Developing Listening Skills Among English as a Second Language Learners Through AI-Generated Podcasts: A Quasi-Experimental Study

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https://doi.org/10.54855/callej.262722

Received: 15/10/2025 Revision: 17/04/2026 Accepted: 26/05/2026 Online: 26/06/2026

ABSTRACT

Developing listening comprehension remains a persistent challenge in secondary school ESL education, exacerbated by a lack of scaffolded, learner-centered listening materials. This quasi-experimental study investigated how repeated exposure to AI-generated English-language podcasts via Google NotebookLM impacts listening performance among junior secondary ESL learners in Sri Lanka. The study also explored learners' perceptions of using AI-generated podcasts to develop listening skills. Thirty purposively sampled Grade 9 students were divided into control (N-15) and experimental (N-15) groups. The experimental group interacted with customized NotebookLM podcasts prior to formal contact sessions. Paired-sample t-tests revealed a statistically significant improvement in the experimental group's listening performance after the intervention ($t(14) = -15.20$, $p < .001$), with a mean increase of 6.6 points ($SD = 1.68$) from pretest to posttest. Qualitative insights indicated that while native-speaker accents posed initial challenges, the automated podcasts enhanced vocabulary familiarity, pronunciation awareness, and self-directed learning. This study demonstrates the importance of AI-Generated Podcasts to bridge resource gaps in developing listening skills.

Keywords: Listening Skills, AI-Generated Podcasts, Google NotebookLM

Introduction

Listening is the primary receptive skill in any language. Human beings first begin to receive linguistic elements and the motivation to produce language through listening. Hence, it can be considered the foundational skill for communication and language acquisition. Being the earliest skill acquired in human language does not imply that listening is a simple process. It is not merely a process of hearing, but it further involves "identifying, understanding and interpreting spoken language" (Lewis, 1958, p.89). Definitions of listening have evolved significantly over time as our understanding of its complexity and the influence of external factors has deepened. It has evolved from "a passive act of receiving auditory information" (Devine, 1967, p.152) to a contemporary dyadic view which highlights the mutual relationship

CITATION | Sandamali, K. A. D. (2026). Developing Listening Skills Among English as a Second Language Learners Through AI-Generated Podcasts: A Quasi-Experimental Study. *Computer-Assisted Language Learning Electronic Journal (CALL-EJ), 27*(2), 23-45. DOI: https://doi.org/10.54855/callej.262722

between speaker and listener in an interpersonal context as "co-exploring the other with and for the other" (Kluger & Mizrahi, 2023, p.1). Listening functions in the same manner in the second language (L2) context and serves the function of the other core skills equivalent to first language (L1) (Nunan, 1997; Richards, 2008). Proficiency in listening is crucial in second-language learning, as it directly affects language development, comprehension, linguistic knowledge (vocabulary, grammar, pronunciation), and successful communication across a variety of settings. Additionally, it helps second-language learners communicate in everyday situations and develop their academic skills. (Gao & Wang, 2025; Goh, 2023; Graham, 2017; Marx et al., 2017; Vandergrift & Baker, 2015; Vandergrift, 2007). Compared with other language skills, listening receives less emphasis in both research and pedagogy, despite its critical importance (Ahmadi, 2016; Hogan et al., 2014; Osada, 2004). Therefore, Nunan (2002) introduces listening as a Cinderella skill in second language learning:

> Listening is the Cinderella skill in second language learning. All too often, it has been overlooked by its elder sister: speaking. For most people, being able to claim knowledge of a second language means being able to speak and write in that language. Listening and reading are therefore secondary skills – means to other ends, rather than ends in themselves. (p238)

This indicates that listening is often treated as a passive activity, which does not lead to production. Consequently, assessing and evaluating the development of listening skills is challenging (Buck, 2001; Field, 2008; Kormos et al., 2024). This causes language teachers to limit listening activities to playing an audio or reading a paragraph, rather than engaging students in comprehension-based activities on the audio or paragraph. These activities do not extensively focus on developing listening strategies or facilitating learners in developing their listening skills. This argument is further supported by Toapanta (2022), who states that such activities often do not focus on developing listening skills; instead, they function primarily as tools for assessing comprehension or facilitating learners with another type of activity. Furthermore, language teachers avoid investing time in listening practice due to limited resources or materials that provide authentic exercises. Lack of encouragement to engage in continuous practices in listening is also a pivotal issue. Xu et al. (2021) state that learners' listening self-efficacy is high when strategy-based and self-regulated instruction and practical listening strategies are provided. On the other hand, a lack of knowledge of listening strategies affects learners' low self-efficacy. In line with this, this current study emphasizes the importance of familiarizing learners with listening strategies and providing meaningful listening activities to support the development of L2 listening skills.

Structured and meaningful listening practices go beyond passive audio exposure. They should comprise both bottom-up (recognizing individual sounds, stress patterns, and syntactic cues) and top-down strategies (predicting content, inferring meaning, and using context) (Manihuruk & Sidabutar, 2022; Henderson, 2017). Metacognitive instructions, which enable the teachers to plan, monitor, and evaluate the listening process, also play a significant role in developing listening skills of L2 learners (Chin et al., 2017). When applying these strategies, language teachers encounter challenges in selecting authentic, meaningful, and level-appropriate materials that promote strategic engagement, especially in contexts with limited instructional

resources (Bozorgian & Shamsi, 2022). Podcasts, as a teaching-learning aid, help integrate authentic materials and engage learners in listening activities (Alm, 2013). Podcasts facilitate the development of L2 listening skills by providing multifaceted benefits for the learners. They support a variety of listening strategies and provide learners with opportunities to practice learning through repetition (Alm, 2013). They foster independent learning skills by promoting autonomous learning strategies, which lead to practical listening exercises outside the classroom (Bozorgian & Shamsi, 2022; Cross, 2014). Furthermore, they provide engaging and diverse listening content to enhance learners' listening comprehension, pronunciation, vocabulary, creativity, critical thinking, and, finally, speaking strategies (Besser et al., 2021; Ducate & Lomicka, 2009; Yu & Wen, 2024).

Although empirical studies emphasize the importance of traditional podcasts for developing listening skills, several limitations arise when integrating them into the teaching and learning process. One major limitation is the lack of customization. Language teachers usually borrow podcasts from different contexts. For example, some podcasts are adapted from native languages and cultural contexts, which can discourage L2 learners who cannot understand the context or the accent (Field, 2008). Some podcasts are not appropriate for learners' proficiency levels and are beyond their interest due to the formal, conventional language used (Rosell-Aguilar, 2013). The limitations of traditional podcasts can be effectively addressed through AI-generated podcasts, which can be customized and tailored to learners' proficiency levels (Zhang, 2025). They enable language teachers to produce podcasts from existing texts or lessons, making them relevant to the context. Furthermore, they have the autonomy to determine key variables related to the podcast, such as playback speed, duration, and content, to align with the instructional objectives.

While the vast majority of studies have examined the role of traditional podcasts in developing L2 learners' language skills, the pedagogical potential of AI-generated podcasts for L2 listening remains largely unexplored. Therefore, there is a notable gap in empirical evidence regarding emerging pedagogical practices for AI-generated podcasts. This study aims to fill that gap by examining the impact of repeated exposure to AI-generated podcasts as a pre-listening activity in the development of L2 listening skills in a real-world instructional context, focusing on listening competencies and strategic engagement.

Literature review

Listening skills in second language learning and associated challenges

Listening is considered a foundational skill in second-language learning and is important not only for successful communication but also for the development of other core skills (Suriaman, 2023). Listening skills are crucial in second language learning because they facilitate the cognitive processes necessary for language acquisition (Krashen, 1985; Rost, 2011; Vandergrift & Goh, 2012). Furthermore, they provide linguistic input and opportunities for interaction, thereby developing vocabulary, pronunciation, comprehension, fluency, and linguistic knowledge (Priya & Kumar, 2022; Suriaman, 2023).

Despite its importance, listening is often overlooked and gets the least attention in language

education compared to other skills (Goh, 2023). That marginalization is often represented by labeling it as the "Cinderella skill" in second language acquisition (Nunan, 2002). One reason is the complexity of the listening process, as learners must decode and interpret spoken language in authentic contexts (Buck, 2001; Rost, 2011; Vandergrift & Goh, 2012). It involves both top-down processes (using prior knowledge) and bottom-up processes (decoding sounds) (Field, 2008). Another reason is that listening is considered a "passive skill," and people perceive it as something that can be developed merely through exposure (Slowik, 2017; Siegel, 2014; Goh, 2025). Furthermore, Renandya (2012) highlights five reasons contributing to overlooking L2 listening skills regarding the lower proficiency learners: lack of strong empirical support for listening strategy instruction, heavy demands on teachers, doubts about its effectiveness for basic decoding issues, lower proficiency levels of the learners, and adopting pre-existing strategies from their first language. These findings depict that developing listening skills has been challenging for both learners and teachers.

Research indicates several challenges that hinder the comprehension and development of listening skills in second-language learners. One of the major challenges faced by L2 learners is cognitive processing, including recognizing words in speech streams, applying their grammatical knowledge, and interpreting incompletely (Goh, 2023; Gao, 2014). Moreover, limited vocabulary is another challenge that restricts their ability to understand the spoken language. Unfamiliar accents, fast speech, and environmental factors such as noise and a lack of practice in real-life listening often pose challenges to learners' listening performance (Nguyễn et al., 2024; Apriyanti, 2024). Another significant challenge for L2 learners is a lack of authentic and diverse listening materials that reflect real-life academic contexts, as well as limited exposure to the target language (Apriyanti et al., 2024; LeLoup & Ponterio, 2007; Mukhtorova & Ilxomov, 2024; Picard & Velautham, 2016).

From the teacher's perspective, lack of pedagogical implications for listening instructions (Siegel, 2014), lack of authentic materials (Gao, 2014), time-consuming nature (Walker, 2014), difficulties in finding contextual and purposeful listening texts, inadequate lesson planning, poor infrastructure, and limited professional development (Kandel, 2024) are some of the challenges encountered by the teachers in the teaching-learning process of developing listening skills. Developing listening skills in an L2 context is frequently obstructed by a lack of appropriate teaching materials and infrastructure. Teachers have limited access to authentic listening resources such as audio files, podcasts, and classroom activities (Panthi, 2024; Rahman et al., 2014). These studies have emphasized the need for learner-centered listening instruction that includes authentic materials and opportunities for repeated exposure and reflection (Graham, 2006; Vandergrift, 2004).

Use of podcasts in developing L2 listening

Several empirical studies examine the impact of podcasts on the development of L2 listening skills. Naidionova & Ponomarenko (2018) conducted an experimental study with 102 first-year undergraduates, and the results showed that integrating podcasts into the teaching-learning process positively affected learners' listening comprehension. While their primary findings focus on gains in listening performance, they also discuss – by synthesizing previous research – how podcast-based exposure may contribute to the development of learners' lexical

recognition, pronunciation awareness, and grammatical sensitivity, synthesizing the previous research studies (Nation, 2001; Rost, 2011; Vandergrift & Goh, 2012). These factors support the cognitive processes involved in listening comprehension. Rather than presenting these areas as directly measured outcomes, the study situates vocabulary, phonological, and grammatical development as complementary mechanisms through which podcasts can enhance L2 listening. Similarly, Mohammed & Khadawardi (2014) conducted an exploratory survey to elucidate the perceptions of 102 English as a foreign language (EFL) learners. The findings of this study revealed that podcasts significantly enhance learners' motivation in listening activities. Subsequently, podcasts help develop listening comprehension and listening proficiency. Furthermore, Kang's (2016) quasi-experimental study involving 20 intermediate ESL learners indicated that the experimental group showed greater improvement in listening performance than the control group. This improvement was associated with the integration of podcast-based materials and explicit instruction in listening strategies, rather than with exposure to traditional listening practice alone. Chaves-Yuste & Peña (2023) also conducted a similar study with 78 EFL ninth-grade learners, and the results were similar to Kang's (2016) study. According to this study, podcasts provide practical educational practices and positively affect learners' language proficiency. They further emphasized that developing listening skills through podcasts affects the development of oral skills. There are a number of studies conducted under quasi-experimental designs to examine the effect of podcasts on the development of listening skills, and almost all of them show that podcasts have a positive impact on the listening performance of L2 listeners (Efendi et al., 2024; Oraif & Alrashed, 2025).

While integrating podcasts into the teaching-learning process has positive effects, some studies have highlighted challenges associated with traditional podcasts. Technical challenges and limited learner familiarity with the podcast format have hindered the integration of traditional podcasts (Cebeci & Tekdal, 2006; Indahsari, 2020). Difficulty understanding fast speech, unfamiliar accent, instructional time spent on teaching strategies, and the lack of level-appropriate authentic podcasts are other challenges faced by both L2 learners and teachers (Efendi et al., 2024; Kang, 2016; Mohammed & Khadawardi, 2014; Oraif & Alrashed, 2025). These findings reveal that the lack of options for customizing traditional podcasts hinders the development of L2 listening skills. The advanced technology in the digital era helps mitigate the drawbacks of traditional podcasts by introducing AI-generated podcasts that can be easily customized. The next sector provides empirical evidence regarding relatively new pedagogical implications introduced by AI-generated podcasts.

AI-generated podcasts and their pedagogical implications

Chaikovska et al. (2024) conducted a quasi-experimental study involving 82 engineering students to explore the effect of AI-generated podcasts on listening comprehension. The study found that learners in the experimental group outperformed those in the control group. 15 students in the experimental group scored 60/100, while only 8 in the control group scored more than 60. It further emphasized that AI-generated podcasts enhanced listening comprehension, motivation, and autonomous learning. This study encourages language teachers to integrate AI-generated podcasts to improve L2 learners' listening performance while scaffolding them with appropriate instruction, especially in English as a special purpose (ESP) contexts. Similarly,

Syifa et al. (2024) examined the effect of English podcasts on the listening comprehension skills of ESL students, using a quasi-experimental design with a sample of 35 ESL students. This study suggested that integrating podcasts, including AI-generated podcasts, enhances listening comprehension and motivates educators to incorporate such tools into their teaching methods to improve L2 learners' listening skills.

Sahito et al. (2025) explored the impact of AI-embedded tools on ESL learners' skill development, with a particular focus on speech recognition software and two other AI tools. According to their findings, learners in the experimental group increased their listening comprehension by 26.15 points, whereas those in the control group increased it by 8.30 points. Based on the findings, they further emphasized that ESL learners' listening comprehension can be optimized by using AI-powered tools. Other studies have explored the effect of AI-generated podcasts on learners' listening performance and concluded that they can enhance listening skills, while also highlighting some limitations (Ali et al., 2025; Vincent et al., 2025). For example, Vincent et al. (2025) found that the use of AI platforms, including speech recognition and chatbot tools, significantly improved listening comprehension over traditional instruction. In addition, Huang et al. (2024) explored the importance of integrating generative AI podcasts into listening instruction, using semi-structured interviews and classroom observations. Findings of this study indicated that AI-generated podcasts foster student engagement and self-autonomy while providing personalized learning experiences. They highlighted that educators and policymakers should explore new pedagogical implications to develop L2 listening skills through generative AI technologies.

Providing learners with podcasts can enhance listening comprehension by allowing repeated, self-paced exposure to spoken English outside class and by supporting metacognitive processing, such as decoding and meaning construction (Azmee, 2022). Research on blended and flipped models shows that pre-session audio access improves listening performance compared to traditional in-class listening alone, suggesting that asynchronous listening opportunities contribute positively to learners' outcomes (Hosseini et al., 2021). Moreover, learner interest and prior exposure to podcasts have been shown to influence engagement with listening tasks, underscoring the value of integrating tailored, contextually relevant audio materials into instruction (Kelsen, 2016).

However, traditional podcasts often lack adaptability in terms of proficiency level, content relevance, and instructional alignment. In this regard, AI-generated podcasts offer a more flexible alternative, as they can be tailored to learners' needs, customized to specific lesson objectives, and adjusted for linguistic complexity and delivery. Therefore, AI-generated podcasts are beneficial as pre-session learning tools, as they combine the advantages of asynchronous exposure with personalized, context-sensitive input.

Google NotebookLM as an AI-assisted Tool for Creating Personalized Listening Materials

Google's NotebookLM is an AI-powered research and learning assistant that facilitates the creation of podcast-style audio from user-provided text. Users can upload storybooks, notes, or lesson content into NotebookLM, which then summarizes the key information and reorganizes it into a coherent script suitable for oral presentation (Reuter et al., 2025; Rettberg, 2025). This script can be later converted into natural-sounding audio using text-to-speech engines, with options for voice type, intonation, pacing, and multiple languages, creating personalized

listening materials for learners (Tufino, 2025). Students can play or download these AI-generated podcasts and engage with the content repeatedly, promoting vocabulary retention, recognition of connected speech, and comprehension. While empirical studies directly evaluating NotebookLM's impact in language classrooms are still emerging, existing research on AI-generated podcasts and AI-assisted listening technologies demonstrates that such tools can significantly enhance listening skills, learner engagement, and comprehension outcomes (Do et al., 2024; Xiao, 2025; Law, 2024).

While numerous studies have examined the integration of traditional podcasts into second-language learning, with a particular focus on developing listening comprehension and learner engagement, there is a notable lack of empirical research on the pedagogical impact of AI-generated podcasts. Existing studies in this area are predominantly anecdotal or exploratory, with only a few offering classroom-based evidence to evaluate the effectiveness and challenges of AI-generated podcasts. Furthermore, most of the research studies have been conducted at the tertiary level, primarily involving undergraduate ESL learners (Azmee, 2022; Chaikovska et al., 2024; Kelsen, 2016). There are a limited number of studies conducted in a school-based context. Additionally, research studies that incorporate tools such as Google NotebookLM, introduced in July 2023, remain scarce. Moreover, there is a significant research gap in this area in the Sri Lankan context. In light of these gaps, the present study aims to provide pragmatic pedagogical insights into the use of AI-generated podcasts to develop listening skills and to serve as a springboard for future research in this emerging field.

Research Questions

This study aimed to examine the effect of AI-generated podcasts on the development of second language listening performance. The following research questions were formulated in light of the scope of the research study.

1. To what extent does the use of AI-generated English-language podcasts delivered via Google NotebookLM influence the listening performance of grade 9 ESL learners in Sri Lanka?
2. How do grade 9 ESL learners in Sri Lanka perceive the use of AI-generated English-language podcasts for developing listening skills?

The first research question guided the study toward a hypothesis-driven analysis and, consequently, led to the formulation of a null and an alternative hypothesis.

H_0: There is no significant difference in the listening performance of grade 9 ESL learners in Sri Lanka before and after the use of AI-generated English-language podcasts.

H_1: There is a significant improvement in the listening performance of grade 9 ESL learners in Sri Lanka after the use of AI-generated English-language podcasts.

Methods

Pedagogical Setting & Participants

This study was conducted at a 1AB school in the Western province of Sri Lanka, with participants selected from a grade 09 English as a Second Language (ESL) classroom. The classroom was heterogeneous, comprising learners with varying levels of language proficiency. A total of 30 grade 9 students participated in the study, selected through purposive sampling.

This sampling technique was employed to ensure the inclusion of learners with similar curricular exposure and access to digital devices. Access to digital devices was essential for participating in the AI-generated podcast intervention. The selection criteria included students who were (a) following the same Grade 9 English syllabus, (b) had basic familiarity with smartphone or computer use, as determined through a brief pre-study questionnaire assessing their prior experience with digital devices and online learning platforms. Students were equally divided into two groups: the control group (N-15) and the experimental group (N-15). Group allocation was carried out to maintain comparability between the two groups based on pre-test listening scores and thereby minimizing potential group differences that could influence the study outcomes. All learners in the experimental group had access to a WhatsApp group used to distribute the AI-generated podcasts. Additionally, informed consent was obtained from all the participants and their parents prior to the commencement of the study to ensure adherence to ethical standards.

Design of the Study

This study used a quasi-experimental design to test the hypothesis formulated in the first research question, which examined the impact of AI-generated podcasts on ESL learners' listening performance. Cook and Campbell (1979) introduced a quasi-experimental design to conduct experimental research in real-world settings. According to Cook and Campbell (1979), quasi-experimental designs are used to evaluate the effectiveness of interventions, particularly when random assignment is not feasible. According to them, this design is appropriate for evaluating the effectiveness of interventions in authentic settings. In line with this rationale, the present study used pretest and posttest scores to assess the impact of the intervention. Participants in this study were selected through purposive sampling from the target population, and this design was well-suited, given that the study was conducted in a natural, pre-existing educational setting.

Data collection & analysis

First, a pretest was administered to assess learners' listening proficiency before implementing the intervention in the experimental group. The pre-test consisted of two listening comprehension tasks, including multiple-choice and short-answer items. It was designed in alignment with the Grade 9 national English curriculum, specifically the third competency level: “Engages in active listening and responds appropriately.” The test assessed learners’ ability to listen to a simple text for specific information, transfer information into other forms, and identify intonation patterns and word stress. All participants completed the pre-test under standardized classroom conditions, with a 45-minute test duration.

Following the intervention, a post-test with a parallel structure and comparable level of difficulty was administered to measure changes in listening proficiency. Both the pre-test and post-test were scored using a predetermined marking scheme, awarding 2 marks for each correct response, for a total of 30. The same scoring criteria were applied to both tests to ensure consistency and objectivity. The hypothesis formulated for the first research question was tested using the pretest and posttest results. At the end of the intervention, the learners' perceptions of integrating AI-generated podcasts to develop listening skills were explored through a focus

group discussion with participants from the experimental group. The discussion was conducted in Sinhala to ensure comfort and facilitate clear expression of their views. It was guided by semi-structured questions aligned with this study's research questions and key constructs, including listening confidence, comprehension support, engagement, and the perceived relevance of AI-generated podcasts. The questions were developed based on themes identified in prior literature on L2 listening development, strategy use, and technology-enhanced listening instruction (e.g., Vandergrift & Goh, 2012; Rost, 2011). The key questions for the focus group discussion are as follows:

1. How did listening to AI-generated podcasts affect your confidence and preparedness for listening activities in class?
2. What aspects of the podcasts helped or hindered your understanding?
3. In what ways did repeated exposure to podcasts support your listening comprehension?
4. How relevant and useful were the podcasts for your classroom activities?

In the analysis, both qualitative and quantitative methods were employed. The quantitative data from the pretest and posttest were analyzed using SPSS, and the intervention effect was assessed using a paired-samples t-test. The data from the focus group interview were analyzed thematically to explore insights and experiences regarding the use of AI-generated podcasts.

Intervention

The intervention in this research study was implemented over three months, during which ten face-to-face contact sessions were conducted for both the experimental and control groups. Each contact session lasted 80 minutes, including pre-listening, while-listening, and post-listening activities. The lesson plan for each contact session was designed to align the competency levels prescribed for grade 9 students in the teacher's guide issued by the National Institute of Education in Sri Lanka *(Figure 1 – Competency levels)*. The experimental group was provided with AI-generated podcasts created using NotebookLM before each contact session, and these podcasts were directly aligned with the listening materials for that session. These podcasts were derived directly from the listening paragraphs used in the classroom while-listening stage, but differed from the classroom audio in key ways: they were customized to learners' proficiency level and interests, with a controlled speech rate, a clear, neutral accent, and lexical support to highlight challenging vocabulary. Each podcast was approximately 4–6 minutes long, matching the length of the classroom material, and enabled learners to engage in repeated listening at their own pace, supporting self-directed learning and comprehension. The podcasts were designed to familiarize learners with both vocabulary and context, providing scaffolding that facilitated more meaningful engagement during subsequent classroom listening tasks. AI-generated, customized podcasts were shared with learners one week before each contact session, and they were instructed to listen to the podcast and be prepared for the listening comprehension assigned in the contact session.

In contrast, the control group received no prior listening materials and engaged in listening comprehension only during classroom sessions. While both groups were exposed to the same listening content, the experimental group's pre-exposure via podcasts enabled multiple

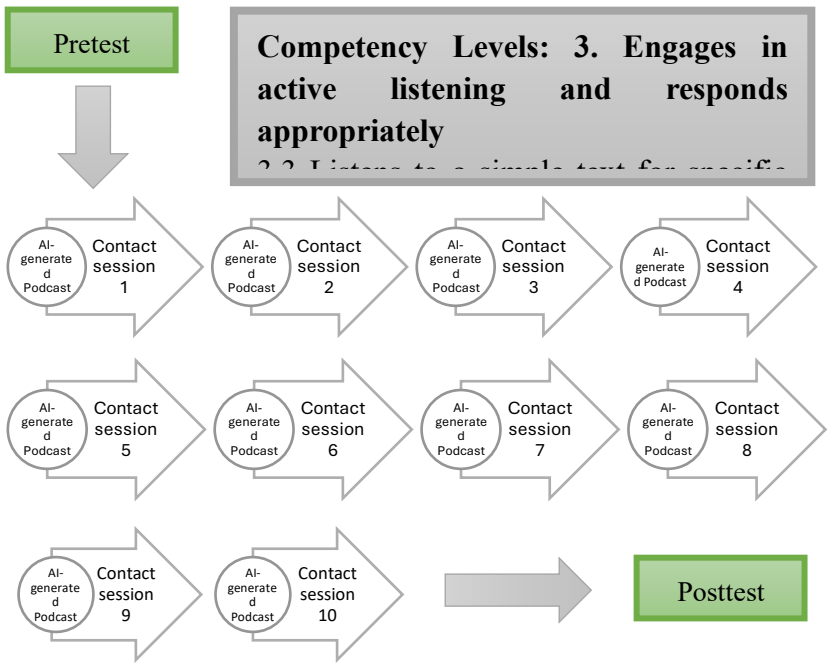
interactions with the material, whereas the control group had a single synchronous exposure.

It is acknowledged that the experimental group's performance could be influenced by the additional exposure time. However, the podcasts provided not only repetition but also pedagogical enhancements such as scaffolded comprehension, vocabulary support, and controlled delivery. They enable distinguishing AI-generated podcasts from classroom audio, allowing the study to investigate the added value of AI-generated podcasts as pre-listening tools for junior secondary ESL learners in Sri Lanka.

The summary of the intervention process is illustrated in Figure 1

Figure 1:

Summary of the intervention



Results/Findings and Discussion

The impact of AI-generated podcasts on the developing listening skills of the ESL learners

This section presents the statistical analysis to improve the effectiveness of the intervention implemented to develop learners' listening performance in the experimental group. Descriptive statistics were used to summarize central tendencies and variability for the pretest and posttest in both the control and experimental groups to determine whether there is a statistically significant improvement after the intervention. Furthermore, paired-samples t-tests were employed to assess the difference between the pretest and posttest means for the experimental group. The analysis aims to compare the magnitude of improvement across groups and determine whether the intervention had a greater impact on the experimental group than on the control group. The findings of this statistical analysis were used to test the hypothesis, leading to the acceptance of either the null hypothesis or the alternative hypothesis.

Table 1

Central Tendency Values

	Group		Statistic	Std. Error
Pretest	Control	Mean	7.73	.796
		Std. Deviation	3.081	
		Minimum	3	
		Maximum	12	
	Experime	Mean	8.93	1.270
		Std. Deviation	4.920	
		Minimum	2	
		Maximum	19	
Posttest	Control	Mean	9.27	.913
		Std. Deviation	3.535	
		Minimum	4	
		Maximum	15	
	Experime	Mean	15.53	1.420
		Std. Deviation	5.502	
		Minimum	7	
		Maximum	27	

Table 2

Paired Sample Test (Experimental Group)

	Paired Differences					t	df	Significance	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
				Lower	Upper				
Pretest - Posttest	-6.600	1.682	.434	-7.531	-5.669	-15.199	14	<.001	<.001

Paired sample t-test is used to analyze the mean difference between the pretest and the posttest of the experimental group. The results of the paired-samples t-test revealed a mean difference of -6.60 (SD = 1.682) between the two tests, with $t(14) = -15.199$, $p < 0.001$. These statistical results provided strong evidence that the intervention had a significant positive effect on the experimental group's listening performance. Ultimately, these findings contributed to rejecting H0 (Null Hypothesis) and accepting H1 (Alternative Hypothesis); *"There is a significant improvement in the listening performance of ESL learners after the integration of AI-generated podcasts into the teaching-learning process."*

Perceptions of learners on AI-generated podcasts

Perceived Effectiveness and Preparation for Listening Tasks

A focus group interview was conducted with learners in the experimental group to explore their perceptions of integrating AI-generated podcasts as teaching and learning aids to improve listening performance. The data revealed that 13 of 15 learners generally perceived a positive effect from integrating AI-generated podcasts in preparing them for listening activities, as the podcasts were directly aligned with the listening texts used during the contact sessions. However, the remaining two learners reported some challenges related to understanding the content and native-speaker accent. One of the prominent benefits highlighted by the learners was the flexibility that the podcasts offered. Learners expressed positive views on the impact of podcasts, noting that they could listen at their own pace and at times convenient for them.

Furthermore, the ability to replay the podcasts multiple times contributed to deeper comprehension. When learners encountered unfamiliar words, they frequently consulted a dictionary by pausing the podcast and continued to expand their lexical knowledge. A learner from the experimental group elaborated this experience:

> *"An AI-generated podcast was a new experience for me, and I was instructed to listen to the podcast shared by the teacher. At first, I could not understand much of what was discussed in the podcast, so I did not just listen to it once; I listened to it several times a day until I got familiar with the discussion. Sometimes I consult a dictionary to look up unfamiliar words. By the time I was assigned listening activities in the contact session, I was very confident, as I already knew the context and the vocabulary used in the listening text."*

The quotation above highlights how AI-generated podcasts prepared learners for the listening texts. It illustrates that the learner's confidence improved as a result of prior exposure to the podcasts, which were closely aligned with the listening materials used in the contact session. One of the main factors discouraging learners from engaging in listening activities is unfamiliar vocabulary (Altun, 2023; Wallace & Lee, 2020). However, as they familiarized themselves with the vocabulary related to the text through the podcasts, they became more confident in their listening comprehension. Prior preparation for the listening activities enhanced learners' attention. Maintaining active listening is challenging in an ESL classroom as the learners are easily distracted by unfamiliar vocabulary. The opportunity to become more familiar with such vocabulary through podcasts before the formal listening task encouraged learners to engage in listening activities more confidently and attentively.

Accordingly, the findings highlight the importance of repeated exposure to listening input through AI-generated podcasts. The observed improvement in learners' listening performance appears to be influenced by both the use of the podcasts and the opportunities for repeated exposure they afforded. It is important to note that the AI-generated podcasts facilitated and supported repeated exposure, allowing learners to listen multiple times, pause the audio, and engage in active meaning-making at their own pace.

It can be argued that if the control group had received prior listening practice using audio materials of similar content, they might have demonstrated comparable improvement in listening performance. However, a key challenge in traditional classroom contexts is identifying or developing listening materials that closely align with in-class listening texts, particularly in terms of content, vocabulary, and proficiency level. This limitation can be effectively addressed by using AI-generated podcasts created with tools such as Google NotebookLM, which allow teachers to transform lesson-specific scripts into podcasts. Such tools enable the rapid generation of context- and syllabus-aligned listening materials, thereby supporting structured repeated exposure as an integral component of the instructional design.

Another significant challenge for language teachers is the lack of learner motivation for listening activities (Field, 2008; Graham, 2006; Vandergrift & Goh, 2012). However, the focus group interview revealed that integrating AI-generated podcasts positively affects learner motivation. The following comment indicates how the relevance of AI-generated podcasts influenced learner motivation:

> *"I was quite motivated to listen to an AI-generated podcast because they were relevant to the topics of the English language syllabus… All the topics related to those podcasts and the listening activities were really interesting (e.g., extinct animals, Great personalities, Health habits).*

Flexibility, Autonomy, and Repeated Exposure

One of the persistent challenges for language teachers is selecting or creating listening materials that are appropriate for proficiency level, interests, and learning context (Gilmore, 2007; Rost, 2011). Traditionally, developing a podcast that considers all these aspects and leverages human resources requires significant time, effort, and technical expertise (Dudeney & Hockly, 2007). In contrast, AI-generated podcasts enable language teachers to create customized content within minutes, ensuring relevance to learners' proficiency levels, interests, syllabi, and curriculum goals. The comment above emphasizes that alignment among the aspects mentioned stimulates learner motivation.

Purposeful or goal-oriented listening is crucial in developing the learning skills of second-language (L2) learners. When learners are assigned activities with clearly defined objectives, their engagement in listening activities tends to increase significantly. It is further clarified with the following experience shared by a learner.

> *"The teacher instructed us to listen to the podcasts, mentioning that they would help us with the listening activities assigned in the contact session. I usually get low marks for listening comprehension. Therefore, I thought to listen to them and see whether they would be helpful. Yes, they did."*

The quote highlights the importance of goal-driven instructions in encouraging learners to become more active learners in the learning process. Learners perceived AI-generated podcasts as supportive aids in achieving their goal of improving listening proficiency. Furthermore, when AI-generated podcasts are used merely as supplementary materials without being aligned with instructional objectives or upcoming classroom listening tasks, their impact on the learner's listening performance will be limited due to a lack of clear purpose and guidance for engaging with the listening input (Ling & Kettle, 2011). However, the data indicated that when the podcasts were meaningfully integrated into the teaching-learning process aligned with upcoming classroom activities, even learners with lower proficiency levels were motivated to listen to them. This was evident in the responses of 4 learners, including those who initially scored lower on the pre-test but improved on the post-test.

Perceived Challenges

Despite the above positive perceptions, some learners identified challenges with the native-speaker accents featured in the AI-generated podcasts.

> *"I found it difficult to understand the discussion properly because their pronunciations were different."*

This highlights a common challenge that is associated with AI-generated podcasts. Some learners find it challenging to process and understand native-speaker speech due to variations in pronunciation, accent, and intonation. Nevertheless, for other learners, the native-speaker accent served as a motivating factor, encouraging them to engage in listening activities. Several learners perceived listening to native speakers as an opportunity to enhance their listening skills.

> *"I like the way they talk in the discussion."*
>
> *"I was motivated to listen to the podcasts because two foreigners engaged in*

the discussion. I like listening to the way they talk."

"I want to speak like a native speaker. These podcasts help me not only to understand what they say but also to learn their pronunciation patterns."

These quotations indicate that the native-speaker accent in the podcast has positively affected learners' motivation to develop their listening skills. While some find it challenging, others find it valuable for developing their listening skills.

Finally, the focus group interview revealed that learners held positive perceptions of the role of AI-generated podcasts in developing second-language listening skills. Learners reported that the AI-generated podcasts helped optimize their listening proficiency by providing flexibility to engage in listening activities, preparing them for upcoming listening tasks, and encouraging goal-directed, purposeful listening. Furthermore, the podcasts enhanced learner motivation by providing context and level-appropriate listening opportunities. Although the native-speaker accent was a hindrance for some learners, others found it stimulating and beneficial for fostering their listening comprehension.

Discussion

This study examined the effectiveness of integrating AI-generated podcasts in developing second-language listening performance in the Sri Lankan context. Results indicated that after 10 weeks of the intervention, learners in the experimental group outperformed those in the control group. The results of the paired-samples t-test indicated a significant improvement in learners' listening performance after the intervention ($t(14) = -15.20$, $p < .001$). The mean difference between the pretest and posttest scores is -6.60 (SD = 1.68). It suggests that students improved by 6.6 points from pretest to posttest. Even though AI-generated podcasts were not used with the control group, that group also showed a statistically significant improvement ($t(14) = -6.00$, $p<.001$). However, the magnitude of the improvement was relatively small compared to that of the experimental group. These positive results are consistent with prior studies and emphasize the importance of integrating AI-generated podcasts into the teaching-learning process (Ali et al., 2025; Chaikovska et al., 2024; Huang et al., 2024; Sahito et al., 2025; Syifa et al., 2024; Vincent et al., 2025). These statistical evaluations support rejecting the null hypothesis and accepting the alternative hypothesis.

The improvement in the control group may be attributed to continuous exposure to listening activities over the weeks and to the instructions provided during the contact sessions. However, the notable progress of the experimental group highlights the positive effect of exposure to AI-generated English-language podcasts delivered via Google NotebookLM prior to each contact session. The data revealed that it enhanced student achievement more effectively than conventional methods, which primarily involved one-time in-class listening activities using pre-recorded materials, with limited opportunities for repetition and pre-task preparation. Importantly, AI-generated English-language podcasts can be used to cultivate a habit of listening to the target language in contexts where listening is often overlooked.

When considering learners' perceptions of integrating AI-generated podcasts, learners indicated

that the podcasts helped them become familiar with the vocabulary and context before engaging in the formal listening task. This shows how AI-generated podcasts promote self-directed learning by enabling learners to be autonomous in deciding when, where, and how they listen. This finding is consistent with previous studies (e.g., Vandergrift & Goh, 2012; Rost, 2011), which emphasize the role of pre-listening support and learner autonomy in enhancing listening comprehension. However, unlike traditional approaches, the use of AI-generated podcasts in this study offered more flexible, personalized opportunities for learners. Their perceptions also emphasize the importance of goal-oriented listening tasks as a pedagogical implication that enhances purposeful listening, leading to greater attention and motivation. A challenge some learners encounter is the native-speaker accent in podcasts. Their perceptions are consistent with Field's (2008) findings, which emphasize that L2 learners become discouraged when they cannot understand the native speaker's accent and the context. Nevertheless, other learners perceived the native speaker's accent as an opportunity to be motivated to engage in listening activities and expand their pronunciation awareness.

This study further investigated the important benefits of AI-generated podcasts that could help mitigate the challenges teachers face in engaging learners in listening activities. First, they give language teachers the opportunity to customize the podcast for the lesson they are going to teach and align it with the upcoming listening activities. As the teacher is well aware of the learners' level, they can further customize it by adjusting the podcast's pace. The teacher's choice of the listening material (listening text) to be turned into podcasts completely aligned with the context and instructional objectives. Although the primary focus of the study was to evaluate the effectiveness of AI-generated podcasts in improving ESL learners' performance, the findings also suggest that their use can reduce teachers' workload, as podcasts can be generated rapidly with minimal time and effort. It reduces the time a teacher spends searching for relevant podcasts for educational settings and lessons (Hockly & Dudeney, 2018; Kohnke et al., 2023; Zawacki-Richter et al., 2019; Crompton & Burke, 2023; Huang et al., 2024). Motivating learners to engage in listening activities is another challenge teachers face. AI-generated podcasts could help teachers motivate learners to engage in listening activities with well-defined instructional goals.

The outcomes of this study are consistent with recent empirical research on integrating AI-generated podcasts to enhance L2 listening performance and learner engagement. Consistent with the findings of Chaikovska et al. (2024) and Sahito et al. (2025), participants in the experimental group in this study demonstrated considerable improvements in listening performance after exposure to AI-generated podcasts. Participants in this study expressed positive perceptions of AI-generated podcasts and of the development of listening skills, and their attitudes align with the findings of Do et al. (2024), which emphasized the importance of integrating personalized AI-generated podcasts to enhance learner motivation and engagement. These consistencies emphasize the pedagogical significance of integrating AI-generated podcasts into ESL instruction, not only as a tool for listening development but also as catalysts for learner autonomy, motivation, and technology-mediated engagement.

Finally, the findings of this study urge the teachers to integrate artificial intelligence into the teaching-learning process in the ESL context, especially when developing listening skills. A

vast majority of research studies have examined the use of artificial intelligence to develop productive skills, such as writing and reading. However, research on receptive skills and the use of AI to develop them is limited (Vincent et al., 2025). This study would shed light on pedagogical changes that can optimize and enhance learners' listening skills.

Conclusion

This study examined the role of AI-generated podcasts as a teaching and learning aid to enhance listening performance among a purposively selected group of grade 9 Sri Lankan ESL learners. The findings indicated that exposure to AI-generated English-language podcasts delivered via Google NotebookLM prior to contact sessions significantly contributed to the development of learners' second-language listening performance. Learners reported that AI-generated podcasts enabled them to become self-regulated learners with increased motivation and greater confidence when engaging in listening activities. The personalized and flexible nature of AI-generated podcasts addresses diverse learning needs in a heterogeneous classroom. Furthermore, if language teachers tend to overlook the development of listening skills due to heavy workloads or the lack of contextual, level-appropriate materials, emerging AI tools such as NotebookLM offer practical solutions. Language teachers can create culturally and curriculum-aligned podcasts to support learners' listening activities. Even though listening is often labeled a "Cinderella Skill" in ESL education due to its lack of prioritization, emerging generative AI tools empower educators to make pragmatic changes to the teaching-learning process. As a result, listening may receive greater attention and become less neglected in second language acquisition.

Despite its contributions, this study has certain limitations. The study's sample size is limited, and it focused on a single senior secondary ESL classroom (Grade 09). The intervention in this study was also limited to 10 contact sessions over 3 months. Therefore, further research should examine the longitudinal impact of AI-generated podcasts across diverse proficiency levels and educational contexts. It is further recommended to explore pedagogical applications of interactive audio modes created by NotebookLM and other advanced AI-based tools, which can be integrated to develop learners' listening skills by customizing the speaker's accent to suit the learner's proficiency level. The unequal listening exposure between the control and experimental groups is also a limitation of this study. Additional engagement with a pre-session podcast may have affected the experimental group's outcomes beyond the specific contribution of AI-generated podcasts. Future studies could control exposure time by providing equivalent listening input to both groups using different formats.

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Biodata

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