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## The Impact of Amazon Alexa on Listening and Speaking Skills in EFL Higher Education Students

**El impacto de Amazon Alexa en la comprensión auditiva y expresión oral en estudiantes de inglés de educación superior**

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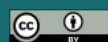
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## Resumen

Este estudio aborda el uso de herramientas de inteligencia artificial para el desarrollo de las habilidades de comprensión auditiva y expresión oral en estudiantes universitarios de inglés como lengua extranjera. El objetivo fue determinar la efectividad del uso de Amazon Alexa para mejorar la escucha, el habla y la motivación en estudiantes de nivel A1–A2. Se utilizó un diseño cuasi-experimental cuantitativo con pretest y posttest, con 50 estudiantes. Los datos se recolectaron mediante pruebas de desempeño y un cuestionario de motivación, y se analizaron con el método matemático-estadístico. Los resultados individuales de los participantes evidenciaron mejoras significativas en comprensión auditiva en estudiantes con bajo rendimiento en los pre-tests, mientras que la expresión oral no presentó cambios significativos. Se concluye que la herramienta es eficaz para habilidades receptivas, pero su impacto es limitado para las productivas.

**Palabras clave:** Alexa; escuchar; hablar; educación superior; inteligencia artificial.

## Abstract

This study addresses the use of artificial intelligence tools for developing listening and speaking skills in university students learning English as a foreign language. The objective was to determine the effectiveness of using Amazon Alexa to improve listening, speaking, and motivation in A1–A2 level students. A quantitative quasi-experimental design with pre-test and post-test was employed, involving 50 students. Data was collected through tests and a motivation questionnaire and analyzed using the mathematical-statistical method. The individual results of the participants showed significant improvements in listening comprehension among students with low pre-test performance, while speaking skills did not show significant changes. It is concluded that the tool is effective for receptive skills, but its impact on productive skills is limited.

**Keywords:** Alexa; listening; Speaking; Higher education, Artificial Intelligence.

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## 1. Introducción

The English language is continually being presented with new obstacles and new paths to take in the digital age and has been established as an integral part of the global academic, professional, and cultural environment. It's not uncommon for students to have difficulties with learning English as a foreign language, particularly when it comes to listening and speaking skills; many students will demonstrate insufficient progress in these areas

(Crompton et al., 2024). To address these challenges, artificial intelligence (AI) has recently been introduced into the teaching of the English language as an innovative method of supporting language teaching and learning. For example, in many settings—especially China—AI is regarded as a key resource for improving English language learning outcomes (Hsu et al., 2021). Current research also indicates that AI provides significant resources for the

development of students' English language skills and promotes effective teaching practices in English language pedagogy (Peña-Acuña & Corga Fernandes Durão, 2024).

Several studies have recently shown how helpful AI can be for teaching and learning English. For example, a meta-analysis reported that using AI-based tools in academic settings has shown a significant improvement in oral expression for all learners (Jantakoon *et al.*, 2025). Other systematic reviews have found that online learning through AI-based systems improves student motivation and pronunciation and reduces the anxiety of learning a second language (Vančová, 2023). In addition, voice recognition systems, which provide real-time and immediate feedback about how well one is pronouncing something, have also shown to positively affect speaking ability (Chen *et al.*, 2022). Evidence from experimental studies of younger students suggests that virtual assistants have improved both listening and speaking skills and may also promote participation and motivation during the learning process (Alqarni & Alhramelah, 2025). These studies provide evidence that AI improves teaching and learning by creating interactive and supportive environments for all learners.

Virtual assistants have become important tools in helping teach and learn languages; some of these assistants include Amazon Alexa and Google Assistant as well as Siri. A study showed that students who practiced speaking and pronunciation with Alexa (Amazon) during their university classes demonstrated substantial improvements in their spoken language when compared to a control group (Qiao & Zhao, 2023). Another study of the

qualitative nature indicated that engaging with Alexa increased students' motivation, their confidence levels and their ability to learn the English language, thus providing greater participation in their English language learning (Luria, 2024). A third study utilized a case study design and reported that students had very positive perceptions of Amazon Alexa and believed it was a very valuable and enjoyable tool for practicing the English language (Dizon *et al.*, 2022). Finally, research looking at the voice characteristics of Amazon Alexa's voice found that increased expressiveness and enthusiasm in Amazon Alexa's tone created less cognitive load on the individual and produced strong positive emotional responses; however, the amount to which these voice characteristics may have increased the student's motivation was not significantly different (Liew *et al.*, 2023).

In Ecuador, the use of AI is also growing in English language education. There are studies that show that the use of AI has resulted in significant improvements in some quantitative measures connected to education (Atencio & Criollo, 2025). A quasi-experimental study comparing high school students in Ecuador clearly indicates that students who used AI platforms scored better in language learning than those who received traditional instruction (Acosta & Bedon, 2025). This may be attributed to improvements in oral communication skills and access to immediate feedback, as well as new types of learning activities. However, challenges remain for both limited access to technology and insufficient teacher training for successful implementation (Gavilanes & Naranjo, 2024). Regardless of these limitations, the literature in the region supports

that if appropriate conditions exist, AI can improve the quality and accessibility of English language education (Fajardo-Ramos *et al.*, 2025).

Within this context, although both global and local research support the effectiveness of AI tools, empirical research on the use of Amazon Alexa in higher education in Ecuador remains limited. Therefore, this study aims to determine the effectiveness of integrating artificial intelligence through Amazon Alexa to strengthen listening and speaking skills as well as students' motivation in English leveling courses at Yachay Tech University.

## Materials and methods

The research was conducted using a mixed approach with a quasi-experimental pre-test and post-test design to obtain quantitative data for the analysis, as well as qualitative data from a survey designed to receive feedback and to collect students' perceptions on the use of Alexa. This design made it possible to compare the effect of using Amazon Alexa in the learning process on the development of listening and speaking skills, as well as motivation, before and after the implementation of Alexa. The research project was reviewed and approved by the research department of Yachay Tech University.

The study population consisted of 50 university students enrolled in the English leveling course at Yachay Tech University, which represents 30% of the total students enrolled in this level. The participants signed a letter of consent, and they were also informed about the activities and the rubrics to be used in the study. All students expressed their

willingness to participate, and students who withdrew from the course during the intervention period were excluded from the analysis. These criteria ensured that the final sample consisted only of students who fully met the study conditions.

The researchers designed activities for the use of Alexa in the classroom. These activities were created based on the content and syllabus for the leveling course, which corresponds to levels A1 and A2 according to the Common European Framework. The pre-test for listening included an A1 audio of two people talking about their personal interests and hobbies and a test with 10 questions about the audio with 10 maximum points. The post-test included an A2 audio about a person describing past activities on a holiday; the test had 10 questions with a maximum score of 10 points. To assess speaking and observe students' interaction with the device in class, the researchers created a rubric to assess the criteria of pronunciation, fluency, grammar, and vocabulary (to measure the accuracy in formulating questions) and the type of interaction of students with the device during the activities. This instrument had a score ranging from 0 to 5 for each criterion with a maximum of 25 points. The total score was then converted to a grade out of 10 points. This instrument was also used as pedagogical support to monitor students' participation and progress throughout the interaction with the device. All the instruments were reviewed and validated by other professors of this level to ensure the questions and the rubric aligned with the level requirements.

The period of intervention was from April 7th to August 4th, 2025. During this time, the researchers carried out

the listening and speaking activities previously designed, whose aim was to make students use the device. Among the activities, students had to ask questions about vocabulary or make requests (to play music, to tell a short story, or to translate words from Spanish to English); all the activities were conducted in class. A post-test for the listening and speaking test was applied to find any variation in means and scores after the intervention. In this way, variations in students' communicative performance could be observed, and descriptive comparisons between the results could be established. At the end of the period of implementation students completed a perception survey on the use of Alexa during the English classes.

The survey had five sections, and all the questions were in Spanish to ensure that all students understand what is being asked. The first section was about students' general experience with Alexa, the second section was about students' perceptions of their speaking with Alexa, and the third section was about listening. Each of these sections included 5 questions with a Likert scale. Additionally, there were open questions about the difficulties that the participants faced when using the device, the willingness to use the device in future classes, and some recommendations for future implementations.

The research was conducted with strict adherence to ethical considerations for research involving human participants. Student participation was voluntary, ensuring participant anonymity and confidentiality of the collected data. Likewise, efforts were made to ensure that the implementation of Alexa did not negatively affect students' regular academic performance.

## Results

Based on the pretest and posttest results for speaking and listening, missing values were imputed. The analysis was conducted using R statistical software, and the selected imputation method was Multivariate Imputation by Chained Equations (MICE) with Predictive Mean Matching (PMM). This approach ensures that imputed values remain within the observed data range (0–10). MICE is considered appropriate for small sample sizes, such as the present cohort of 50 students (Van Buuren & Van Buuren, 2012), and is preferred over k-nearest neighbors (KNN), which may produce biased significance estimates due to its deterministic nature (Little & Rubin, 2019). Additionally, MICE preserves relationships between variables in complex datasets, although it is computationally less efficient (Mohammed *et al.*, 2021).

The listening results for the complete dataset after imputation indicated a decrease from  $M = 7.1$  to  $M = 6.4$  ( $\Delta M = -0.70$ ), which was not statistically significant ( $p = .15$ ).

The speaking results for the complete dataset indicated a decrease from  $M = 8.1$  to  $M = 7.6$  ( $\Delta M = -0.50$ ), which was not statistically significant ( $p = .06$ ).

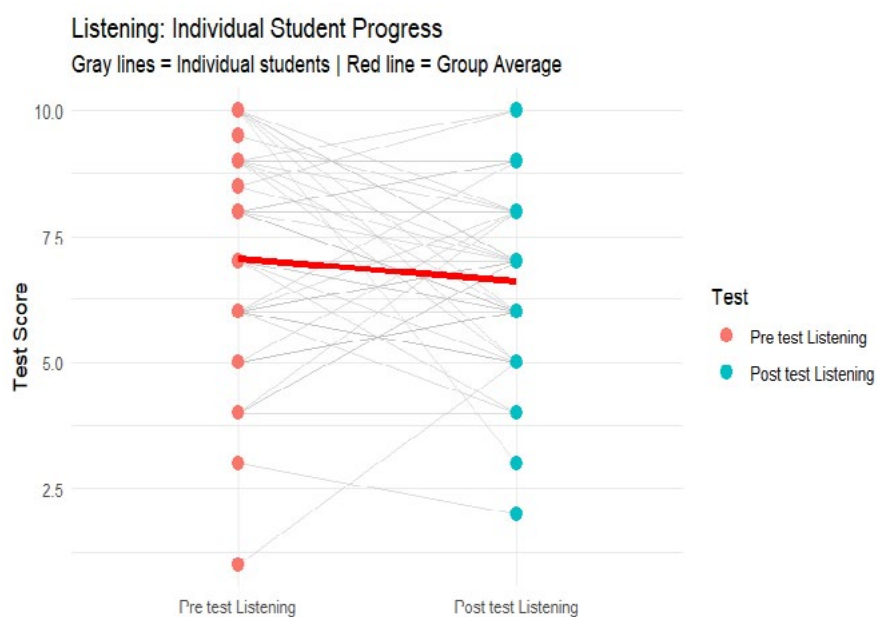
A visual analysis using parallel coordinates plots (Figure 1) was conducted to explore the unexpected decline in mean scores. The results indicate that the decrease in mean values was primarily driven by students with high pretest scores. This pattern suggests the presence of a ceiling effect, where participants with initial high performance had limited opportunity for further improvement. Consequently, these students tended to obtain lower or similar scores in the posttest, which may

have affected the overall mean and produced misleading aggregate results. In Figure 1, bold lines represent mean scores,

whereas lighter lines represent individual student trajectories.

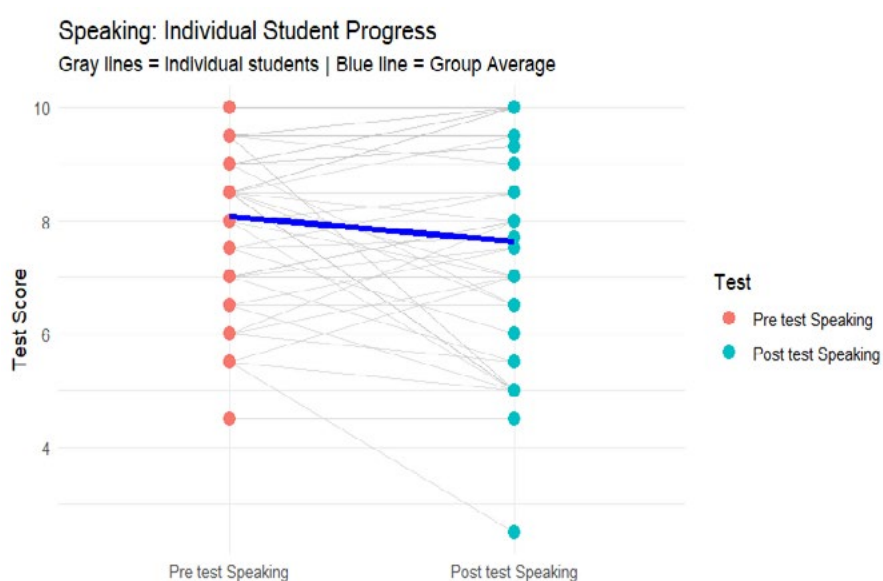
**Figure 1. a) Listening scores:**

*Parallel coordinates plots showing individual changes in listening and speaking scores from the pretest to the posttest.*



**Figure 1. b) Speaking scores:**

*Parallel coordinates plots showing individual changes in listening and speaking scores from the pretest to the posttest.*



To further examine the results, a one-way ANOVA was conducted to compare performance across groups defined by initial proficiency levels. Participants were categorized based on their pretest scores to account for the potential influence of ceiling effects observed in the overall results.

The analysis revealed differences in listening performance across proficiency groups. As shown in Table 1, no statistically significant change was observed for the full cohort ( $p = .152$ ). However, when participants were grouped by initial scores, the subgroup with pretest scores  $\leq 6$  demonstrated a statistically significant improvement (M gain = 1.09,  $p = .01$ ), indicating that gains were concentrated among lower-performing students.

These results indicate that the observed decline in overall mean scores was influenced by higher-performing students, whereas meaningful improvements were detected among learners with lower initial proficiency. This pattern is consistent with a ceiling effect, in which participants with initially high performance have limited opportunity for further improvement (Wang et al., 2008).

**Table 1.** Targeted gains in listening proficiency by initial proficiency group.

| Analysis | Group             | N Size | Mean Gain | P_Value |
|----------|-------------------|--------|-----------|---------|
| 1        | Full Cohort       | 50     | -0.47     | 0.15    |
| 2        | Pre-test $\leq 7$ | 26     | 0.61      | 0.11    |
| 3        | Pre-test $\leq 6$ | 21     | 1.09      | 0.01    |

As shown in Table 1, no statistically significant differences were observed in the full cohort ( $p = .15$ ). However, the subgroup with pretest scores  $\leq 6$  demonstrated statistically significant gains ( $p = .01$ ), indicating that improvements were concentrated among lower-performing students.

Using ANOVA, the speaking was not statistically improved across any of the groups that were seen in the listening part (Table 2).

**Table 2.** ANOVA results for speaking gains across proficiency groups.

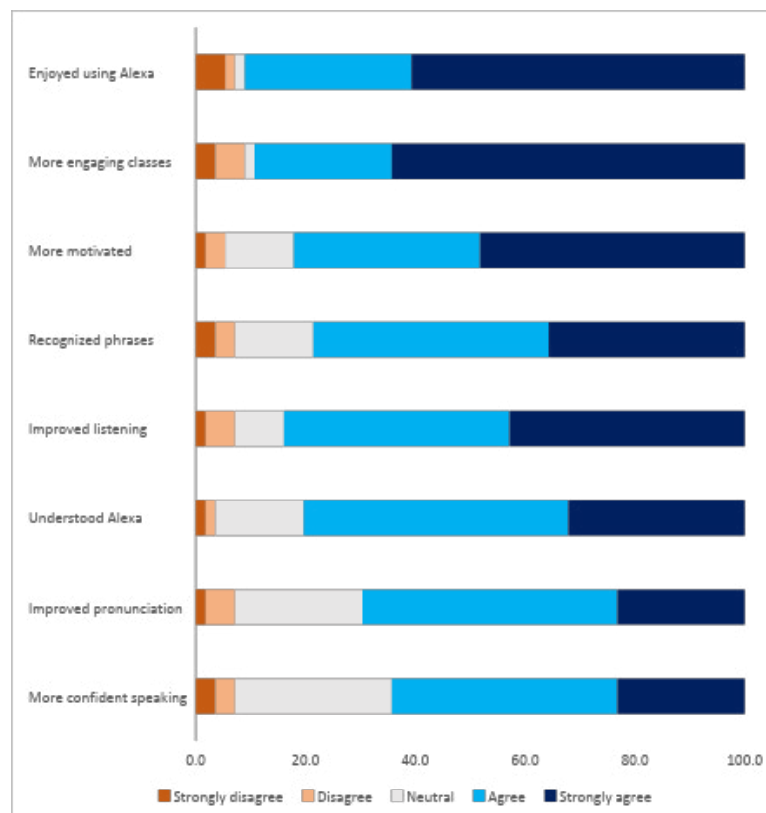
| Analysis | Group       | N Size | Mean Gain | P_Value |
|----------|-------------|--------|-----------|---------|
| 1        | Full Cohort | 50     | 0.02      | 0.85    |

As shown in Table 2, no statistically significant differences were observed in speaking performance ( $p = .850$ ), indicating that the intervention did not result in measurable improvements in this skill.

In figure 2, the perceptions of students about the use of Alexa in the English classes are presented. The distribution of responses across survey items is presented as follows.

**Figure 2**

*Students' perceptions of the use of Amazon Alexa in English classes (percentage of responses).*



A post-intervention perception survey (N = 56) indicated generally positive student attitudes toward the use of Amazon Alexa in the classroom. Most participants reported enjoying the use of the device and perceived that it increased engagement and motivation during English lessons. Participants also reported perceived improvements in listening comprehension, particularly in recognizing vocabulary and understanding spoken English. In contrast, responses related to speaking development were more varied, with fewer students reporting improvement in pronunciation and confidence. Most participants expressed willingness to continue using Alexa in future classes.

## Discussion

The findings of this study reveal a significant divergence between the development of receptive (listening) and productive (speaking) skills when Alexa from Amazon is used as a support tool in EFL teaching. While the intervention was highly effective for lower-proficiency learners in listening, these improvements were not observed in speaking. These results partially support previous studies on the use of voice assistants and AI in English teaching.

The significant improvement in listening among students with low grades suggests that Amazon Alexa worked effectively as a “one-to-many”

broadcasting tool, which is consistent with the findings of Hsu *et al.* (2021), who found that Alexa can help develop the listening skill through exposure to spoken input. Therefore, Alexa can be a helpful tool in a large classroom setting; all students can simultaneously receive high-quality linguistic input when the device speaks. The results also align with the work of Alqarni and Alhramelah (2025), who reported improvements among English students interacting with voice assistants. The present study extends to the Ecuadorian context, where similar studies in higher education are still scarce.

The positive impact on listening can be explained by the exposure of multiple learners at the same time to the spoken English. This is also consistent with research indicating that AI-based tools can enhance language learning through interactive and accessible input environments (Peña-Acuña & Corga Fernandes Durão, 2024; Vančová, 2023).

In contrast, the absence of a significant improvement in speaking differs from previous studies that reported a positive impact on this skill. For instance, Qiao and Zhao (2023) found that the use of AI systems for language learning helped university students develop their speaking skills. Jantakoon *et al.* (2025) also reported positive effects on speaking and listening. One possible explanation of this discrepancy is the implementation condition of the present study, which used a single Alexa device for a large group of students, which might have limited the opportunities for oral interaction; consequently, the participants of this study might not have received enough feedback, and the number of speaking

activities planned was not enough to have a measurable positive impact.

The perception survey also supports the motivational benefits associated with AI-based assistants reported by Luria (2024) and Dizon *et al.* (2022). Most students indicated that they enjoyed using Alexa during the English classes, and they consider the device to help the teacher to make the class more engaging and interesting. A large majority of students reported feeling more motivated to participate when it was time to use Alexa in the class. Most participants agreed that the device helped them improve their listening in terms of recognizing vocabulary and some grammar structures. These perceptions align with the quantitative findings of the present study, which revealed some gains among students who obtained low grades in the listening pre-test.

Most of the participants expressed their willingness to continue using Alexa in future English classes, which aligns with the findings of Qiao and Zhao (2023), who suggest that the device serves not only as an instructional tool but also as a motivational resource. However, despite these positive perceptions, the quantitative data indicate that while students may feel more confident and motivated when interacting with Alexa, to have measurable improvements in this skill, it is necessary to plan and carry out more speaking activities using the device. Future studies should consider the implementation of multiple devices and the increase in the number of speaking activities where students can use the device and receive feedback to improve their oral production.

## Conclusions

This study evaluated the effectiveness of using Amazon Alexa to enhance A1 and A2 university learners' listening and speaking. Evidence suggests that results from the use of Amazon Alexa as a tool to improve students' listening and speaking abilities vary according to their skill or level of proficiency and should consider the relevant statistical and contextual considerations.

The data analysis of the sample does not show statistically significant gains in speaking skills. As reported, there are slightly lower mean posttest scores than pretest scores for the listening skill; however, additional analysis shows that these reductions can be largely attributed to the existence of ceiling effects for participants who did better on the pretest and/or had very limited room for improvement from their original score. Therefore, the importance of considering factors beyond overall averages is critical when determining the effectiveness of instructional interventions.

One-way ANOVA tests and Tukey HSD analysis demonstrated data patterns that were undetectable from initial analysis. These patterns showed significant improvement in levels of listening skill for lower-level learners, especially those who had scores of 6 or below on the pretest. Therefore, an effective way of using Alexa to develop the receptive skill of listening for beginning learners can occur when there is consistent auditory exposure.

In contrast, there were no significant improvements in speaking across all proficiency levels. This would suggest limitations related to intervention design versus the actual technology itself.

Typically, speaking is an active skill that requires individual practice. Therefore, with one device in use, the students involved had limited active engagement and less total time speaking to practice their speaking ability.

The overall outcome of this research supports the fact that Amazon Alexa acts as an effective teaching device to help lower-level learners improve their ability to understand spoken English. However, due to limited opportunities for interaction and the use of devices, the effectiveness of Alexa in developing students' speaking skills is very limited.

It would be beneficial for future implementations to add more devices, revise classroom task structures so that students are able to interact with one another as much as possible, and develop more activities to support spoken language production. This research also emphasizes what appropriate statistical techniques to use for evaluating technological devices and tools used to support language learning in the classroom, such as reporting ceiling effects.

## Contribución de los autores

**J. P.:** Diseño del proyecto de investigación, recolección de datos, conclusiones.

**M.V:** Recolección de datos

**H.P.:** Recolección de datos

**K.R.:** análisis de resultados, discusión, revisión final.

## Aprobación del comité de ética y consentimiento para participar en el estudio

El proyecto de investigación cuenta con la revisión y la aprobación del departamento de investigación y del comité de ética

de la Universidad de Investigación de Tecnología Experimental Yachay Tech bajo el código DPI 24-10.

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