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ORIGINAL RESEARCH PAPER

Reducing English speaking anxiety through voice-based AI chatbots: Evidence from classroom implementation

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Abstract

This study investigates the effectiveness of voice-based AI chatbots, such as C-AI, Parlalingo, and Copilot in reducing foreign language classroom anxiety among English Language Education students. Speaking anxiety remains a major barrier to students' willingness to communicate, particularly in EFL contexts where opportunities for authentic interaction are limited and fear of negative evaluation is high. Hence, this research aims to examine whether incorporating voice-based AI chatbots over a ten-week period can significantly reduce students' anxiety levels. A quantitative pre-experimental design was employed involving 33 students. Before conducting pre-test and post-test, data were collected using an adapted version of the Foreign Language Classroom Anxiety Scale (FLCAS). Descriptive statistics, Shapiro–Wilk normality test, and paired-samples t-test were used to analyse the data. The results showed that the mean anxiety score declined from 3.31 (SD = 0.37) in the pre-test to 3.03 (SD = 0.38) in the post-test. The paired-samples t-test showed that this decrease was statistically significant ($p < .001$) with a moderate-to-large effect size (Cohen's $d = 0.74$). However, challenges such as occasional technical problems and the need to verify AI-generated responses were also described. Overall, the findings suggest that voice-based AI chatbots have the potential to reduce speaking anxiety and foster positive learning experiences. This study highlights the promising role of voice-based AI chatbots in supporting both affective and pedagogical aspects of language learning. Further study employing more rigorous experimental designs is recommended to establish their effectiveness more conclusively.

Keywords: anxiety reduction, English language learning, foreign language classroom anxiety, voice-based AI chatbot

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INTRODUCTION

In English as a Foreign Language (EFL) contexts, the speaking competence allows learners to take part in meaningful interaction and to use language for authentic communication. Improving speaking competence is therefore a crucial goal of language education since it helps learners improve not only fluency, but also accuracy and confidence when having conversation in English (Xin & Derakhshan, 2025; Leong & Ahmadi, 2017). For university students in English Language Education Study Program, good speaking skill is significant because they are intented to use English actively in group discussions, academic presentations, and professional communication. According to Rose and Galloway (2019), the use of English as lingua franca is highly needed to face the global and professional environment. However, even though English has been learnt in five or more years years by students from elementary school until senior high school, they still have problem especially in vocabulary, pronunciation, grammar, and confidence in speaking skills and these all issues can affect their oral communication both in formal and informal way

(Zhang & Huang, 2024). Therefore, improving students' speaking ability becomes a main issue in English language education and teachers need to adjust their teaching methods and techniques by combining various technology in classes.

In Indonesian higher education context, the problems related to Foreign Language Speaking Anxiety (FLSA) are quite visible. Based on a survey conducted by Daflizar (2024) with a total of 87 students from three different higher education institutions, students felt anxious in several situations and most of them being moderately anxious. Another study was conducted by Herusatoto and Nurtia (2025) by observing and interviewing 20 students in one university in Yogyakarta. They found that the majority of the students found themselves feeling afraid and worried because of being watched and they already had bad experience in the past. The other causes that make students feel anxious are shyness, lack of motivation, lack of confidence, limited vocabulary, lack of preparation and grammatical error.

Some studies have investigated the factors that can cause of speaking anciety in class. Bo et al. (2022) mentioned that the use of traditional pedagogical approaches which put too many emphasize on grammar and vocabulary would reduce their opportunity to have speaking practice. Besides, peers' discussion, classroom practices and teacher-led instruction are not always effective in helping students with high level of FLSA (Ding & Yusof, 2025). These techniques, in fact, often make students feel anxious and afraid of making mistakes (MacIntyre, 2017; Renandya & Nguyen, 2022). Teachers pedagogical and technological competence also becomes one main major in determining students speaking skills. Therefore, teachers need to modify their teaching approach and start to adapt new approach by implementing current technology like AI-powered chatbots which are helpful to address FLSA (Xin & Derakhshan, 2025; Wang et al., 2024).

To address this psychological barrier, voice-based AI chatbots has been noticed by many educators to improve students speaking skills. Ding and Yusof (2025) through their mixed-method study mention that voice-based AI chatbots are effective to enhance L2 learners' fluency, pronunciation, grammar, motivation and to mitigate FLSA. According to Halimah et al. (2026), voice-based AI chatbots could help learners to conduct a continuous speaking practice with non-judgmental environment. Similar ideas are also stated by Muniandy and Selvanathan (2025) who found that talking with voice-based AI chatbots like Google Assistant would provide students safe space and they can make mistakes and do some more attempts without feeling embarrassed like when they fail in front of a human audience. Hence, it has lower pressure that could allow learners with FLSA to make mistakes and receive instant feedback without fear of negative evaluation from their instructors or their peers (Tai & Chen, 2023). As a result, voice-based AI chatbots have been considered as practical and effective tools to reduce the affective barriers when enhance learners L2 oral development.

In the last decade, there has been some improvement in English Language Teaching (ELT) world especially in terms of the technology use. For example, there is a shift from Computer Assisted Language Learning (CALL) to Mobile-Assisted Language Learning (MALL) which enables students to use their smartphones in learning activity (Kukulska-Hulme, 2020). However, the development of AI has now shown a big change in the role of technology in language learning which later initiates a term called AI-Assisted Language Learning (AIALL). The integration of AI into language learning has brought several positive impacts such as enhanced motivation, better personalized learning experience, and also enriched feedback (Wei, 2023). A more current trend called Chatbot-Assisted Language Learning (CALL) is growing and it is possible to make them speak to live agent (Zhang & Huang, 2024). The speech detection technology enables students to conduct a speech interaction (Adamopoulou & Moussiades, 2020). This transition shows that students become more active in the way they practice the language.

The use of AI in ELT has given positive impacts. For example, Puspadnyani et al. (2026) found that ChatGPT as one of generative AI tools could increase students' confidence and develop their

writing skills. Similarly, Widhiatama and Brameswari (2026) investigated that the use of chatbots as digital media could enhance students' speaking skills, including their critical thinking, which eventually can develop their awareness about environmental problems. However, most of the studies are focused heavily on text-based ChatGPT interactions and the impact on the use of voice-based AI chatbots still remained under-explored. Secondly, studies that talked about the comparisons between different types of voice-based AI chatbots, such as Parlalingo, Copilot, and C-AI, on their effectiveness in reducing speaking anxiety were still rarely found. Thirdly, there is a methodological gap, as few studies employed mixed method approach in Indonesian context. Qualitative data to explain the students' challenges when using voice-based AI chatbots is also needed.

Despite these impressive technological advances, FLSA still becomes the main barrier to oral proficiency for many students. Wang et al. (2024) explains that students become more anxious when their performance are being assessed. As explained by MacIntyre and Gregersen (2012), that situation can stimulate the rise of affective filter and later would hinder their ability to process input and produce output. Interpersonal communication in classroom could worsen the affective constraints since direct presence of teachers and learners might trigger social pressures, thereby learners' affective filters raise, leading to a reduction in their willingness to communicate (Krahnke & Krashen, 1983; MacIntyre et al., 1998). These affective constraints, based on Tai and Chen (2023), could reduce students' participation in speaking activity and also their fluency. Overcoming FLSA becomes an important agenda to improve students' L2 speaking outcome.

Therefore, this study is intended to fill these research gaps by investigating the effectiveness of voice-based AI chatbots or also known as chatterbot or conversational bot (Shawar & Atwell, 2007) that has an ability to chat using text or voice with human (Chen et al., 2022) in reducing FLSA. As many as 35 students of English Language Education coming from a private university in Yogyakarta were involved in this study. From this study, we attempt to answer two research questions: (1) How effective is voice-based AI chatbots in lowering down the students' anxiety level? and (2) What are the students' challenges in using voice-based AI chatbots in integrated listening and speaking class? The findings of this study would be used as recommendations for lecturers on how to incorporate AI tools, especially voice-based AI chatbots, into their curriculum. Besides, this study is expected to provide pedagogical solutions related to FLSA and improve the quality of instructions in speaking class.

RESEARCH METHOD

This study employed sequential explanatory mixed-method design. There were two sequential phases, the first is quantitative phase and the second is qualitative phase which deals with personal experience (Creswell, 2013). The quantitative method was used to investigate the effectiveness of voice-based chatbots use in reducing the student speaking anxiety when talking in English and the qualitative one is used to find out students' perceptions in using voice-based AI chatbots in speaking class. The changes of students' anxiety level were measured by quantitative method, while the students' personal thoughts about the use of voice-based chatbots were explored using qualitative one. All participants were given their informed consent before the data collection process began.

Participants in this study were 33 students of English Language Education Study Program who took Integrated Listening and Speaking class in the even semester of 2025/2026 academic year at one private university in Yogyakarta. This course aims to develop students' ability to understand spoken English and respond effectively in various communication contexts. Through this class, students were intended to have better fluency, pronunciation, critical thinking, and confidence through interactive and real life-communication assignment. Purposive sampling technique was applied to choose the participants who were the active users of some voice-based

AI chatbots such as Parlalingo, Copilot, and C-AI for conversation purposes. In this class, they may use their smartphones or laptop (See Figure 1). They chose their chatbots based on ease of use and personal convenience. To make sure that all students have worked on the given task, all the conversation with the voice-based AI chatbots were recorded and uploaded into Youtube and the link will be sent to the lecturer in each week. The worksheet will also be scanned or captured and submitted through a Google drive folder.

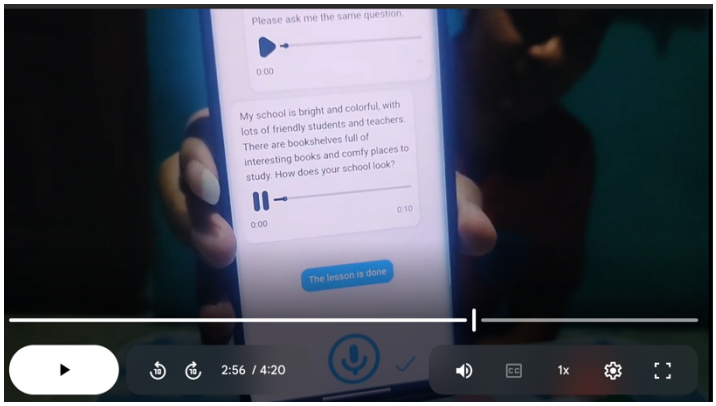

Figure 1. One of the student's activities when they are talking with voice-based AI chatbot.

The intervention was done in 10 meetings. At the first week, the lecturer introduced the course to students. And then, FLSA questionnaire was given to students in order to gain their initial level of anxiety as a pre-test. In the second until twelfth week, students were introduced to the use of voice-based AI chatbots such as C-AI, Parlalingo, and Copilot. They had flexibility to use which AI tool they found most applicable on their gadget. Afterwards, the researcher as the lecturer explained how to use some voice based chatbots so no one would have a problem in the future. Starting from week 2 until week 12, the students were also given a specific topic to discuss, for example about preserving environment. Before asking the chatbots, there were several open-ended questions that students needed to answer by themselves first. Once they filled in with their answers, students were supposed to ask the same questions to chatbots using their voice. Student had to write chatbots' answers and write them on provided space in the worksheet. And then, they would ask chatbots to ask them back with the same questions. In the thirteenth week, students were required to fill in FLSA again as the post-test which results would be compared to the pre-test. The complete implementation plan is given in Table 1.

This study was conducted in two phases, quantitative and qualitative phase. In quantitative phase, Foreign Language Classroom Anxiety Scale (FLCAS) was used to measure the speaking anxiety level. It was developed by Horwitz et al., (1986) and has been proven to have high reliability which was seen from its great internal consistency and stability across different context. FLCAS was actually used to measure FLSA and it was reported to possess 0.93 Cronbach Alpha that shows a relatively high internal consistency. As for the FLCAS invented by Elaine K. Horwitz, there is no standardization of the score cut-off for classifying the respondents' anxiety levels as low, moderate, or high. The test tool has been made to assess foreign language anxiety levels through the scale where those who have higher total scores mean they have higher foreign language anxiety level. In this case, the difference between pre-test and post-test mean scores will be analyzed. For the interview phase, up to seven students were interviewed using semi-structured interview to gain their opinion about the application of voice-based AI chatbots for Integrated Speaking and Listening course.

Table 1. Implementation plan

Weeks	Research Action	Data Collection
1	Introducing students to the course and conducting a pre-test.	Pre-test
2	- Introducing students to voice-based AI chatbots. - In-class activities. - Home assignment: Having a discussion with voice-based AI chatbots upon a certain topic.	-
3-6	- In-class activities (listening practice and peer discussion). - Home assignment: students engage in discussions with voice-based AI chatbots on a specific topic guided by the worksheet.	-
7	Mid test There was an assignment to have a discussion with AI-based chatbots.	-
8-12	- In-class activities (listening practice and peer discussion). - Home assignment: students engage in discussions with voice-based AI chatbots on a specific topic guided by the worksheet.	-
13	- Final presentation preparation. - Interviewing students to gain the challenges they faced while using voice-based AI chatbots.	Post-test Interview
14	Final presentation preparation.	-
15	Final presentation performance.	-
16	Final presentation performance.	-

Quantitative data were processed using SPSS software to discover the significance of voice based chatbots in reducing student's speaking anxiety in classroom. A paired-samples t-test was implemented to compare FLCAS score prior and after the intervention. The intervention is considered potentially effective if (1) there is a statistically significant decline in anxiety scores ($p < 0.05$), and (2) the post-test mean score is lower than the pre-test mean score. In addition, effect size (Cohen's d) is calculated to determine the magnitude of the effect. Meanwhile, the qualitative data were analyzed through thematic analysis. This step was started by doing systematic coding of interview transcripts and identifying the recurring themes that reflect students' perceptions and experiences.

RESULTS AND DISCUSSION

The main purpose of this study was to investigate the effectiveness of voice based chatbots in reducing speaking anxiety and also the challenges that students face during the activities using voice-based chatbots. There are two research questions that are discussed in this study. First, whether it is effective to use voice based chatbots to lower down the level of speaking anxiety. Second, the challenges in that the students face in while using voice-based chatbots in Integrated Speaking and Listening Learning class.

Voice-based chatbot reduces the students' FLSA in English Classroom

The first research question deals with the effectiveness of voice based chatbots in reducing the students' foreign language speaking anxiety. In order to explore this, a paired samples t-test was conducted prior to using voice-based AI chatbots and after using them. Table 2 shows the sample size (N), mean scores, standard deviation (SD), standard error (SE) and coefficient of variation (CV).

Table 2. Descriptive statistics of FLCAS scores

Variable	N	Mean	SD	SE	Coefficient of Variation (%)
Pre-test	33	3.31	0.37	0.06	11.18
Post-test	33	3.03	0.38	0.07	12.54
Mean Reduction	–	0.28	–	–	–

Table 2 shows the descriptive statistics of students' FLCAS scores before and after the lecturer taught the students using voice-based AI chatbots. The mean of anxiety score declined from 3.31 (SD = 0.37) in the pre-test to 3.03 (SD = 0.38) in the post-test. This reduction of 0.28 points indicates a downward change in students' foreign language speaking anxiety following the intervention. In order to provide additional context regarding the extent of change, the decrease by 0.28 on a scale of five suggests that there was a decline in the anxiety levels among the students. In determining the significance of this result, it is also important to consider the effect size (Cohen's d).

The relatively similar standard deviations at both measurement points showed that the spread of anxiety scores remained stable. In other words, the decrease was not driven by a few extreme outliers but occurred consistently among students. The coefficient of variation (11.18% and 12.54%) also shows a moderate level of homogeneity in the distribution of data. To conclude, these descriptive results indicate initial evidence that the implementation of voice-based chatbots helped reduce students' speaking anxiety levels.

The Shapiro-Wilk test was conducted to examine the assumption of normality before implementing the paired-samples t-test (See Table 3).

Table 3. Shapiro-Wilk normality test of FLCAS scores

Variable	W	df	Sig. (p)
Pre-test	0.96	33	0.29
Post-test	0.97	33	0.41
Difference scores	0.97	33	0.38

Table 3 showed the Shapiro-Wilk test results for pre-test (p = 0.29), post-trest (p = 0.41), and the difference scores (p = 0.38) were all greater than the significance level of α = 0.05. It means that the data did not substantially deviate from normal distribution. As the normality assumption was fulfilled, it was acceptable to continue with a parametric analysis using paired-sample t-test.

In order to verify whether the reduction in anxiety scores was statistically substantial, a paired-sample t-test was conducted (See Table 4).

Table 4. Paired-sample t-test of FLCAS scores

Comparison	Mean Difference	SD Difference	t	df	Sig. (2-tailed)	Cohen's d	Hedges' g
Pre vs. Post tests	0.28	0.32	4.97	32	< .001	0.74	0.72

The paired-samples t-test showed a significant reduction in FLCAS scores after the intervention, t(32) = 4.97, p < .001. This indicated that the reduction in anxiety from the pre-test to the post-test did not occur by chance. The effect size analysis revealed a Cohen's d of 0.74 and Hedges' g of 0.72, indicating a medium-to-large effect based on commonly accepted criteria (0.2 = small, 0.5 = medium, 0.8 = large). This implies that the intervention made a practically significant upgrading in students' anxiety levels.

Challenges in using voice-based AI chatbots in integrated speaking and listening learning class

The qualitative analysis of students' open-ended responses was conducted using thematic analysis method by (Braun & Clarke, 2006). This method was used for identifying, analyzing, and reporting patterns (themes) within data. Using this thematic analysis, the researcher found several challenges influencing their use of voice-based AI chatbots for English speaking and listening practice. The answers were coded and grouped into seven major themes: (1) lack of

awareness and knowledge, (2) preference for alternative learning methods, (3) psychological barriers, (4) technological and infrastructure constraints, (5) perceived limitations of AI systems, (6) language proficiency barriers, and (7) situational or contextual constraints. These themes reflect both internal and external factors affecting students' adoption of AI-mediated speaking tools.

Lack of awareness and knowledge

The major visible theme identified from the data was students' lack of awareness regarding the existence and educational use of voice-based AI chatbots. Many participants reported that they had never used such tools due to their limited understanding that those voice-based AI chatbots could be used for language practice.

S6 : Because I didn't know that voice-based AI chatbots exist as a tool to practice.
S33 : I only found out after this class; before that I didn't know there were applications that could be used to practice speaking.

This finding suggested that students were not resistant to technology but they lacked resources and information to relevant tools and guidance on their educational potential. Previous studies point out that awareness and digital literacy were important predictors of technology implementation in educational settings (Schacter & Fagnano, 1999). Similarly, research on AI chatbots in language learning showed that students often demanded structured directions before recognizing their usefulness for communication practice (Zhang & Huang, 2024).

Preference for alternative or conventional learning methods

Another important theme was students' preference for well-known learning strategies, such as watching movies, listening to music, joining courses, interacting with peers or native speakers, and using text-based applications. Some students also reported feeling more happy typing rather than speaking to voice-based AI chatbots.

S6 : I usually practice through music and films.
S33 : I prefer communicating directly with people, such as friends or native speakers, because it feels more natural.

This preference reflects well-developed learning habits and perceptions of authenticity in human interface. Learners often consider talking to real people more natural and meaningful than interacting with automated systems (Fryer et al., 2020). Besides, their past experiences significantly influence willingness to adopt new learning technologies (Stockwell & Reinders, 2019). The findings therefore suggest that integrating voice based chatbots with existing learning practices may support better adoption.

Psychological barriers: Confidence and anxiety

Psychological factors were also apparent, particularly low confidence, fear of making mistakes, and speaking anxiety. Several students expressed distress when speaking English through voice based-chatbots which might indicate the presence of foreign language speaking anxiety.

8

S22 : I am not confident and afraid of making mistakes.
S26 : I didn't know about voice chatbot applications, and I also felt less confident speaking English without guidance.

This result was similar to research showing that anxiety significantly reduces learners' willingness to communicate in a second language (Dewaele & MacIntyre, 2014). However, the use of technology such as AI in classrom setting may also diminish anxiety by providing personal, low-pressure practice opportunities without fear of negative feedback (Tai & Chen, 2023). Therefore, while anxiety at the first place prevented students from using voice-based AI chatbots, structured pedagogical use may convert the technology into a tool that reduces anxiety over time.

Technological and infrastructure constraints

Students reported that they often face several technical challenges like device limitations both on their smartphone or on their laptop, malfunctioning microphones, limited data quotas, unstable internet connections, and slow system responses.

S10 : I rarely use the voice feature because my laptop no longer supports the microphone.
S29 : "There were technical problems because the signal was not stable."

Some participants also faced contextual limitations, such as institutional or dormitory restrictions on device usage. These findings underlined the importance of technological readiness in employing AI-based learning tools. Unequal access to devices and problems in connectivity becomes a common issue in technology-enhanced language learning, particularly in developing contexts (Hockly, 2015; Kukulska-Hulme, 2020). Without sufficient and proper infrastructure support, the potential benefits of voice-based AI technologies may not be fully accomplished.

Perceived limitations of AI systems

Some students felt doubtful regarding the accuracy, sensitivity, or naturalness of voice-based AI chatbots interactions. Some comments of miscommunication, slow responses, or interruptions during conversations decreased their trust in the technology.

S2 : Sometimes the AI answers do not match the questions, so I prefer learning through films and music.
S17 : The chatbot cut off my speech and the loading was very slow.

Students' trust in system quality became one of the crucial factors of AI adoption. Research proved that learners' engagement and enjoyment in using conversational platforms were greatly affected by their trust and their perception of natural conversation quality (Fryer et al., 2020; Zhang & Huang, 2024). Therefore, leveraging user experience and system responsiveness may enhance students' approval of voice-based chatbots.

Language proficiency barriers

Several participants admitted that they avoided using voice-based AI chatbots because they felt their English proficiency was not good. Some factors that reduced their speaking confidence were limited vocabulary, pronunciation difficulties, and lack of fluency.

S8 : I am not fluent in English yet and still do not know many vocabulary words.
S16 I have difficulty speaking English, especially pronunciation.

This finding resonated with research on second language learning including a study by Saito and Akiyama (2017) who found that learners who had proficiency problem might encounter higher cognitive load during conversational tasks. These conditions may lead in avoidance

behaviors. Providing structured guidance and scaffolding were therefore crucial when implementing AI-enhanced speaking activities to beginners.

Situational and contextual constraints

Some students responded that situational obstacles such as time limitatations, competing responsibilities, institutional regulations prohibiting gadget usage, or lack of prior requirement to use voice-based chatbots or other AI tools.

S4 : I live in a dormitory where using a phone is not allowed.
S10 : I have other activities, so I do not have enough time to practice.

These contextual considerations showed that adoption was affected by both individual preparedness and also by environmental conditions. According to research on technology adoption, external facilitating conditions greatly affect users' behavioral intentions and actual technology usage (Venkatesh et al., 2012). Thus, integrating voice-based AI chatbots, such as Copilot, Parlalingo, and C-AI into learning activities and offering institutional support could enhance student engagement.

CONCLUSION

Overall, this study provides empirical evidence that the use of voice-based AI chatbots, when it is combined in individual speaking activities in 5 interventions, could reduce students' speaking anxiety in classroom in a significant way. This performance was measured using FLCAS instrument designed by Horwitz et al. (1986). There were three AI applications that students used such as C-AI, Copilot, and Parlalingo and they are free to use. This finding also shares valuable evidence that voice-based AI chatbots could be an alternative for teachers who find that speaking anxiety is the main problem in classroom.

Responding to the challenges faced by students, suggestions could be proposed to make better integration of voice-based AI chatbots in classroom. First, sequential training on how to use voice-based AI chatbots needs to be implemented in classes in order to minimize the technological barriers. Second, teachers need to introduce voice-based AI chatbots using simple activity in classroom, such as free talk, interviewing AI, and so on. This activity would reduce the anxiety in using AI tools. Third, teachers have to strengthen the pedagogical aspects in the activities to make the learning more meaningful. As a final point, teachers also need to develop their skills in integrating technology in class without having to wait for a training (Mali, 2025). Teachers can start from their own classes by support of other teachers or stakeholders.

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DECLARATION

Author contribution

All authors contribute in the research and/or writing the paper, and approved the final manuscript.

Daniel Ari Widhiatama	Conceptualizing the research idea, leading the investigation, setting up the methodology, analyzing the data, and writing the original draft.
Elysa Hartati	Assisting the investigation, reviewing the validity of the methodology, supervising the data collection, analyzing the data, and writing the original draft.
Lu'luil Maknun	Contributing to data curation, supporting the data analysis process, validating the research findings, reviewing and editing the manuscript, and assisting in the overall project administration.

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Conflict of interest
All authors declare that they have no competing interests.

Ethics declaration
We as authors acknowledge that this work has been written based on ethical research that conforms with the regulations of our institutions and that we have obtained the permission from the relevant institutes when collecting data. We support the International Journal on Education Insight (IJEI) in maintaining the high standards of personal conduct, practicing honesty in all our professional practices and endeavors.

The use of artificial intelligence
We do not use any generative AI tools to write any part of this paper.

Additional information
Not available.

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