (2024) Evmenova et al. (2024) Wang (2024)
Exposure to AI	6	Alsadoon (2021) Xiaolei and Teng (2024) Wei (2023) Chiu (2024) Özçelik and Ekşi (2024) Xia et al. (2023b)
Review of Literature	2	Ramirez and Esparrell (2024) Cheng and Yim (2024)
Implement Digital learning material	1	Huang and Liao (2015)
Integrating AI & VR in teaching	1	Chen et al. (2022)
Out of class learning	1	Dizon et al. (2022)
Studying the tools	1	Delgado et al. (2020)

4. CONCLUSION

The findings from the review suggest that there has been a surge in the study of Artificial Intelligence and use of AI in LLA in recent years. The articles published suggest that researchers have started looking into studying AI and its impact on various subjects including that of English and also are trying to explore how these AI applications can be useful in automated and autonomous learning. Although the initial search for literature was totalled to 180 articles, the focal point of the study was grasped by only 21 articles. The

screening revealed that the majority of the papers were not relevant to language learning or autonomy to be specific. This shows that the attention given to language learning and autonomy from the AI-driven technology industry has been relatively low and provides for more opportunities for research work in this field. There is no notable research in the context of the study conducted in India. This calls for a deeper understanding on the reasons for non-availability of literature published in India on the subject of study which is Artificial Intelligence in Language Learning Autonomy. However, since this study included articles only from premier journals published at International level, there is substantial less literature available. A study on the literature available in Indian journals can provide for more in-dept and relevant study on AILLA in India. Most of the research is conducted with Learners of Higher Education which calls for a need to train teachers on the use of AI in LLA to be able to reach a larger population as training teachers translates to student learning. The AI-driven technology used shows that there isa growing utilization of AI in education and language learning in particular. The AI-driven applications suggest the inclination of target population towards the increase in usage of the AI for LLA. The low availability of empirical research in understanding the role and effect of AI on LLA leaves a void which needs to be filled. Further research can be conducted on the various generative AI applications used by autonomous language learners in Higher Education. It was found that most of the research work was done on AI education rather than AI in Education. The perspective of scholars on looking at the role of AI education can be seen as more important. This calls for further research work to be undertaken specifically addressing the level of impact of specific applications on different aspects of learning and more focused on the acquisition of four language skills (LSRW). The findings of this research reveal that there is more emphasis on the working of the AI-driven technology or the application rather than the impact and potential benefits of AI in LLA. Further studies on the perception and attributes of the target audience about the benefits of these Generative AI applications can be brought forward. This study included studies only from three of the many databases, which is restricted in the articles collected and reviewed. Further Literature review and bibliometric analysis can be conducted on a larger scale to understand big data relevant to AILLA.

BIBLIOGRAPHY

1. Ahmad, S. F., Rahmat, M. K., Mubarik, M. S., Alam, M. M., & Hyder, S. I. (2021). Artificial intelligence and its role in education. Sustainability, 13(22), 12902. https://doi.org/10.3390/su132212902
2. Alsadoon, R. (2021). Chatting with AI Bot: Vocabulary Learning Assistant for Saudi EFL Learners. English Language Teaching, 14(6), 135. https://doi.org/10.5539/elt.v14n6p135
3. Benson, P. (2007). Autonomy in language teaching and learning. Language Teaching, 40(1), 21–40. https://doi.org/10.1017/s0261444806003958
4. Benson, P. (2012). Autonomy in language learning, learning and life. Synergies France, 9, 29–39. https://gerflint.fr/Base/France9/benson.pdf
5. Chen, Y., Hsu, C., Lin, C., & Hsu, H. (2022). Robot-Assisted Language Learning: Integrating Artificial Intelligence and Virtual Reality into English Tour Guide Practice. Education Sciences, 12(7), 437. https://doi.org/10.3390/educsci12070437
6. Cheng, M. W. T., & Yim, I. H. Y. (2024). Examining the use of ChatGPT in public universities in Hong Kong: a case study of restricted access areas. Discover Education, 3(1). https://doi.org/10.1007/s44217-023-00081-8

7. Chiu, T. K. F. (2024). A classification tool to foster self-regulated learning with generative artificial intelligence by applying self-determination theory: a case of ChatGPT. Educational Technology Research and Development. https://doi.org/10.1007/s11423-024-10366-w
8. Chukwunemerem, O. P. (2023). Lessons from Self-Directed Learning Activities and Helping University Students Think Critically. Journal of Education and Learning, 12(2), 79. https://doi.org/10.5539/jel.v12n2p79
9. Cotterall, S. (1995). Readiness for autonomy: Investigating learner beliefs. System, 23(2), 195-205.
10. Daflizar, Sulistiyo, U., & Kamil, D. (2022). Language learning strategies and learner autonomy: The case of Indonesian Tertiary EFL students. LEARN Journal: Language Education and Acquisition Research Network, 15(1), 257–281. https://files.eric.ed.gov/fulltext/EJ1336149.pdf
11. Delgado, H. O. K. (2020). Artificial intelligence adaptive learning tools: the teaching of English in focus = Plataformas de aprendizagem adaptativa com base na Inteligência Artificial: o ensino da língua inglesa em foco. DOAJ (DOAJ: Directory of Open Access Journals). https://doaj.org/article/55371de9f6294a4c8a2a778630b452f0
12. Dickinson, L. (1987). Self-Instruction in language learning. Cambridge, MA: Cambridge University Press.
13. Dizon, G., Tang, D., & Yamamoto, Y. (2022). A case study of using Alexa for out-of-class, self-directed Japanese language learning. Computers and Education. Artificial Intelligence, 3, 100088. https://doi.org/10.1016/j.caeai.2022.100088
14. Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. Journal of Advanced Nursing, 62(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x
15. Evmenova, A. S., Borup, J., & Shin, J. K. (2024). Harnessing the power of generative AI to support ALL learners. TechTrends. https://doi.org/10.1007/s11528-024-00966-x
16. Fang, X., & Morris, P. (2021). Cultivation of student translator autonomy in UK higher education. English Language Teaching, 14(5), 41. https://doi.org/10.5539/elt.v14n5p41
17. Grewal, A., Kataria, H., & Dhawan, I. (2016). Literature search for research planning and identification of research problem. Indian Journal of Anaesthesia/Indian Journal of Anaesthesia, 60(9), 635. https://doi.org/10.4103/0019-5049.190618
18. Guidance for generative AI in education and research. (2023). In UNESCO eBooks. https://doi.org/10.54675/ewzm9535
19. Hobert, S., & Berens, F. (2023). Developing a digital tutor as an intermediary between students, teaching assistants, and lecturers. Educational Technology Research and Development. https://doi.org/10.1007/s11423-023-10293-2
20. Huang, Y., & Liao, L. (2015). A STUDY OF TEXT-TO-SPEECH (TTS) IN CHILDREN'S ENGLISH LEARNING. Teaching English With Technology, 15(1), 14–30.
21. http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-9bb9f529-2013-4ddd-b5b9-319ff493a824/c/ARTICLE2-final.pdf
22. Kabudi, T., Pappas, I. O., & Olsen, D. H. (2021). AI-enabled adaptive learning systems: A systematic mapping of the literature. Computers and Education. Artificial Intelligence, 2, 100017. https://doi.org/10.1016/j.caeai.2021.100017
23. Kessler, G. (2009). Student-initiated attention to form in wiki-based collaborative writing. Language Learning & Technology, 13(1), 79- 95. http://llt.msu.edu/vol13num1/kessler.pdf

24. Khodary, M. M. (2017). Edmodo use to develop Saudi EFL students' Self-Directed learning. English Language Teaching, 10(2), 123. https://doi.org/10.5539/elt.v10n2p123
25. Kim, H.-J. (2014). The Use of Technology for Learner Autonomy in Language Classrooms. ITBE Link. https://www.itbe.org/v_newsletters/article_23358209.htm
26. Kohonen, V. (2001). Towards experiential foreign language education. In Kohonen, V., Jaatinen, R., Kaikkonen, P., & Lehtovaara, J. (Eds.) Experiential learning in foreign language ducation (pp. 8-60). London: Longman.
27. Lame, G. (2019). Systematic Literature Reviews: An Introduction. Proceedings of the . . . International Conference on Engineering Design, 1(1), 1633–1642. https://doi.org/10.1017/dsi.2019.169
28. Lee, D., Kim, H., & Sung, S. (2022). Development research on an AI English learning support system to facilitate learner-generated-context-based learning. Educational Technology Research and Development, 71(2), 629–666. https://doi.org/10.1007/s11423-022-10172-2
29. Li, B., & Peng, M. (2022). Integration of an AI-Based platform and flipped classroom instructional model. Scientific Programming, 2022, 1–8. https://doi.org/10.1155/2022/2536382
30. Li, L., & Kim, M. (2024). It is like a friend to me: Critical usage of automated feedback systems by self-regulating English learners in higher education. Australasian Journal of Educational Technology. https://doi.org/10.14742/ajet.8821
31. Melvina, N., Lengkanawati, N. S., & Wirza, Y. (2021). The use of technology to promote learner autonomy in teaching English. Advances in Social Science, Education and Humanities Research/Advances in Social Science, Education and Humanities Research. https://doi.org/10.2991/assehr.k.210427.048
32. Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for Systematic Reviews and Meta-Analyses: the PRISMA statement. PLoS Medicine, 6(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097
33. Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B. T. (2022). Ethical principles for artificial intelligence in education. Education and Information Technologies, 28(4), 4221–4241. https://doi.org/10.1007/s10639-022-11316-w
34. Onozawa, C. (2010). Promoting autonomy in the language class: How autonomy can be applied in the language class. 共愛学園前橋国際大学論集, 10, 125–139. https://gair.media.gunma-u.ac.jp/dspace/bitstream/10087/7216/1/2010-onozawa1.pdf
35. Oxford, R. L., & Nyikos, M. (1989). Variables affecting choice of language learning strategies by university students. The Modern Language Journal, 73(3), 291-300.
36. Özçelik, N. P., & Ekşi, G. Y. (2024). Cultivating writing skills: the role of ChatGPT as a learning assistant—a case study. Smart Learning Environments, 11(1). https://doi.org/10.1186/s40561-024-00296-8
37. Pati, D., & Lorusso, L. N. (2017). How to write a systematic review of the literature. HERD, 11(1), 15–30. https://doi.org/10.1177/1937586717747384
38. Patty, J. (2023). The use of AI in Language Learning: What you need to know. Jurnal Review Pendidikan Dan Pengajaran, 7(1). https://journal.universitaspahlawan.ac.id/index.php/jrpp/article/view/24609
39. Pokulevska A. I. (2018). Experience of using skype as a means of foreign languages teaching efficiency improving. Inf. Technol. Learn. Tools 68, 155–165. doi: 10.33407/itlt.v68i6.2150

40. Ramirez, E. a. B., & Esparrell, J. a. F. (2024). Artificial intelligence (AI) in Education: Unlocking the perfect synergy for learning. Educational Process: International Journal, 13(1). https://doi.org/10.22521/edupij.2024.131.3
41. Reinders, H., & Benson, P. (2017). Research agenda: Language learning beyond the classroom. Language Teaching, 50(4), 561–578. https://doi.org/10.1017/s0261444817000192
42. Richards, J.C., & Schmidt, R. W., (2010). Longman dictionary of language teaching & applied linguistics (4th Ed). Harlow: Pearson Education Limited.
43. Seo, K., Tang, J., Roll, I., Fels, S., & Yoon, D. (2021). The impact of artificial intelligence on learner–instructor interaction in online learning. International Journal of Educational
44. Technology in Higher Education, 18(1). https://doi.org/10.1186/s41239-021-00292-9
45. Song, B., & Xiong, D. (2023). A comparative study of the effects of social media and language learning apps on learners' vocabulary performance. Asia Pacific Education Review/Asia Pacific Education Review. https://doi.org/10.1007/s12564-023-09871-z
46. Wang, C. (2024). Exploring Students' Generative AI-Assisted Writing Processes: Perceptions and Experiences from Native and Nonnative English Speakers. Technology, Knowledge and Learning. https://doi.org/10.1007/s10758-024-09744-3
47. Wei, L. (2023). Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning. Frontiers in Psychology, 14. https://doi.org/10.3389/fpsyg.2023.1261955
48. Wei, L. (2023). Artificial intelligence in language instruction: impact on English learning achievement, L2 motivation, and self-regulated learning. Frontiers in Psychology, 14. https://doi.org/10.3389/fpsyg.2023.1261955
49. Xia, Q., Chiu, T. K. F., Chai, C. S., & Xie, K. (2023). The mediating effects of needs satisfaction on the relationships between prior knowledge and self-regulated learning through artificial intelligence chatbot. British Journal of Educational Technology, 54(4), 967–986. https://doi.org/10.1111/bjet.13305
50. Xiaolei, S., & Teng, M. F. (2024). Three-Wave Cross-Lagged model on the correlations between critical thinking skills, Self-Directed learning competency and AI-Assisted writing. Thinking Skills and Creativity, 52, 101524. https://doi.org/10.1016/j.tsc.2024.101524
51. Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. Computers and Education. Artificial Intelligence, 2, 100025. https://doi.org/10.1016/j.caeai.2021.100025