Research Article

Leveraging AI-Generated Audio in the Metaverse for Enhanced English Listening Skills: An Innovative Approach

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Abstract: *Conventional listening tasks often involve synchronous drilling in the classroom setting whereas students would listen to audio clips in workbooks for asynchronous learning. However, the former approach is deemed monotonous by most learners while the latter does not ensure the consistency of audio quality in terms of the speakers' accents. Hence, researchers have incorporated the elements of Metaverse and Artificial Intelligence (AI) in developing a Google Classroom equipped with AI-generated audio being embedded in a Metaverse. The ADDIE Model is employed throughout the development of MetaListen. MetaListen aims to develop original resources aligned with the Form 5 Curriculum and the SPM listening format to assist students with deficient listening abilities. A quasi-experimental study on a total of 80 students showed that students who employ the following tool of learning exhibit an improvement in their listening scores as well as their learning attitudes pertaining to listening as independent samples t-test conducted indicated a significant difference between the control group (without MetaListen intervention) and treatment group (with MetaListen intervention). MetaListen utilises AI, the Metaverse, and Google Classroom to create a dynamic learning environment that enhances cognitive processing and retention of listening materials. It offers immersive and interactive learning experiences through the Metaverse. Google Classroom in MetaListen is structured and user-friendly that supports differentiated learning and improves listening skills. AI employed in MetaListen, provides consistent, context-relevant learning materials for English listening. MetaListen's scaffolding effectively aids students' learning processes, and the Teacher's Book with AI-generated prompts enriches the educational experience for both teachers and students, making MetaListen a comprehensive English listening practice tool. Therefore, MetaListen notably enhances English listening skills and fosters a positive shift in student learning attitudes, highlighting its effectiveness and innovation as an educational tool in the English educational settings.*

Keywords: listening, Artificial Intelligence, Metaverse, Google Classroom

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1. INTRODUCTION

As a skill of reception, listening involves the activation of the schemata upon receiving verbal input to construct implicit and explicit meaning of language by the listener (Council of Europe, 2020). Sometimes contextual cues are employed to check whether they match the activated schema or suggest otherwise (Council of Europe, 2020). In short, listening encapsulates the comprehension of oral and audio-visual input in real-life settings (Council of Europe, 2020).

In the Malaysian education landscape, pertaining to listening, the MoE aspires students to be able to understand meaning, use appropriate listening strategies, and to recognise conventional features of different spoken genres as prescribed in the national curriculum (Curriculum Development Division, 2020). Apart from the curriculum, listening is also one of the components that is assessed via formative assessment in the form of Classroom Based Assessment (CBA) and summative assessment in the form of Sijil Pelajaran Malaysia (SPM) examination (Curriculum Development Division, 2019; Examination Syndicate, 2020).

In The Roadmap 2015 - 2015, in order to prepare school leavers and graduates to compete at international level, based on the Common European Framework of Reference for Languages (CEFR) level, secondary school students are expected to achieve a B1 or B2 while post-secondary students and university graduates are targeted to achieve an English proficiency equivalent to B2 (English Language Standards and Quality Council, 2015). In layman's terms, a B1 student can understand the main ideas of clear standard audio on familiar matters while a B2 student can understand the main points of complex texts (Examination Syndicate, 2020).

Upon exiting secondary school, students should at least attain a B1 High in terms of CEFR level for listening (Curriculum Development Division, 2020). In other words, by the end of Form 5, students should be able to:

1. understand the main ideas, specific details and attitudes or opinions independently in extended texts.
2. understand longer, more complex narratives and guess the meaning of unfamiliar words adequately.
3. recognise typical features at word, sentence and text levels of a range of spoken genres with little or no support.

(Curriculum Development Division, 2020, p.24)

Even though there is no statistical evidence being published by MoE regarding the listening performance of students at secondary school level, a clear data representation in terms of CEFR level is ascertained when the secondary school students pursue post secondary and tertiary education in higher institutions as they are required to sit for the Malaysian University English Test (MUET) conducted by the Malaysian Examinations Council. MUET has been aligned with the current CEFR level since 2021 (Bidin, Mohd Don, Abdul Raof, Zubairi, & Mahat, 2019). In 2021, the percentage of students who have yet to achieve B2 in the listening component showed a trend of increment: 6.53% (Session 1), 9.61% (Session 2) and 21.11% (Session 3) (Malaysian Examinations Council, 2023). In 2022, the percentage of students who failed to achieve B2 in the listening paper exhibited an opposite trend: 27.47% (Session 1), 17.71% (Session 2), 10.39% (Session 3) (Malaysian Examinations Council, 2024).

Apart from that, the quality of the audio used in the listening paper has raised concerns back then. During the SPM 2022 listening paper, a social media influencer was allegedly hired by the Examination Syndicate in doing the voice-over, hence causing the struggle for candidates to understand the audio due to the speaker's fast pace and unclear pronunciation in the audio clips despite the claim from the Examination Syndicate stating that the speakers consist of educators and students who are proficient in English (Bernama, 2023). Not only in high-stake examinations, it is evident that the audio quality is deemed plausible to be a problem in a listening test at school level. This is due to the fact that educators in school receive professional development training in developing items for the writing paper and reading paper, but not for the listening paper (Adnan, 2024). Hence, educators have to opt for the audio clips in workbooks which are recorded by anonymous people, thus giving room for inconsistency in audio quality because of the variation in terms of accent, pace in speaking and pronunciation.

In Malaysia, the Ministry of Education Malaysia (MoE) advocates to introduce Information Communication Technology (ICT) solutions in the education system by suggesting ICT innovations such as self-paced learning and the Digital Educational Learning Initiative Malaysia (DELIMa) platform for delivery (Ministry of Education Malaysia, 2013). In accordance with the Digital Education Policy, artificial intelligence (AI) and metaverse can be perceived as few of the rising digital technologies that can be employed to diversify the approaches to the teaching and learning process (Ministry of Education, 2023). Considering the related issues discussed above, AI and metaverse are suggested by researchers to be embedded in one of the DELIMa tools, Google Classroom, to become a learning tool for listening in an asynchronous manner. The learning tool, MetaListen, is an online learning platform which contains AI-generated audio clips infused in a metaverse world for students to learn listening skills based on their own pace.

In this paper, the researchers aimed to investigate the effectiveness of MetaListen as a learning tool for listening by comparing the listening performance of students learning listening based on this innovation and that of students learning listening using the conventional method. At the same time, this study is guided by the following research question (RQ).

RQ: Is there any significant difference between the listening performance of students learning listening using MetaListen and that of the control group?

The null hypothesis (H_0) and alternative hypothesis (H_1) for this study are as follows.

H_0 : There is no significant difference between the listening performance of students learning listening using MetaListen and that of the control group.

H_1 : There is a significant difference between the listening performance of students learning listening using MetaListen and that of the control group.

2. LITERATURE REVIEW

2.1 SPM Listening

The listening component was introduced in tandem with the latest format of SPM which has been implemented since the year 2021 (Examination Syndicate, 2020). Given the name Paper 4 (Listening) and the code 1119/4, this paper requires students to answer 30 objective questions in total pitched at B1 to B2 CEFR level within 40 minutes as it tests students' ability to understand the audio and apply the linguistic knowledge they learnt (Examination Syndicate, 2020).

There are 4 parts for the listening paper. For Part 1, seven short, unrelated dialogues or monologues, each of 60 to 70 words long, are listened by students followed by a 3-option multiple choice question with respect to every recording (Cambridge Assessment English, 2020). In Part 2, students will listen to a longer narrative or informational monologue which is 350 to 400 words long before answering eight multiple choice questions (Cambridge Assessment English, 2020). In Part 3, students are required to match five statements with their respective speakers after listening to five short monologues of approximately 50 words (Cambridge Assessment English, 2020). As for Part 4, a neutral or informal dialogue in the form of an interview which is 600 to 650 words long is listened by the students twice before they complete a gapped summary text with one word for each gap (Cambridge Assessment English, 2020). In short, the examination assesses students based on the learning standards as stipulated by the Curriculum Development Division (2020), hence reflecting the alignment between the curriculum and assessment.

2.2 Artificial Intelligence

AI can be considered as a computational system that can perform human-like activities such as learning, synthesising, self-correcting and using data to complete complex tasks (Popenici & Kerr, 2017). AI covers a range of disciplines, for example, computer science, information theory, linguistics and cybernetics, hence allowing the growth of new technologies such as deep learning and open intelligence (Aichun, 2019). According to Fang (2018, p.3), the "intersection of 'artificial intelligence + education' is one of the most salient topics in academic and research". Nowadays, there are three categories of existing AI applications in education, which are personal tutors, intelligent support for collaborative learning and intelligent virtual reality (Luckin, Holmes, Griffiths, & Forcier, 2016).

Natural language generation (NLG) is a part of AI which allows written or spoken forms to be produced using softwares (Reiter & Dale, 2000). Because of NLG, the "text-to-speech" process is enabled and the systems have produced voices from initially robot-like to currently human-like (Taylor, 2009). Previous studies have shown that the seemingly human-like voices in the applications like ELSA speak are able to improve the pronunciation of language learners (Bione & Cardoso, 2020; Proenca, Raboshchuk, Costa, Lopez-Otero, & Angeura, 2019; Senowarsito & Ardini, 2023). This is because AI reduces anxiety in second language learners as they receive personalised AI-based pronunciation lessons (Kim, 2019; Zhao, Chen, & Ma, 2021).

In the context of writing, AI has been introduced in writing scoring by providing corrective feedback to students after analysing the sentence construction and checking grammar in essays (Park, 2019). Also, translation in second language writing is facilitated by AI as it narrows the gap between skillful writers and weak writers as it suggests a range of vocabulary and provides syntactically correct sentences (Chon, Shin, & Kim, 2021).

As technology advances, there is a significant use of generative AI chatbots in the education sector. Generative AI is the technology that is capable of producing endless new responses based on customised prompts provided by the users (Kostka & Toncelli, 2023). Chatbots are AI programs that can communicate with both humans and computers in the form of text or audio in natural language (Nghi, Phuc, & Thang, 2019; Sameera & Woods, 2015). One of the famous generative AI chatbots is ChatGPT in which educators perceive it as a tool that can be integrated in the teaching and learning for vocabulary expansion and enhancing language fluency and communication by providing language support, conversational practices and access to information (Mabuan, 2024).

2.3 Metaverse

Metaverse is a three-dimensional computer-generated virtual space which allows users to interact with the digital contents and others using avatars or their own virtual representation (Johnson, 2012). It highlights three essential concepts which are interactivity, embodiment and persistence (Yen, Tsai, & Wu, 2013). The avatars which embody learners navigate freely within the virtual space to interact with the other avatars (Blascovich, 2002; Han, 2022). By doing so, learners can immerse themselves in a seemingly authentic context and practise interactive communications since Metaverse replicates real -world interactions (Li & Yu, 2023). Besides, the Metaverse virtual realm persists ensuring the uninterrupted preservation of data despite the users being disconnected from the virtual world or leaving the virtual environment (Abu-Sahih, 2022; Pujasari, Fatimah, Sri, & Sulastri, 2024).

The existing literature has shown that Metaverse is effective for language instruction considering the fact that the virtual environment offers opportunities for communication and collaboration (Kim, Lee, Lee, 2021; Pham & Tran, 2020; Zhang, Chen, Hu, & Wang, 2022). When students are immersed in an environment that is not possible via conventional learning, they find the learning process to be engaging, hence making them more motivated to learn (Kim, Kim, & Park, 2021;

Li & Yu, 2023). Besides, learning in a Metaverse environment is found to be able to promote cultural awareness as students can perform authentic communication with people of other cultures (Lee & Park, 2022). Examples of Metaverse platforms in current studies found effective for vocabulary learning and speaking include Gather.Town, ifland, FrameVR (Hwang, Shin, & Lee, 2023; Kim, Kim, & Cha, 2023; McClure & Williams, 2021).

2.4 Google Classroom

Google Classroom serves as a cloud-based platform that integrates Google applications such as Sheet, Docs, Slides, Drive and Calendar (Lin, 2021). It is a free user-friendly learning management system (LMS) which enables educators and students to track the teaching and learning process effectively because assignments can be assigned and submitted according to topics and the students' learning progress can be traced based on the scores and feedback given (Hulse, 2019).

There are many types of learning activities that can be planned under the three main features: Stream, Classwork and People (Cristiano & Triana, 2019). First and foremost, the Stream feature allows announcements, discussions, assignments and materials to be posted in the form of a stream that can be viewed by everyone in the class, hence facilitating communication and workflow by providing a one-stop centre for discussion forums and assigned assignments (Iftakhar, 2016; Zhang, 2021). Apart from that, under the Classwork section, educators can assign assignments, quizzes and materials to students in the form of topics and students will be able to receive feedback in the form of comments and scores (Miller, 2020). Moreover, the teacher can monitor the number of students in the class itself as students can only join the class via access code or email invitation (Miller, 2020; Zhang, 2021).

Due to the aforementioned features, many students experience a good online learning experience. Studies show that many students perceive Google Classroom as an effective learning tool as they can access the information in the portal via a variety of devices, for example, phones, laptops and tablets (Putra, 2020). Besides, the teacher-student and student-student interactions in the Google Classroom platform cultivates a collaborative learning environment (Khalil, 2018). Feedback and questions can be asked and given directly or privately to both educators and students, hence assisting shy students in learning (Wahyuni, Etfita, & Alkhaira, 2022). Furthermore, personalised learning can be realised because students can learn at their own pace (Zheng, Liang, Chai, Chen, & Liu, 2023).

Current literature shows that Google Classroom can be employed to teach all language skills: reading, speaking, listening, and writing (Albashtawi & Al-Bataineh, 2020). It is found to be effective in writing classes where students receive writing corrections from the feedback given by educators (Lin, 2021; Muslem, Mustafa, Rahayu, & Eridafithri, 2024). Besides, an integrated listening and speaking class can be conducted with the aid of Google Classroom as students can learn the target language by watching the experts in the videos (Isda, Imran, Purwati, & Rahmiati, 2021; Musa & Fojkar, 2019). Furthermore, reading comprehension can be improved when students access learning materials in an organised manner in the Google Classroom (Haggag, 2019; Jiemsak, 2021).

2.5 Related Theories

According to the social constructivism theory, language is acquired through social interactions between people (Vygostky, 1978). When one interacts with another person in the target language, knowledge regarding the target language is constructed via social discourse, hence improving language development and mastery of language.

When one takes charge of one's own learning, autonomous learning happens as the learner sets achievable goals based on his/ her own capabilities and devises strategies to achieve them (Willis, 2018). Self-directed learning can be more effective in language learning as one learns because of intrinsic motivation rather than extrinsic motivation.

Multimodal learning arises when the teacher employs various forms of inputs to engage students' multiple sensory systems and action systems (Massaro, 2012). When learning a language, other than using visual inputs and texts, auditory inputs can be introduced in the classroom setting to address learners of multiple needs.

According to cognitive load theory, educators should consider the cognitive load they are giving learners as human cognition requires a huge information store when dealing with novel information which is considered as secondary knowledge (Sweller, 2011).

2.6 Research Gap

Based on the synthesis of literature, researchers concluded that there has been little research being conducted on incorporating Metaverse in the development of learning tools considering that it is still at the stage of infancy. Besides, AI has been given heavy emphasis in learning language skills except listening. Hence, researchers decided to bridge the gap by studying how AI and Metaverse can be embedded in one of the famous LMSs: Google Classroom.

3. METHODOLOGY

The instructional system design approach, ADDIE model, was initially developed in 1975 by the Centre for Educational Technology at Florida State University (Budoya, 2019). According to Branch, 2010, it is an efficient approach for designing instructional learning materials, including multimedia technologies. ADDIE is an acronym representing the process: Analyse, Design, Develop, Implement, and Evaluate (Figure 1). Each phase of the ADDIE model may be reiterated until it fulfills the researcher's expectations and the objectives of the development process.

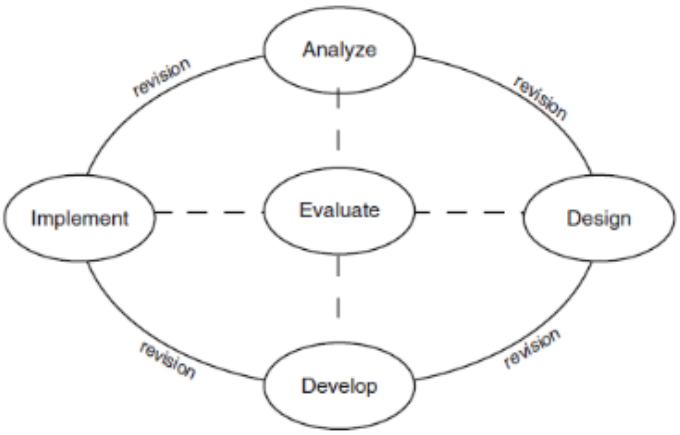

Figure 1: The ADDIE Concept (Branch,2021)

3.1 Analysis

The first phase is the Analyze phase. In this phase, a need analysis is conducted by carrying out interviews with educators and students in order to find out their problems about listening. This need analysis aims to identify the educators and students' learning needs, and the expectation of MetaListen.

Several critical concerns were detected. The initial issue concerns substandard audio quality. The educators assert that the current products frequently possess inadequate audio quality, hindering students' comprehension of the subject. Moreover, educators encounter difficulties in developing their own resources that accurately depict authentic listening situations. They would require an extended period to generate their original materials, and some may even need to record themselves reading the

text. In addition to that, the students perceive listening classes as merely repetitive exercises, which they find quite tedious. Furthermore, students receive inadequate direction and clarification on how to respond to the listening exam, and the listening exercises in the current textbook do not adhere to the format of the 119/4 English Listening Paper for SPM.

The instructional objective of MetaListen is to generate authentic B1-B2 level listening materials employing high-quality audio through AI technologies, including ChatGPT, Microsoft Copilot, and ElevenLabs for students aged 16 to 17 years who have poor listening skills. Additionally, the generated resources will be integrated into the Metaverse and Google Classroom to enhance student engagement while simultaneously enabling the monitoring of their progress.

3.2 Design

The design phase encompasses three primary areas: instructional methodologies, course organisation, and evaluation methods. Instructional strategies involve the selection of optimal methods, such as discussions, lectures, or simulations, aligned with the learning objectives and audience characteristics. The intended audience comprises 16 and 17-year-old students with deficient listening skills; thus, the materials developed are aligned with the B1 to B2 levels of the Common European Framework of Reference for Languages (CEFR). To guarantee the originality of the materials, they will be produced by AI utilising ChatGPT and Microsoft Copilot via specified prompts. Following that, the produced materials are included into Google Classroom, allowing educators to efficiently track students' advancement and performance. Furthermore, a Metaverse utilising the Spatial.co platform will cater to students who want alternatives to traditional classroom learning, providing them with increased autonomy to navigate the virtual classroom akin to a gaming experience. This will improve their engagement in the course and enable them to fulfil the requirements at their own pace.

The course organisation, encompassing the sequence of topics, activities, and evaluations to guarantee a coherent progression and optimal learning experience, is determined during this phase. The created listening resources will correspond with the SPM 119/4 English Listening Paper, and the Malaysian Form 5 Curriculum Framework. The particular listening abilities addressed include the following:

- Listening 1.1.1: Understanding the main ideas in extended texts on familiar and some unfamiliar topics.
- Listening 1.1.3: Recognizing attitudes or opinions in extended texts on familiar and some unfamiliar topics.
- Listening 1.1.6: Understanding longer, more complex narratives on familiar and some unfamiliar topics.
- Listening 1.2.1: Guessing the meaning of unfamiliar words from context clues
- Listening 1.3.1: Recognizing typical features at word, sentence, and text levels in a range of spoken genres.

In addition, the resources must encompass the themes presented in the textbook, including People and Culture, Consumerism, Health and Environment, and Science and Technology.

The assessment approach will involve administering a pre-test and post-test to students to evaluate their comprehension before and after the six self-conducted lessons. The scores will thereafter be gathered and examined to provide a more comprehensive understanding of the efficacy of the generated materials.

3.3 Development

In the Development phase, six lessons, each comprising two levels, are produced as arranged. Each lesson will encompass distinct themes and will concentrate solely on one specific aspect of the SPM 119/4 English Listening Paper. The objective of the first level for each class should concentrate on

employing basic phrases to facilitate student comprehension, while the next level aims to help students to become accustomed to the format.

The transcripts for listening are generated by AI utilising ChatGPT and Microsoft Copilot, both of which offer complimentary services to all users. The prompts used must encompass a topic , word count, format, and the learning objective. Figure 2 shows the example of the prompt utilised to produce content in Lesson 1.

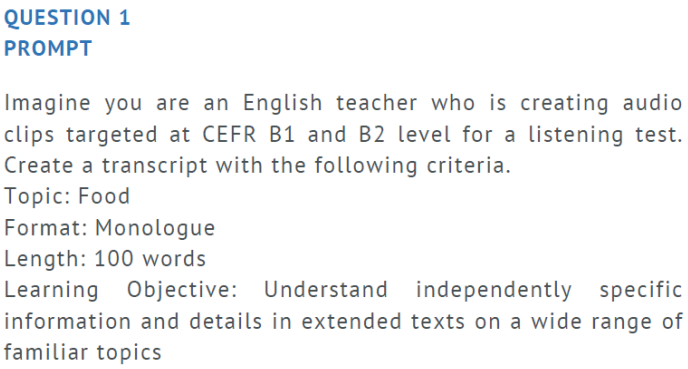

Figure 2: The prompts for Lesson 1, taken from the Teacher's Guidebook, page 5.

Furthermore, AI is utilised to generate questions for each section of the lesson based on specific prompts. A more detailed description is necessary to ensure that the generated questions meet expectations. The prompt should at least include the type of questions, the number of options, and clear instructions on how to handle the provided choices. If the generated questions are not satisfying, further elaborations are required. Figure 3 illustrates the prompts for the questions in Lesson 1.

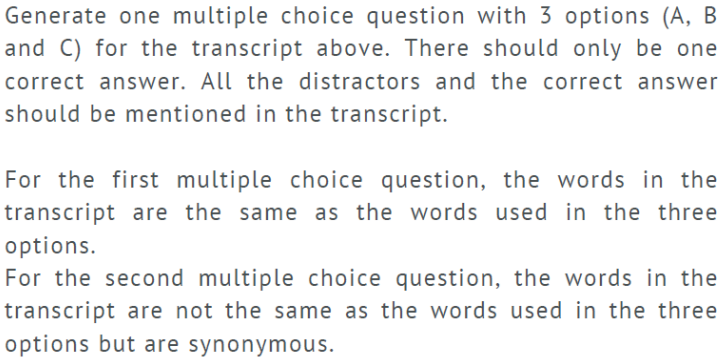

Figure 3: The prompts for questions in Lesson 1.

AI is also employed to produce video lessons corresponding to each segment of the course. Initially, a Word document is generated, containing the script and notes relevant to the curriculum. This document is subsequently converted into a presentation slide using Canva. The slide is then uploaded to VEED.io, which automatically generates a video featuring a real person avatar articulating the content presented in the slide. The video was then uploaded to Youtube so that it would be easier to share with others. An example of the video created with VEED.io is depicted in Figure 4.

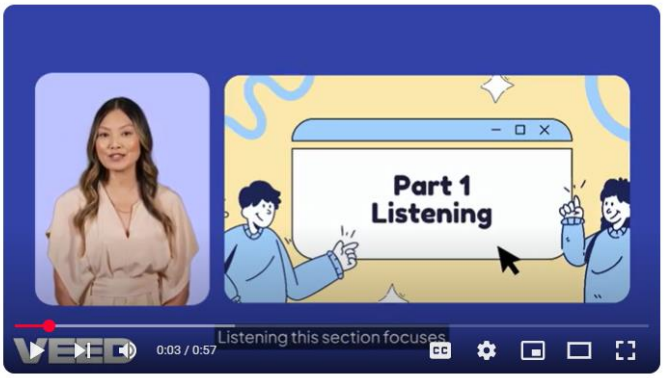

Figure 4: Lesson one video made by VEED.io

Upon completion of the transcripts, various voice-generatedAI programs, such as EleventLabs, Voice AI, TTSMaker, and Luvvoice, are chosen to produce the audio recordings. An example is the production of audio utilising ElevenLabs. Prior to selecting the text-to-speech functions, one must first authenticate their account. Thereafter, the transcript is posted to the specified site. The creators will specify the type of voice to be utilised prior to audio generation. This may be executed according to the description and origin of the voice supplied by the platform. Before the speech is generated, the voices are conveyed via text. Creators promptly download the content upon its creation, then convert it into videos and are uploaded to YouTube. Figure 5 shows an example of the view encountered at EleventLabs.

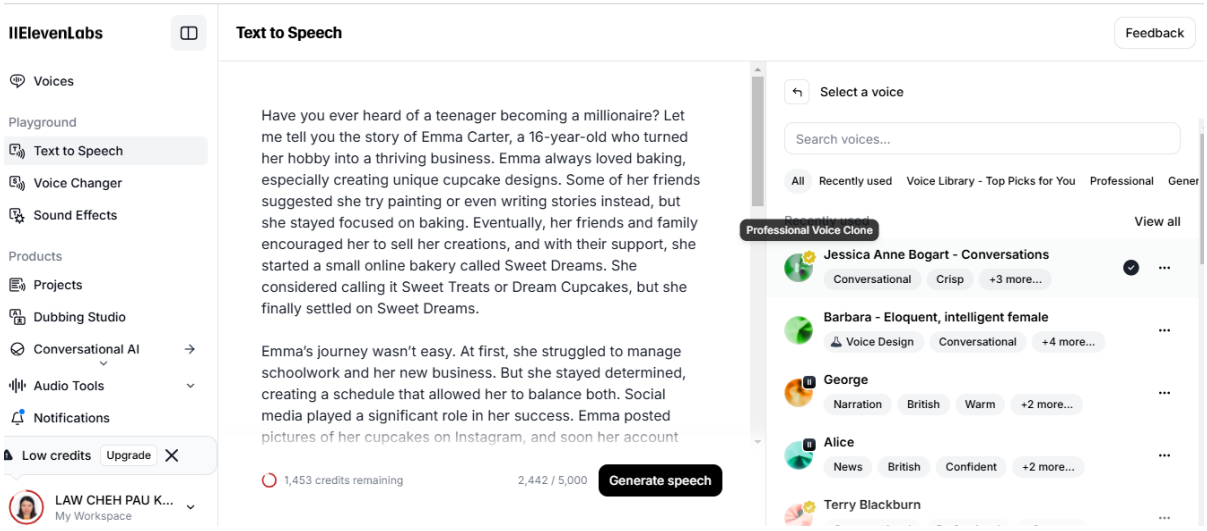

Figure 5: The process of converting text to speech in ElevenLabs.

A Metaverse environment was created utilising Spatial.co enabling students to explore and interact with the material. This platform is selected due to its superior 3D graphics quality relative to other metaverse systems. It affords producers greater autonomy to design and personalise their space with music, video, notes, and various media kinds, or one may choose to customise an existing template offered by the site. Moreover, Spatial.co is very accessible where it can be accessed through desktop browsers or even on a mobile device.

A Jurassic Park-themed space is constructed from the ground up to provide a game-like atmosphere for the students. Several stations were established in the Metaverse, comprising videos, portals, and notes. The videos are published to the Metaverse and are typically positioned adjacent to a link for the quiz. Upon encountering the video, pupils may click on the magnifying glasses to view it.

Numerous portals have been established and dispersed throughout the Metaverse. Two categories of portals have been established. One will direct pupils to the quiz created, while the other will transport them to a different area. Annotations and directional arrows are positioned throughout the Metaverse to direct pupils towards the appropriate path and elucidate the portal's purpose. Figure 6 illustrates an example of the Metaverse.

Figure 6: An example of the Metaverse

In order to provide teachers with the ability to track the progress of their students and supervise their tasks, Google Classroom was created. Because of its accessibility for both students and teachers, as well as its many functionalities, such as integrated quizzes and scoring systems, Google Classroom was selected as the classroom management system of choice. An additional benefit is that navigating within Google Classroom is straightforward. The ability to easily recreate the complete class and all of its resources is available to educators. The prepared materials are currently being transformed into a quiz, and they have been uploaded to Google Classroom and organised in the appropriate manner. An illustration of a Google Classroom that was constructed can be seen in Figure 7.

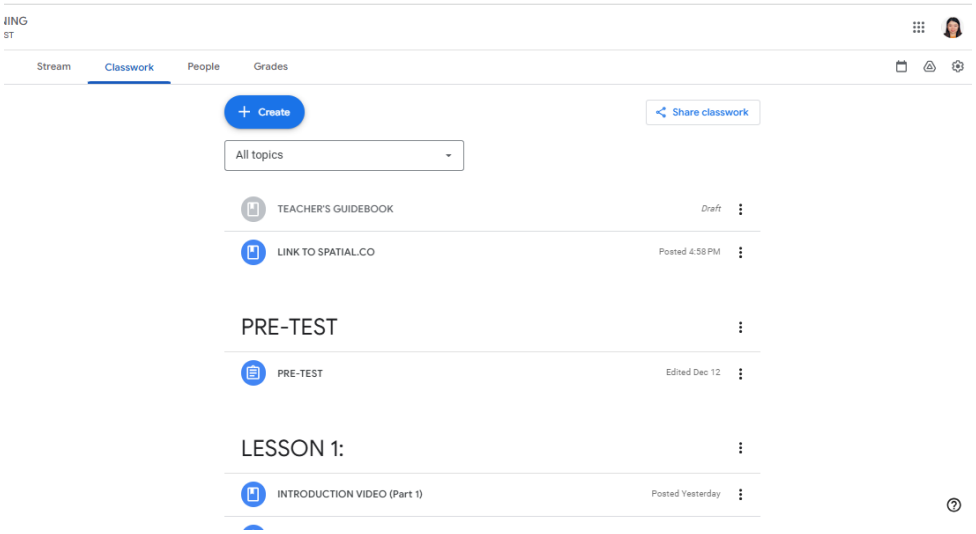

Figure 7: An example of the view in Google Classroom.

A pilot test is conducted during this phase with a limited group of students and educators to collect preliminary feedback. Feedback indicates that instructions for educators on utilising AI to

develop their own materials are unclear. A teacher guidebook has been developed and incorporated into Google Classroom to aid educators in the creation of their own materials. Additionally, some students invest excessive time loading the metaverse, which frequently experiences crashes. They find navigating the environment to be confusing as well. Therefore, the six lessons are also provided in Google Classroom to assist students experiencing difficulties accessing the Metaverse.

3.4 Implementation

In the Implementation phase, a group of 40 students are chosen to join the Metaverse and Google Classroom environments. In this stage, educators are provided with simple instructions on how to guide students to use the Google Classroom and navigate through Spatial.co. Tutorials are also given to teach educators on how to duplicate the Google Classroom to make it as their own so that they can reuse it in the future. As an additional point of interest, the teacher's manual is being published to Google Classroom in the form of a draft, with the intention of restricting its accessibility to just the educators.

3.5 Evaluate

A pre-test is administered to two groups, each consisting of 40 students. The marks are subsequently collected. One group will then implement the intervention by completing the six lessons. A post-test was subsequently administered to the same groups of students. The marks are analysed quantitatively to evaluate improvements in listening skills and the overall effectiveness of the instructional materials through statistical analysis.

4. FINDINGS

4.1 Increase in Listening Scores for Control and Treatment Groups

Table 1. Increase in listening scores for control and treatment groups.

Control group (without MetaListen intervention)		**Treatment group (with MetaListen intervention)**	
Participant	**Increase in listening scores (Post -Pre)**	**Participant**	**Increase in listening scores (Post -Pre)**
1a	1	1b	6
2a	5	2b	7
3a	2	3b	7
4a	3	4b	6
5a	4	5b	6
6a	5	6b	3
7a	4	7b	6
8a	3	8b	5
9a	4	9b	4
10a	1	10b	8
11a	1	11b	7
12a	3	12b	7
13a	5	13b	5
14a	4	14b	6
15a	2	15b	4
16a	3	16b	3
17a	0	17b	6
18a	3	18b	8
19a	4	19b	8
20a	2	20b	5
21a	6	21b	5

22a	2	22b	4
23a	0	23b	7
24a	2	24b	8
25a	3	25b	6
26a	5	26b	7
27a	2	27b	2
28a	2	28b	5
29a	3	29b	4
30a	3	30b	5
31a	5	31b	5
32a	1	32b	7
33a	2	33b	6
34a	4	34b	5
35a	3	35b	5
36a	2	36b	4
37a	4	37b	4
38a	1	38b	5
39a	0	39b	4
40a	4	40b	3

Treatment group of 40 students (n_1=40) were given intervention with MetaListen whereas control group of another 40 students (n_2=40) were not given MetaListen intervention. The increase in listening scores are obtained by subtracting pre-test listening scores from post-test listening scores for each group respectively *(Post-test– Pre-test)*, before being used for parametric test (Refer Table 1).

4.2 Test of Normality for Control and Treatment Groups

Table 2. Tests of Normality for control group (without intervention) and treatment group (with intervention).

	Shapiro-Wilk test		
	Statistic	**df**	**Sig.**
Score (control group)	0.953	40	0.098
Score (treatment group)	0.951	40	0.084

Since a small sample size, n=40 (n<50) was used, determining the distribution was important to choose an appropriate statistical method. Thus, a Shapiro-Wilk test was performed and did not show evidence of non-normality, W(40) = 0.95, p-value = 0.10 for the control group and W(40) = 0.95, p-value = 0.08 for treatment group (Refer Table 2). Based on this outcome, we decided to use a parametric test.

4.3 Levene's Test for Equality of Variances

Table 3. Levene's Test for Equality of Variances for control and treatment groups.

		Levene's Test for Equality of Variances	
		F	**Sig.**
Score	Equal variances assumed	0.013	0.911
	Equal variances not assumed		

The significance of 0.911 is greater than 0.05, null hypothesis is failed to be rejected and there is no difference between the variances of the two groups (Refer Table 3).

4.4 Independent Samples t-test

Table 4. Independent samples t-test.

	N	**Mean**	**SD**	**t**	**df**	**p**	**η2**
Control group	40	2.825	1.534	-7.650	78	< 0.01	0.429
Treatment group	40	5.450	1.535				

An independent sample t-test was conducted to compare and test the statistical significance of learning listening with or without using MetaListen on students' listening performance (Table 6). There is a significant difference between the control group (without MetaListen intervention) and treatment group (with MetaListen intervention) with $t(78)= - 7.650$, $p<0.01$. The mean listening score increase of students using MetaListen (treatment group) was 5.450 [95% CI= -3.308 to -1.942], higher than the mean listening score increase of students not using MetaListen (control group) which was 2.825. Since $\eta 2 = 0.429$ indicated a large effect, the means of score increase between students not using MetaListen (control group) and students using MetaListen (treatment group) were very likely different (Refer Table 4).

In short, there is a significant difference between the listening performance of students learning listening using MetaListen and that of the control group.

5. DISCUSSION

The findings from this study using independent samples t-test indicated a significant difference and improvement in listening scores for students who used the MetaListen platform compared to those who did not use MetaListen. The treatment group, which utilised MetaListen, showed a higher mean increase in listening scores of 5.450 than that of the control group (2.825). This difference was statistically significant with a p-value of less than 0.01, indicating that the intervention had a substantial impact on students' listening abilities. The results also suggest that the MetaListen that integrates AI, the immersive environment of the Metaverse and Google Classroom, is an effective tool for enhancing listening skills in students. By providing a rich, multimodal learning environment, MetaListen facilitates better cognitive processing and retention of listening material (Mayer & Moreno, 2003).

5.1 Metaverse in MetaListen

Metaverse incorporated in MetaListen offers engaging and immersive learning experiences with interactive virtual environments to students, to promote active engagement and knowledge retention to significantly enhance English listening lessons. This is because students find learning more engaging and are motivated to learn when they are immersed in an environment distinctly different from conventional learning (Kim, Kim, & Park, 2021). MetaListen incorporates metaverse which creates engaging and authentic learning experiences making English listening practice more effective and enjoyable (Jiao et. al., 2024), enhancing students' listening performance.

5.2 Google Classroom in MetaListen

MetaListen incorporates Google Classroom as Google Classroom is very effective in improving all language skills individually or in an integrated mode of teaching in English language teaching (Albashtawi & Al-Bataineh, 2020). Google Classroom is also chosen for MetaListen as it is a tool known for its structured and interactive learning environment that enhances students' language learning outcomes, including listening skills (Perumal & Jalaluddin, 2023). Google Classroom offers real-time feedback and multimedia integration, making it easier for students to engage with listening materials and improve their comprehension. Moreover, Google Classroom platform allows differentiated

learning and instruction, as shown in 2 levels of difficulties utilised for each lesson of MetaListen, to meet the different needs of Form 5 students (Ketut Sudarsana et al., 2019). With Google Classroom within MetaListen, various listening materials can be uploaded like tutorial videos and various fun quizzes in which students can access the materials anytime and anywhere (Perumal & Jalaluddin, 2023). Budhwar (2017) also stated that technology leads to continuous learning as students can learn anytime and anywhere. With electronic gadgets like smartphones, desktops, tablets and laptops easily available, learning anywhere has become practical and easy (Perumal & Jalaluddin, 2023), allowing Google Classroom to be convenient for SPM English listening practice and learning. Therefore, MetaListen allows students to revise and reattempt the Listening practices in school and at home via Google Classroom, improving their listening performances. At the same time, MetaListen could facilitate autonomous learning among students anywhere anytime and aids teachers in conducting flipped classrooms for SPM listening lessons, rendering MetaListen to be practical in English educational settings.

Additionally, Google Classroom is chosen to upload videos and quizzes for MetaListen because students find it user-friendly as it is easy to use, learn and use as an e-learning medium (Jannah et al., 2020). Google Classroom meets students' needs for a simpler interface, allowing more interaction (Heggart & Yoo, 2018), making it suitable for MetaListen while tackling SPM listening exercises. Students also perceive Google Classroom as helpful and worthwhile (Harefa, 2020; Izenstark & Leahy, 2015; Zulkifli & Kassim, 2021), making Google Classroom a suitable hub to aid students to access listening practice materials in one stop easily for MetaListen. Thus, with factors that make Google Classroom a favourite includes easy access to the Internet, the ability to load various images and videos, easy tracking of student assignments, grade transparency, regulatory language, and saving on paper consumption (Perumal & Jalaluddin, 2023), MetaListen could engage students to practise SPM listening exercises without hassle with multimodal learning. Besides, MetaListen used Google Classroom that linked to a listening module and online quizzes. The quizzes are fun and interactive, incorporating game-based learning like Quizizz and Google Form. The online quizzes provide immediate feedback for student responses which facilitates autonomous learning. With immediate feedback in a timely manner, students can focus on their learning without being burdened with information overload (Erdoğmuş & Kurt, 2023).

5.3 Artificial Intelligence (AI) in MetaListen

MetaListen leverages AI, especially Copilot, to generate questions for quizzes, audio transcripts, and audio clips for English listening practice. The ability of AI to produce fresh and relevant content on demand ensures that listening materials of MetaListen remain up-to-date and closely aligned with real-world language use, thus enhancing the overall learning experience (Erdoğmuş & Kurt, 2023). AI like Copilot enables educators to swiftly generate any types of context-relevant learning materials (Duan, 2023; Lalonde, 2023; Lo, 2023) and a more diverse, comprehensive, and inclusive Open Educational Resources (OER) (Bozkurt, 2023).

Moreover, MetaListen uses AI, Elevenlabs, a "text-to-speech" system that converts AI-written texts into speech, essentially making it an AI-powered voice generator. AI-powered voice generators used to produce robotic sounds and mechanical voices in the past; however, with advancements in technology, they have evolved to generate more human-like voices (Taylor, 2009). Hence, this would make the audio quality of the audio clips for Listening practice in MetaListen consistent and greatly audible as compared to human voice overs that may have accents incomprehensible to students. Therefore, students would engage and prefer to use MetaListen as it uses AI, closely aligned with Form 5 English syllabus and simulates real-life situations in language practices, for instance, interview between two people, alongside its consistent quality of Listening audio. This makes learning listening more engaging, effective and worthwhile.

5.4 Replicable AI prompts for educators

A distinguishing feature of MetaListen from other English language learning platforms is the inclusion of detailed, replicable AI prompts for English educators in the Teacher's Book of MetaListen. The prompts serve as a step-by-step manual and guidelines for other English language teachers to utilise AI, specifically Copilot, to create their own instructional and student assessment materials, similar to MetaListen, for SPM Listening practice in English pedagogical settings. The replicable AI prompts are detailed and easy-to -follow for English teachers to generate audio transcripts, audio clips, quiz questions and answers to enhance students' listening performance.Since AI's capability to quickly produce any kinds of context-relevant learning materials supports teachers in delivering tailored and dynamic content (Duan, 2023; Lalonde, 2023; Lo, 2023), the prompts for AI utilisation from MetaListen is likely to have a substantial impact on English language teaching for listening skill, thereby improving the educational experience for both teachers and students.

5.5 Scaffolding in MetaListen

Another plus feature of MetaListen as compared to conventional listening instruction is that it provides scaffolding in two distinct difficulty levels for each lesson for Listening practice. Since listening is treated as one of the most difficult skills to learn and consequently to teach (Rost, 2011), scaffolding during instruction or practice is essential for students. Scaffolding is considered as the support from teachers given to students, tailored to students' needs to fulfil learning goals (Gibbons, 2015; Reiser & Tabak, 2014). For instance, collaborative scaffolding strategies were effective in enhancing Iranian English learners' listening comprehension (Shabani & Malekdar, 2016). Talebinejad and Akhgar (2015) also confirmed the significant impact of the teacher's scaffolding on listening achievement in male and female EFL learners. Besides, scaffolding can minimise the English learners' level of frustration (Kamil, 2017; Reiser & Tabak, 2014; Vacca, 2008), especially those who get easily frustrated while facing challenging tasks. Nevertheless, MetaListen serves the purpose to alleviate weak and intermediate students' frustration during listening practices with two different difficulty levels of each lesson for scaffolding, further improving their listening performance as compared to students without the intervention.

6. CONCLUSION

This study aimed to evaluate the effectiveness of MetaListen as a learning tool for improving SPM students' listening skills, comparing it with conventional methods. The findings from independent samples t-test revealed a significant improvement in listening performance for the treatment group utilising MetaListen compared to the control group without MetaListen. By integrating AI, the Metaverse, and Google Classroom, MetaListen provided a rich, multimodal learning environment.that facilitated better cognitive processing and retention of listening material. First, the Metaverse enabled immersive and interactive learning experiences. Second, the structured, interactive platform of Google Classroom proved user-friendly, supporting differentiated learning and effective listening skill improvement. Third, AI generated context-relevant and consistent-quality learning materials for English listening. Fourth, the scaffolding provided in MetaListen supported students' learning processes effectively. Finally, the Teacher's Book with replicable AI prompts enhanced the overall educational experience for both teachers and students, making MetaListen a comprehensive tool for English listening practice.

However, the study faced limitations, including a relatively small sample size and short duration, which may affect the generalisability of the results. Future research should explore long-term effects and larger diverse populations to confirm these findings. Additionally, as Metaverse and AI

technologies continue to evolve, further studies should investigate their potential to offer even more personalised and adaptive learning experiences. This research provides a promising foundation for the continued integration of advanced technologies in language education, particularly in improving listening skills.

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