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DESIGNING VR STAGE MASTER: A VIRTUAL REALITY APP FOR OVERCOMING PUBLIC SPEAKING ANXIETY

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ABSTRACT

Public speaking anxiety (PSA) has long been a challenge for students, particularly those studying English as a second language in Malaysian polytechnics. While effective communication skills are essential for academic and professional success, fear of public speaking lingers, harming confidence and performance. Despite increased access to information in the digital age, effective ways to reduce speaking anxiety remain limited. This study introduces VR Stage Master, a Virtual Reality (VR) tool designed to assist students practice public speaking in virtual, immersive surroundings. The tool functions as a digital coping method, reducing PSA while increasing communication confidence. VR Stage Master was designed and developed using the Design Thinking Process (Empathise, Define, Ideate, Prototype, and Test), which ensures that the application is user-centric and effective. The process includes surveys and observations to better understand user behaviour and anxiety responses. Existing VR therapies and best practices were examined to guide the app's development. Initial data indicate that the VR software was well-received as a novel tool for managing PSA. After several sessions, students reported feeling more comfortable and willing to speak in public. As a result, VR Stage Master not only assists educators, but also enables students to practise consistently and autonomously. This approach frames VR as a therapeutic and instructional tool for solving one of the most persistent issues in student communication.

1. Introduction

English is widely used as the medium of instruction in most higher learning institutions across Malaysia, including polytechnics, where the majority of courses, reference materials, assessments, and examinations are conducted in English. As a result, students are expected to attain a certain level of proficiency in all four language skills—listening, speaking, reading, and writing. Among these, speaking is consistently perceived as the most challenging for learners, particularly those studying English as a Second Language (ESL). According to Zhang (2009), "speaking skill continues to be the most difficult skill to learn for most English language learners." This difficulty arises from the multifaceted nature of speaking, which requires real-time mastery of grammar, vocabulary, pronunciation, fluency, and comprehension. ESL

learners often struggle to express themselves spontaneously, especially in public speaking situations, where anxiety levels can be significantly heightened (Russell & Topham, 2012; Marinho et al., 2017).

In the Malaysian polytechnic context, oral communication skills in English are a key requirement for graduate employability and workplace professionalism. Polytechnic students frequently engage in communication-related tasks such as academic presentations, interview simulations, and industrial training. Many English as a Second Language (ESL) students still have problems in these areas, especially when they have to speak in front of a group, which is often linked to public speaking anxiety (PSA). "Public speaking anxiety is still a big problem for college ESL students" (Marinho et al., 2017; Russell & Topham, 2012). This worry is often caused by a number of deeper problems. First, processing verbal answers in real time can be too much for students who aren't very fluent or confident, which can make it harder for them to communicate clearly (Yasuda & Nabei, 2018). Second, people who are afraid of being judged or making mistakes often don't speak up or stay quiet, which slows down oral growth even more (Marinho et al., 2017). Third, a lack of natural fluency is caused by not having much language exposure outside of school, since many ESL students only use organised academic settings to practise English.

These problems make people feel less confident and make them avoid talking to others, which has been seen in Malaysian college students. In line with this, the 2024 Industrial Training Unit report from Politeknik Tuanku Syed Sirajuddin (PTSS) showed that students got average scores in communication and English-speaking skills when judged by their industrial managers (Figure 1). This result shows that there is a big disconnect between learning a language in a classroom and the communication needs of real-life workplaces. To fill this gap, Yasuda and Nabei (2018) suggested two types of ways to deal with language-related anxiety: functional and effective. Functional strategies focus on using strategies in real-life situations, while effective strategies require regular use. The use of technology-based tools, especially Virtual Reality (VR), has shown promise in supporting these kinds of methods. Virtual reality (VR) creates worlds that are immersive, repeatable, and controlled in a way that looks and feels like real life. "Virtual reality (VR) lets students practise speaking in realistic, low-risk settings" (Lister, 2020; Anderson et al., 2013). VR is also known to make students more interested and motivated to learn.

Figure 1. Average English communication skill scores of PTSS students in 2024, as rated by industry supervisors

In response to this educational need, the present study focuses on the development of a VR-based application called VR Stage Master. This system is specifically designed to assist ESL students in polytechnics with public speaking practice in simulated environments. The application adopts the Design Thinking framework to ensure user-centric development, comprising phases such as empathise, define, ideate, prototype, and test. “Design Thinking focuses on understanding user needs through iterative development” (Brown, 2009). The development process involves needs analysis, VR environment design, software and hardware selection, functional prototypes, and preliminary usability testing. Instead of assessing the system's performance at this level, the study emphasises the whole development cycle of a context-specific instructional VR tool that could help ESL learners overcome public speaking anxiety.

2. Materials and Methods

The Design Thinking approach, which is a user-centred and iterative way to solve problems, was utilised to make the VR Stage Master app. There are five primary steps in this approach: Empathise, Define, Ideate, Prototype, and Test/Evaluate. It helps make sure that the application really satisfies the needs of its users, especially ESL polytechnic students who have trouble with public speaking anxiety (PSA). Each step was done in a planned way to make sure that the system was designed and built correctly.

2.1 Phase 1: Empathise (Understanding User Needs)

The first step in the Design Thinking process is to get a comprehensive understanding of the demands, problems, and real life of ESL polytechnic students who get anxious when they have to speak English, especially in public. To do this, a survey based on Abu-Rabia's (2004) Public Speaking Class Anxiety Scale (PSCAS) was created and given to 30 students at Politeknik Tuanku Syed Sirajuddin (PTSS) from Semester 1 to Semester 5.

To have a better idea of the students' backgrounds and requirements, the survey was split into three primary parts:
Section A focused on their experience with public speaking,
Section B measured their level of speaking anxiety, and
Section C explored their readiness to use a VR-based training application.

The summary of findings from each section is presented in the table below.

Table 2.1: Summary of Student Feedback – Public Speaking Experience, Anxiety, and VR Readiness (N=30)

Section	Key Item	Main Result	Insight
Speaking Experience	Have you ever spoken in front of a class/group in English?	76.7% Yes	Most have experience but may still lack confidence.
	Do you feel comfortable speaking in public?	46.7% Yes	Half feel discomfort – need for confidence support.
	Have you avoided presenting due to fear?	60% Yes	Anxiety leads to behavioural avoidance.
Speaking Anxiety	I feel nervous when I speak in English.	56.6% rated level 4 or 5	High anxiety level (cognitive).
	I fear forgetting what to say.	66.6% rated level 4 or 5	Shows need for visual aids and guided prompts.
	I worry about making mistakes.	70% rated level 4 or 5	High fear of judgement – key for stress reduction.
	My heart races when I speak publicly.	60% rated level 4 or 5	Strong physiological symptoms reported.
	I prefer others to speak or present for me.	63.4% rated level 4 or 5	Suggests low self-agency and high avoidance.
VR Readiness	Are you interested in trying a VR app for public speaking?	100% Yes	Excellent buy-in for VR-based interventions.
	Do you think VR can help you gain confidence?	96.7% Yes	Strong belief in virtual learning's potential.

2.2 Phase 2: Define (Problem Definition)

During this step, the main concerns that users have are clearly stated based on the answers to the questionnaire given out during the empathise stage. The study found that ESL students in Malaysian polytechnics who are afraid of speaking in front of others have three main types of anxiety: cognitive, behavioural, and physical. Students are afraid of forgetting what they've learnt or making mistakes with language. Many people tend to avoid discussing chores altogether when it comes to behaviour. In terms of the body, symptoms including a faster heart rate, perspiration, and nervous tension are prevalent.

The design of the VR Stage Master app is based on two well-known frameworks: the User-centred Design (UCD) approach and the Cognitive-Affective Theory of Learning with Media (CATLM) (Moreno & Mayer, 2007). These frameworks help the app deal with these difficulties in a targeted and organised fashion. UCD makes sure that the system meets the wants and problems of users, while CATLM stresses how important emotions are in multimedia learning settings. Theories like presence in VR and peer-assisted learning also help shape the addition of features like real-time immersion, motivational reminders, and social support. These theoretical foundations are then mapped directly to functional elements in the system. (refer: table 2.2)

Table 2.2 : Mapping of public speaking anxiety (PSA) symptoms to theoretical foundations and proposed VR design features in the VR Stage Master application

Identified Problem (PSA Symptom)	Theoretical Foundation	Proposed VR Design Feature
Fear of forgetting content or making mistakes	Cognitive-Affective Theory (CATLM); Cognitive Load Theory	Visual notes, guided prompts, virtual facilitator voice
Avoidance of speaking tasks	Exposure therapy principle (Anderson et al., 2013); UCD	3-level speaking modules (Easy → Medium → Hard) with increasing realism
Physical symptoms (sweating, heart racing)	Theory of VR presence (Slater, 2003); Affective immersion	Safe, repeatable VR simulations with realistic but controlled settings
Lack of peer support and encouragement	Vygotsky's Social Constructivism; Peer-Assisted Learning Models	Virtual audience with positive feedback cues (applause, nodding)
Difficulty tracking personal improvement	Self-regulated learning theory (Bandura, 1997)	Built-in self-assessment after each session

2.3 Phase 3: Ideate

Based on the ideas and theories uncovered in the previous phase, the proposed VR Stage Master system includes a number of new elements that are meant to help ESL polytechnic students deal with their fear of public speaking. The system has three levels of difficulty: Easy, Medium, and Hard. This enables students slowly get better at speaking. They start with fully supervised sessions where the facilitator gives them text and ideas, and they end with spontaneous speech in front of virtual audiences that react. We leverage social constructivist style of learning to add virtual peer support by include peers who demonstrate positive social cues like clapping, nodding, and giving encouraging comments. The system also includes a virtual facilitator and helpful prompts that give both technical help and motivational reminders. This is meant to lower the cognitive load and make it easier to process information in a structured way, following the Cognitive-Affective Theory of Learning with Media (CATLM). After each session, students use reflection questions (such "How confident was I today?" or "What can I do better next time?") to do interactive self-assessment. This helps them become more conscious of their own thinking and develop on their own. Finally, the app lets you practise public speaking in safe, realistic settings like classrooms, auditoriums, and meeting rooms. This is based on the idea of controlled exposure therapy in VR (Anderson et al., 2013; Slater, 2003).

2.4 Stage 4: Prototype

During this phase, the design concepts developed in the Ideate stage were converted into a practical prototype called VR Stage Master. The functional prototype was created on 3D Vista 2023, a platform designed for constructing interactive panoramic virtual environments and was implemented on Meta Quest 2 VR headsets. The design execution adhered to the essential characteristics derived from user requirements and theoretical principles established in previous phases.

2.5 Phase 5: Application Evolution

The last step in making an application is to improve the prototype so that it meets both user needs and possible market needs. At this point, changes are made based on how the product is used in the real world, how well it works technically, and what early users think of it. Once the beta version of the VR Stage Master is done, it will be tested with a group of ten target users who are ESL students at Polytechnic Tuanku Syed Sirajuddin (PTSS). This will help the developers gain feedback on how easy it is to use, how engaging it is, and how useful the features are. This iterative testing will help us make more improvements, such as optimising the interface, changing the content, and adding new features as needed. The goal of this evolution process is to turn the application from a workable prototype into a completely useable product that can be scaled up or used more widely in educational institutions.

3. Results

The final prototype of VR Stage Master brings together all the main design ideas that were thought of in the earlier stages of the design thinking process. The three-tier public speaking module is the most important part of the program. It has Easy, Medium, and Hard levels, each of which is designed to gradually increase the user's cognitive and emotional engagement, which in turn increases immersion and skill-building (Figure 3.1). This scaffolding approach ensures learners can gradually transition from guided speech practice to high-pressure, spontaneous delivery, supporting the principles of graduated exposure and cognitive-affective learning.

The system includes a virtual peer audience that responds to the user's performance through animated gestures such as clapping, nodding, or neutral facial expressions, in addition to the tiered module. This is intended to simulate the social feedback that is common during real-life presentations (Figure 3.2). A virtual facilitator is integrated into the experience to offer motivational prompts, delivery advice, and general support, thereby reducing anxiety and enhancing user engagement through simulated mentorship. This is complemented by visual aids—including speech text and key-point outlines—for the Easy and Medium levels, which serve to reduce cognitive overload and enhance learner focus (Figure 3.3).

At the end of each session, learners are presented with an interactive self-assessment panel, prompting reflection on confidence, content delivery, and areas for improvement. This feature reinforces metacognitive awareness and supports self-regulated learning practices. Furthermore, all simulations are hosted in carefully crafted virtual environments that replicate common public speaking contexts such as classrooms with high realism to align with presence theory and promote affective authenticity in the learning experience (Figure 3.4).

Collectively, these features demonstrate that the VR Stage Master prototype is not only technically functional but also pedagogically aligned with learner needs and psychologically responsive to the factors contributing to public speaking anxiety among ESL students.

Figure 3.1 Three-tier public speaking module

Figure 3.2 Virtual peer audience

Figure 3.3 Virtual Facilitator

Figure 3.4 Interactive self-assessment

4. Discussion

The VR Stage Master prototype was successfully developed, integrating key components such as the progressive speaking module (Easy, Medium, Hard), virtual facilitator, peer audience, visual aids, and interactive self-assessment. These features were designed based on established learning theories and user requirements identified during the earlier design phases.

The tiered structure allows learners to gradually build confidence, aligning with principles of graded exposure therapy (Anderson et al., 2013). The inclusion of a virtual facilitator and visual prompts reduces cognitive load and enhances information processing, in line with the Cognitive-Affective Theory of Learning with Media (Moreno & Mayer, 2007). Meanwhile, virtual peer support increases motivation and positive emotional engagement, reflecting Vygotsky's Social Constructivism (1978).

The self-assessment panel encourages reflection and self-regulation, supporting Bandura's Self-Regulated Learning Theory (1997). Additionally, the use of realistic virtual environments enhances presence, making practice sessions more immersive and emotionally impactful (Slater, 2003).

Overall, the prototype meets the study's objectives by providing a safe, flexible, and authentic platform for ESL polytechnic students to practise public speaking. It demonstrates strong potential as an innovative learning tool within the Malaysian TVET and ESL education context.

5. Conclusion

In conclusion, this study details the design and development of VR Stage Master, a virtual reality application created to help ESL students in Malaysian polytechnics overcome public speaking anxiety. Using the Design Thinking framework, the system was developed through five phases—Empathise, Define, Ideate, Prototype, and Application Evolution—ensuring alignment with learner needs and pedagogical theory. The final prototype includes a tiered speaking module, virtual facilitator, peer audience, reflective self-assessment, and immersive real-world environments, all designed to support communication skill-building in a safe, authentic setting. Grounded in theories of presence, cognitive-affective learning, self-regulated learning, and social constructivism, VR Stage Master offers a context-sensitive and user-centred approach to language learning. While the focus of this paper is on the development process, future research will involve evaluating usability and educational outcomes. Ultimately, the application holds strong potential as a transformative tool for supporting communication competence among ESL learners in the TVET sector.

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