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Enhancing Aviation English Speaking Skills through Virtual Reality-Assisted Language Learning: Insights from Vocational College Teachers in China

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Abstract

This study explores ESL teachers' perceptions of integrating Virtual Reality-Assisted Language Learning (VRALL) into English for Specific Purposes (ESP) instruction, specifically within aviation English programs in vocational colleges in China. Using a qualitative exploratory design, semi-structured interviews were conducted with six aviation English instructors. Thematic analysis revealed four key findings: VRALL significantly enhanced student engagement and oral communication confidence; students initially experienced disorientation but adapted quickly, leading to increased motivation; teachers faced challenges including misaligned VR content, insufficient training, and technical limitations; and educators suggested improvements such as customized VR scenarios, deeper integration into curricula, and structured teacher training. The findings largely align with previous research on VRALL benefits and barriers, while providing new insights into its application in aviation-specific ESP contexts. This study highlights the necessity of authentic content development, institutional support, and professional development for successful VRALL implementation. Future research should expand to other ESP fields, incorporate student outcomes, and examine the long-term impact of VRALL adoption on language proficiency and professional readiness.

Keywords: Virtual Reality-Assisted Language Learning (VRALL), English for Specific Purposes (ESP), Aviation English, Teacher Perceptions, Vocational Education

Introduction

English for Specific Purposes (ESP) instruction in Chinese vocational colleges faces persistent challenges, particularly in developing students' oral proficiency. Despite the inclusion of ESP English courses tailored to fields like tourism, aviation, and healthcare, many vocational students graduate with limited speaking skills. Surveys and studies have identified speaking as one of the most difficult areas for Chinese EFL learners (Huang et al., 2022). Traditional teaching in vocational ESP programs often remains exam-oriented and teacher-centered, emphasizing grammar and rote memorization over communicative practice (Jiao et al., 2021). As a result, even after years of English study, students often struggle to communicate

effectively in professional contexts. This gap between curriculum goals and oral English outcomes underscores the need for innovative approaches to improve ESP speaking training.

Oral ESP skills are critically important for students in vocational majors because these skills directly impact their professional competence. In the tourism and hospitality industry, for example, effective English communication is essential for customer satisfaction and service quality (Kostic Bobanovic & Grzinic, 2011). In aviation-related vocations, English serves as the lingua franca; airline personnel must meet international English proficiency standards to ensure operational safety and clear communication (International Civil Aviation Organization [ICAO], 2010). Similarly, in the nursing and healthcare sector, nurses increasingly need strong English speaking abilities to care for foreign patients and collaborate with international colleagues (Gunarso & Chen, 2020). These scenarios illustrate that ESP speaking proficiency is not merely an academic requirement but a practical necessity in vocational careers.

In response to these challenges, educators are exploring cutting-edge technologies to enhance language learning. Virtual Reality-Assisted Language Learning (VRALL) has emerged as a promising innovation in ESP education worldwide. VRALL leverages immersive virtual environments to simulate real-life communicative situations, allowing learners to practice speaking in authentic contexts. A growing body of research suggests that high-immersion virtual reality can boost learner engagement, lower anxiety, and improve speaking outcomes in language education (Xie et al., 2021). Recent systematic reviews have reported rising global interest in VRALL, noting improvements in learners' motivation and oral performance through virtual immersion experiences (Ozgun & Sadik, 2023). As VR technology becomes more accessible, its application in ESP teaching is gaining momentum, offering a potential solution to the spoken English gaps observed in China's vocational colleges.

In light of the growing interest in integrating VRALL into English for Specific Purposes (ESP) instruction, especially in vocational education settings, it is essential to understand how ESL teachers perceive and implement such technology in the classroom. While existing literature has explored student responses and general outcomes, relatively little attention has been given to how teachers themselves experience the integration process—what they find useful, what challenges they encounter, and how they adapt VR tools to suit ESP speaking tasks.

Therefore, this study aims to explore ESL teachers' views on using VRALL to enhance the speaking skills of vocational college students in ESP contexts. By focusing on teachers' first-hand experiences, the research seeks to inform practical strategies for future VRALL implementation. Specifically, this study is guided by the following research questions:

1. What are ESL teachers' perceptions of the usefulness of VRALL in improving ESP speaking skills?
2. What challenges do ESL teachers encounter when integrating VRALL into ESP speaking instruction?

Literature Review

ESP and Vocational English Needs

English for Specific Purposes (ESP) is a subset of English language teaching that focuses on the specific language skills required for particular professions or academic disciplines (Hutchinson & Waters, 1987). Unlike General English, which aims to develop a broad range of language

competencies for everyday communication, ESP targets the precise language needs of learners in their specific fields. This includes specialized vocabulary, discourse patterns, and genres that are essential for success in vocational and professional contexts (Dudley-Evans & St John, 1998). For instance, ESP in vocational education might involve teaching language skills for customer service, technical documentation, or business negotiations, depending on the student's field of study. In vocational education, ESP is particularly crucial because it prepares students for the linguistic demands of their future careers. Research has shown that ESP courses can significantly enhance students' ability to communicate effectively in their professional roles, thereby increasing their employability and career prospects (Harding, 2007). For example, vocational students need to develop speaking skills that are relevant to their occupational contexts, such as engaging in customer interactions, delivering presentations, or participating in workplace meetings. These skills are not only essential for job performance but also for building confidence and reducing language anxiety in professional settings.

In China, vocational education plays a vital role in preparing students for the workforce. With over 14 million students enrolled in secondary vocational schools annually, vocational education is a significant part of the Chinese education system (MOEPRC, 2024). The Chinese government has recognized the importance of vocational education in driving economic development and has implemented various reforms to improve its quality and relevance (Yu et al., 2015). However, there remains a growing need to integrate ESP more effectively into vocational curricula to better prepare students for the globalized workforce. For ESL teachers in vocational colleges, teaching ESP requires a deep understanding of both the language and the specific vocational context. Teachers must design courses that align with students' future job requirements, incorporating authentic materials and real-world scenarios to bridge the gap between academic study and professional practice (Carter, 1983).

VRALL in Language Teaching

Virtual Reality-Assisted Language Learning (VRALL) represents a cutting-edge approach to language education, leveraging virtual reality technology to create immersive learning environments. VRALL allows learners to engage in simulated real-life situations, which can significantly enhance their language acquisition by providing authentic contexts for practice (Yeh & Lan, 2018). A comprehensive review of 38 empirical studies on VRALL from 2018 to 2022 revealed that VR technology can improve a wide range of language skills, including vocabulary acquisition, speaking fluency, writing proficiency, listening comprehension, and reading ability (Huang et al., 2023). Moreover, VRALL has been shown to boost learner engagement, motivation, and confidence while reducing foreign language anxiety, which is particularly beneficial for speaking skills (Parmaxi, 2020).

In the context of ESP, VRALL offers unique advantages by allowing vocational students to practice language skills in profession-specific scenarios. For example, students can participate in virtual customer service interactions, technical presentations, or workplace meetings, thereby gaining practical experience in using English in their future careers. This immersive approach not only enhances language proficiency but also develops cultural competence and soft skills essential for professional success (Zheng et al., 2017). The use of high-immersion VR technologies, such as head-mounted displays, provides a more realistic and interactive learning experience compared to low-immersion VR, like computer-based 3D environments

(Kaplan-Rakowski & Gruber, 2019). Additionally, VRALL has been applied across various languages, with English being the most commonly taught, followed by Chinese and others, indicating its broad applicability across different linguistic contexts. Huang et al. (2023) also highlighted the increasing use of customized VR platforms, with 25 out of 38 studies using tailored solutions, such as semi-immersive virtual reality (SVVR) for specific language tasks. The duration of VRALL interventions ranged from 25 minutes to 1,800 minutes, with most studies lasting weeks or months, suggesting flexibility in implementation. Cognitive benefits included improved memory retention and critical thinking, while affective benefits included positive attitudes, task engagement, and willingness to communicate. However, some studies reported drawbacks, such as unstable internet connections, large storage requirements, and inauthentic materials, which could affect adoption (Hsu, 2019). Recent studies have also highlighted a potential drawback of high-immersion VR: cognitive overload and reduced learning outcomes in certain contexts. Papin and Kaplan-Rakowski (2022) found that students using immersive headsets for vocabulary learning performed worse on post-tests than those using desktop versions, suggesting that the level of immersion must be pedagogically aligned.

Teacher Perspective on VRALL Adoption

The adoption of VRALL in language teaching is contingent upon teachers' readiness and willingness to integrate this technology into their pedagogical practices. Teachers play a critical role in determining the success of VRALL in language learning. However, teachers face several barriers to adopting VRALL, including limited access to VR equipment, lack of technical proficiency, and insufficient training in using VR for educational purposes (Cowie & Alizadeh, 2022). Additionally, there is a scarcity of ready-made educational content that teachers can use or adapt for their classrooms, which further complicates the adoption process (Cowie & Alizadeh, 2022).

To overcome these challenges, teachers require comprehensive training that covers both the technical aspects of VR technology and its pedagogical applications. A suggested training sequence starts with familiarizing teachers with language learning apps like Mondly VR (Mondly VR), which offer situation-based tasks in multiple languages. Teachers can then progress to using virtual tours created with 360-degree cameras or smartphones, followed by web-based collaborative spaces such as Mozilla Hubs (Mozilla Hubs) and Engage (Engage), and finally, immersive headsets for high-immersion VR experiences (Cowie & Alizadeh, 2022). Furthermore, teachers need to be aware of the ethical and health concerns associated with VR, such as cybersickness and data privacy issues, and learn how to address them in their teaching practices. Experiencing VR environments firsthand and collaborating with colleagues can provide valuable insights and support for teachers new to VRALL (Blaschke & Hase, 2019).

Despite these challenges, studies have shown that teachers who have adopted VRALL report positive experiences and recognize its potential to enhance language learning outcomes. For instance, Kaplan-Rakowski and Wojdynski (2018) found that teachers appreciated the immersive and engaging nature of VRALL, which can motivate students and improve their language skills. The Technology Acceptance Model (TAM) provides a useful framework for understanding teachers' adoption of VRALL. TAM suggests that perceived usefulness and perceived ease of use are key determinants of technology adoption (Davis, 1989). In the context of VRALL, teachers' perceptions of its usefulness in enhancing student learning and their confidence in using the technology are critical factors influencing adoption (Scherer &

Tondeur, 2019). Recent studies further support this, noting that teachers who receive structured training and technical support are more likely to sustain VR integration (Tan et al., 2024; Barrett et al., 2021). Collaborative design between teachers and developers is increasingly seen as a viable strategy for improving the authenticity and pedagogical alignment of VR simulations (Parmaxi, 2020). Specific challenges for teacher adoption include limited access to equipment and networks, affordability issues, and the need for teacher training in technical and pedagogical aspects (Teo, 2011). Training should focus on awareness in four areas: signature pedagogies, training in VR environment, technical issues, and ethical/health concerns.

In conclusion, while there are significant challenges to teacher adoption of VRALL, providing adequate training, resources, and support can facilitate its successful integration into language teaching, particularly in vocational education settings.

Methodology

This study adopts a qualitative exploratory design to investigate ESL teachers' perspectives on the integration of Virtual Reality-Assisted Language Learning (VRALL) in ESP instruction within vocational education contexts. This design allows for a deeper understanding of teachers' lived experiences and practical insights, which are crucial for evaluating the real-world applicability of VR in classroom settings (Creswell, 2013).

Research Design

A qualitative exploratory design was employed to explore how ESL teachers perceive, experience, and respond to the use of VR in their ESP classrooms. This design is appropriate for areas where little prior research exists and where open-ended, in-depth exploration is needed. Semi-structured interviews were chosen as the primary method for data collection, as they allow participants to express their views in their own words while maintaining a consistent thematic focus across interviews. The approach supports the uncovering of nuanced opinions, contextual factors, and emergent themes relevant to teaching practices (Kvale, 2007).

Participants

The participants in this study consisted of six ESL teachers with direct experience teaching aviation English in vocational college settings. All participants were purposefully selected based on their background in English for Specific Purposes (ESP) and their involvement in aviation-related language instruction, particularly for pre-service flight attendants.

To ensure the data reflected realistic classroom practice and professional relevance, all teachers were selected from the same ESP subfield—aviation English. This deliberate choice allowed the study to maintain a clear focus on a single industry context, thereby enhancing the practical applicability of the findings. This selection method aligns with the purposeful sampling technique often used in qualitative research to focus on a specific phenomenon or experience (Patton, 2002).

While this selection approach may limit the breadth of cross-disciplinary comparison across other ESP fields (such as tourism or healthcare), it significantly increases the depth of insight into VRALL use within the aviation English context. This trade-off was intentional, as the aim

of the study was to generate detailed, profession-specific insights that could inform more targeted curriculum development and VR integration strategies.

A brief demographic profile of the participants is presented in Table 1.

Table 1

Demographic Profile of Participants

Participant ID	Age Range	Teaching Experience (Years)	ESP Sub-field	Highest Degree	Years of Teaching ESP
P1	30–35	5	Aviation English	MA in TESOL	5
P2	40–45	8	Aviation English	MA in Applied Linguistics	8
P3	25–30	3	Aviation English	BA in English	3
P4	35–40	6	Aviation English	MA in Linguistics	6
P5	50–55	12	Aviation English	MA in Education	12
P6	30–35	4	Aviation English	MA in TESOL	4

Data Collection

Data were gathered through semi-structured interviews, each lasting approximately 30 to 45 minutes. The interviews were conducted either face-to-face or via video conferencing, depending on the participants' availability and location. All interviews were audio-recorded with permission and transcribed verbatim for analysis. The interview protocol included open-ended questions on the perceived benefits of VR in ESP teaching, practical integration challenges, student responses, and suggestions for improving its classroom use. Follow-up questions were used where necessary to probe deeper into participants' responses. This method enabled a balance between structure and flexibility, encouraging rich and reflective dialogue (Seidman, 2013).

Data Analysis

The interview transcripts were analyzed using thematic analysis as outlined by Braun and Clarke (2006). This method involves a six-phase process: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report. Analysis was conducted manually, with an emphasis on identifying recurring patterns and key issues related to teachers' perceptions and practical experiences with VRALL. Themes were refined to ensure clarity, coherence, and relevance to the research aim. The use of thematic analysis allowed for a systematic yet flexible approach to interpreting qualitative data.

Ethical Considerations

The study adhered to standard ethical guidelines for qualitative research. Informed consent was obtained from all participants before the interviews, and participants were made aware of their right to withdraw at any time without consequences. All data were treated with strict

confidentiality, and personal identifiers were removed to ensure anonymity. Audio recordings and transcripts were securely stored and used only for research purposes. The study's ethical procedures ensured that participants' privacy and autonomy were fully respected throughout the research process (Denzin & Lincoln, 2011).

Findings

This chapter presents the results of thematic analysis conducted on interviews with six ESL teachers who specialize in aviation English instruction in vocational college settings. The teachers provided in-depth perspectives on the integration of Virtual Reality-Assisted Language Learning (VRALL) into English for Specific Purposes (ESP), particularly in cabin crew training programs. Four key themes and multiple sub-themes emerged from the analysis. Table 2 offers a visual summary of the findings.

Table 2
Summary of Key Themes and Sub-Themes

Main Theme	Sub-Themes
Teachers' Perception of VR's Usefulness in ESP	• Enhanced student engagement and attention • Greater learner confidence in oral English use • Authentic simulation of professional tasks
Observed Student Responses and Engagement	• Initial disorientation followed by adjustment • Increased participation and enjoyment • Varied adaptation among student groups
Pedagogical and Technical Challenges	• Misalignment of VR content with ESP learning outcomes (e.g., cabin crew inflight tasks) • Insufficient teacher training • Limited access to equipment and IT support
Suggestions for Future Integration	• Structured and practical training for instructors • Development of ESP-specific VR content • Integration into syllabus and course materials • Collaboration between educators and developers • Optional self-directed VR practice for students

Teachers' Perception of VR's Usefulness in ESP

All six teachers interviewed highlighted the positive impact of VR in the ESP classroom, particularly its ability to simulate professional scenarios, enhance student motivation, and boost confidence in speaking English. The teachers unanimously agreed that VR has changed how students engage with content, transforming passive learning into an active, participatory experience.

"Students are no longer just listening or reading. They are reacting to situations, solving problems, and using English naturally in those moments. That's the biggest difference VR makes." (P2)

A recurring observation was that students who typically lacked confidence or remained silent in traditional lessons began speaking more freely in VR environments.

"I was surprised that some of my quietest students actually volunteered to play roles in the VR simulation. It creates a space where they're not afraid to be wrong." (P4)

"The headset makes them feel like they're not being watched by others. That privacy helps them to just speak without pressure." (P6)

Teachers also emphasized that VR supports functional language development, particularly in job-specific areas like making announcements, responding to passenger needs, and handling unexpected events, which are central to cabin crew responsibilities.

"Students finally understood what it means to speak in context. They're not just repeating phrases—they're using English as a tool to complete a task." (P1)

"When students simulate serving a meal or answering a passenger's complaint, they are practicing language that they will really use, not just textbook English." (P5)

Moreover, teachers appreciated the real-time decision-making aspect of VR scenarios, which closely mirrors the communicative demands of real inflight situations.

Observed Student Responses and Engagement

Teachers reported that initial student responses to VR varied, with most experiencing some confusion or hesitation during their first use. This was especially true for students unfamiliar with immersive technology or those with low English proficiency. However, after the first session, teachers noted a marked increase in comfort and enthusiasm.

"The first time, they didn't know how to move or select options in the simulation. But once they figured it out, they became eager to try again." (P3)

"There were some complaints at the start—like dizziness or difficulty hearing—but by the third session, they were fully immersed." (P6)

Once acclimated, students reportedly became more attentive, expressive, and engaged than in conventional lessons. Teachers consistently observed that students were more willing to speak, interact, and repeat tasks in VR environments, often without prompting.

"They actually asked for extra practice. That never happens in traditional drills." (P1)
"Even the students who usually sit quietly were suddenly taking part. They laughed, made mistakes, and tried again." (P5)

Interestingly, teachers noted that technology familiarity influenced student success. Tech-savvy students adapted quickly and often helped their peers, while students with lower digital literacy needed more time and support. Despite this gap, teachers agreed that VR ultimately served as a leveling tool by offering visual and contextual cues that benefited weaker learners.

"Students with low vocabulary could still follow because they could see what was happening. It gave them more confidence to try using English." (P2)

"Some students were learning by observing others in the simulation, even when they weren't active participants." (P4)

Pedagogical and Technical Challenges

While enthusiastic about VR's potential, teachers also voiced critical concerns about its practical limitations. A key issue was the misalignment of VR content with ESP learning objectives, particularly in terms of cabin crew inflight duty tasks. Teachers found that many available VR simulations lacked task-specific detail needed for airline service training.

"Some of the simulations were too basic. They need to reflect more of the cabin crew's actual duties—like cabin security checks, giving safety instructions, handling emergencies, and communicating with passengers under pressure." (P3)

"The environment was fine, but the language was too general. We need VR content that includes emergency phrases, safety briefings, and real service dialogues, not just greetings or simple Q&A." (P6)

Another significant challenge was the lack of training for teachers in both operating the technology and integrating it into effective instruction.

"I had to learn everything on my own. There was no guidance on how to teach using VR, only how to turn it on." (P4)

"We're teachers, not technicians. If institutions want us to use VR, they need to train us as educators, not just as users." (P2)

Teachers also noted that technical support and resources were insufficient. VR headsets were either limited in number or shared across departments, and maintenance issues (e.g., software updates, calibration errors, overheating) disrupted lesson flow.

"We had one device and 20 students. It became more of a demonstration than a real activity." (P5)

"Sometimes the system wouldn't start, or it would crash mid-task. If you lose five minutes in a 40-minute lesson, that's a big deal." (P1)

These issues impacted the sustainability and scalability of VR use in their institutions, despite the enthusiasm for its pedagogical potential.

Suggestions for Future Integration

All participants provided practical suggestions to improve VR integration. A dominant recommendation was the provision of structured teacher training, not just on device operation but on instructional design for immersive environments.

"We need training that shows how to build a lesson around VR, how to set learning goals, how to evaluate student output." (P3)

"Workshops should include real examples—what kind of language to teach, how to give feedback in VR settings." (P6)

Another recurring suggestion was the development of content tailored to ESP needs, particularly in aviation. Teachers called for collaborative development between educators and software developers to ensure simulations cover key communicative events like safety announcements, emergency procedures, and cross-cultural passenger interactions.

"The people designing the VR scenarios should sit in our classrooms for a week. Then they'll know what our students actually need." (P1)

Teachers also emphasized that VR should not be treated as an isolated activity, but rather integrated with textbooks, speaking assessments, and lesson goals.

"It's more useful if VR supports what we're already teaching that week—like inflight announcements or responding to complaints." (P5)

Several teachers suggested expanding the availability of VR for self-directed learning, enabling students to practice speaking independently, especially outside class time.

"Some students don't get enough speaking practice in class. If they can use VR after school, it would really help." (P2)

"VR can be part of a blended learning model—classroom plus independent task review." (P4)

The findings suggest that ESL teachers view VRALL as a promising tool for ESP instruction, particularly in aviation English for cabin crew students. VR supports realistic scenario-based learning, boosts student confidence, and increases engagement. However, its effective integration requires addressing practical barriers such as content alignment, teacher preparedness, and technological infrastructure. Teachers' recommendations highlight the need for collaboration in content design, structured professional development, and institutional support. These findings offer valuable insights for stakeholders aiming to integrate immersive technology into vocational language training.

Discussion

The first major finding reveals that ESL teachers perceive Virtual Reality-Assisted Language Learning (VRALL) as highly effective in enhancing students' oral communication skills and overall classroom engagement. VR technology provides immersive, realistic contexts for practicing aviation English dialogues (e.g., passenger interactions, service scenarios), allowing learners to develop fluency, improve pronunciation, and build communication confidence through authentic simulation and role-play activities. This perception aligns closely with existing literature. For example, a Malaysian study found that VR implementation "significantly" boosted student motivation, engagement, and willingness to actively practice English (Tan et al., 2024). Similarly, Khukalenko et al. (2022) conducted a large-scale international survey where teachers across diverse educational contexts recognized VR's strength in promoting active, contextualized language use, making learning more meaningful. Our study extends prior research by emphasizing VR's specific impact within an ESP (aviation English) context, an area still underexplored compared to general ESL settings. Teachers highlighted that VR scenarios encouraged more spontaneous speaking, fostered attentiveness, and allowed students to simulate real-world aviation tasks, echoing findings by

Raman et al. (2023), who observed heightened learner engagement and improved communication skills through VR-supported speaking lessons.

However, some literature presents a more nuanced view. Although VR clearly enhances engagement, Papin and Kaplan-Rakowski (2022) cautioned that high-immersion VR environments might sometimes cause cognitive overload, distracting students from learning objectives and negatively affecting specific outcomes like vocabulary retention. Our participants, however, did not report such issues. Instead, they emphasized VR's ability to build communication confidence — a primary goal in ESP aviation English training — suggesting that engagement and communicative fluency were prioritized over immediate linguistic accuracy. Thus, our findings largely align with recent studies asserting VR's value for promoting oral proficiency and active learning, while also recognizing that engagement, while crucial, does not inherently guarantee superior measurable academic outcomes. This adds nuance to ongoing discussions about balancing engagement with targeted learning gains.

The second major finding noted that students often experienced confusion, disorientation, or even mild anxiety at the onset of VR-based lessons, but subsequently demonstrated increased motivation, enjoyment, and self-confidence as they acclimated to the new technology. This trajectory mirrors patterns observed in previous research focusing on affective factors in VRALL. Initial difficulties are well-documented: the "novelty effect" and cognitive load associated with navigating unfamiliar VR environments can be overwhelming for some learners. Huang (2024) found that many EFL learners felt nervous and uncertain during their first VR sessions, particularly concerning equipment handling and virtual navigation. Similarly, Tan et al. (2024) observed that initial anxiety could be mitigated effectively through structured guidance and support during the early stages of VR exposure.

Following familiarization, a positive shift in learner attitudes tends to occur. Studies by Makransky and Lilleholt (2018) and Yudintseva (2024) revealed that after gaining comfort with VR technology, learners often reported reduced speaking anxiety and improved self-confidence in using English. Our teachers' observations aligned with these findings, noting that initially shy students began participating more actively and speaking more boldly during virtual airline service role-plays. This sequence from confusion to confidence is also consistent with the Technology Acceptance Model (TAM). Initially, low perceived ease of use triggered hesitation, but as familiarity increased, students' perceived usefulness of VR as a language learning tool grew, leading to more positive attitudes. Thus, our findings reinforce the importance of providing adequate scaffolding and support during early VR implementation stages (Huang, 2024; Yudintseva, 2024), ensuring smoother transitions from initial anxiety to confident participation.

The third major finding identified several challenges teachers faced when integrating VR into aviation English instruction: (a) the misalignment between available VR content and cabin crew-specific communication tasks, (b) lack of teacher training in using VR pedagogically and technically, and (c) technical limitations related to infrastructure and device management. These barriers are widely reported in educational technology research. For instance, Khukalenko et al. (2022) found that teachers often had to adapt or abandon VR tools when content was insufficiently tailored to curricular goals. Our participants echoed this concern, pointing out that many existing VR scenarios were too basic, generic, or mismatched with the

specialized tasks required in cabin crew training, such as handling in-flight emergencies or managing difficult passenger situations. This gap is consistent with calls from scholars like Hua and Wang (2023), who emphasized that English for Specific Purposes (ESP) courses remain significantly under-supported by current VR platforms. In the context of aviation English, where communication tasks are highly industry-specific, the absence of relevant, detailed VR materials directly impacts training effectiveness (Carter, 1983). Our findings provide concrete field-based evidence of this critical mismatch.

Insufficient teacher training emerged as another major barrier. Many teachers reported feeling ill-equipped to troubleshoot VR equipment problems, manage classroom dynamics in VR environments, or design effective VR-based learning activities. This challenge reflects broader concerns in the literature about the "first-order barriers" to technology adoption described by Ertmer (1999) and confirmed by more recent findings (Khukalenko et al., 2022). Teachers also noted that using VR safely and ethically (e.g., managing cybersickness risks, ensuring data privacy) requires specialized knowledge and skills (Cowie & Alizadeh, 2022), further highlighting the complexity of VRALL integration. Technical limitations, including lack of sufficient hardware (e.g., VR headsets), unreliable internet connectivity, software compatibility issues, and occasional malfunctions, formed the third significant challenge. Such barriers are consistently reported in technology integration studies (Mannery, 2023; Hsu, 2019). Teachers emphasized that technical failures disrupted lesson flow and demotivated students, a problem exacerbated by limited institutional IT support in many vocational colleges. This mirrors findings from similar educational settings globally, reinforcing that technical barriers remain a major bottleneck for VR implementation.

The fourth major finding centers on the teachers' proposed solutions to improve VR integration: (a) developing customized VR content aligned with curriculum needs, (b) fostering collaboration between teachers and VR developers, (c) embedding VR activities meaningfully into course structures, and (d) providing structured and ongoing teacher training. Teachers stressed that VR content must be specifically designed to mirror authentic aviation English tasks. Recent scholarship (Hua & Wang, 2023) supports this approach, noting that customized ESP VR content can better address vocational training requirements, especially given the growing demands for specialized workforce communication skills in China (MOEPRC, 2024). Teachers advocated for deeper collaboration with VR developers to ensure realistic, task-oriented simulations (e.g., emergency announcements, first aid procedures, customer service dialogues), a recommendation aligned with Parmaxi's (2020) call for localized VR content creation in language education. Embedding VR into the broader curriculum, rather than treating it as a stand-alone or supplementary novelty, was another key recommendation. Teachers emphasized that VR activities should reinforce existing course objectives (e.g., hospitality English modules, safety communication), be integrated into assessments, and support continuous learning progression. This aligns with best practices in educational technology integration (Hew & Brush, 2007; Tan et al., 2024), which advocate for thoughtful alignment between technology use and pedagogical goals.

Finally, structured and sustained professional development was viewed as essential. Teachers called for dedicated workshops, training programs, hands-on tutorials, and ongoing peer support systems to enhance both their technical fluency and pedagogical creativity with VR. This recommendation mirrors research by Hua and Wang (2023) and Cowie and Alizadeh

(2022), which emphasize that building teacher competency is crucial for successful VRALL adoption. It also reflects insights from the TAM model, where providing facilitating conditions, such as training and institutional support, directly influences technology acceptance and sustained usage (Venkatesh & Bala, 2008).

In sum, teachers' perspectives in our study are strongly corroborated by existing literature, offering practical pathways for addressing VR integration challenges. Their emphasis on authentic content development, collaborative design, curriculum alignment, and robust training infrastructures provides valuable, field-grounded strategies to advance VRALL in ESP education contexts.

Conclusion and Implications

This study explored the perceptions of vocational college English teachers regarding the use of Virtual Reality-Assisted Language Learning (VRALL) to enhance aviation English speaking skills. Based on in-depth interviews with experienced ESP instructors, several important findings emerged:

First, teachers consistently highlighted the positive impact of VRALL on student engagement and motivation. VR's immersive and interactive nature helped reduce language anxiety and encouraged students to participate more actively in oral communication tasks, especially role-plays that mimicked real-life aviation scenarios. Second, teachers observed that VR environments provided more authentic and context-rich opportunities for learners to practice professional English, particularly in cabin service, emergency response, and cross-cultural passenger interactions. This authenticity contributed to improvements in learners' fluency, pronunciation, and pragmatic language use. Third, while the benefits of VRALL were widely acknowledged, teachers also identified challenges related to implementation, including limited institutional support, insufficient training, and the need for ESP-specific VR content aligned with aviation English learning objectives. Together, these findings suggest that VRALL holds strong potential to improve aviation-specific oral communication skills among vocational students, provided that its use is supported by appropriate pedagogical planning and infrastructure.

The findings of this study carry important implications for the future integration of Virtual Reality in English for Specific Purposes (ESP) courses, particularly in contexts similar to Chinese vocational colleges. Taken together, teachers' feedback paints a clear picture of what is needed to harness VR's potential in a sustainable, effective manner. Key practical implications include the following:

Educational institutions and language program administrators should seek out or develop VR content that is closely aligned with their specific course objectives. In the case of aviation English, this might mean creating VR scenarios that simulate a flight cabin environment, complete with common in-flight interactions and challenges (safety briefings, passenger requests, emergency simulations). One way to achieve this is by fostering collaboration between teachers and VR content developers. Teachers bring insight into the linguistic functions and situational contexts that need to be covered, while developers have the tools to build these scenarios. Formal partnerships – for example, a college working with an ed-tech company to co-design VR modules for its ESP curriculum – could ensure the resulting

content is pedagogically sound and contextually authentic. This practice is in line with recent calls in the field to involve end-users in content design (Hua & Wang, 2023). When teachers can customize content (even at a basic level, such as editing dialogue scripts or selecting scenario difficulty), they can better integrate VR into their lesson plans. Therefore, an implication is that schools may need to allocate resources (time, funds) for content customization, whether by training teachers to do minor modifications or by commissioning bespoke VR scenarios. The result would be VR experiences that reinforce course material rather than distract from it.

For VRALL to truly enhance ESP learning, it should be embedded into the curriculum rather than used as an occasional supplement. Practically, this means lesson planning should incorporate VR activities as a method to achieve existing learning outcomes. Teachers might introduce a topic (e.g. handling customer complaints) in a traditional class, then use a VR scenario for students to practice that skill in a simulated environment, and finally conduct a debrief or reflection linking the VR experience back to real-world job requirements. Such an approach ensures that VR sessions have a clear pedagogical purpose and are perceived by students as an integral part of the course. School administrators should support this by adjusting curricula to accommodate VR sessions (for instance, allocating lab time for VR and ensuring those sessions map onto syllabus goals). The implication here is that curriculum design may need updating to include VR-based competencies or activities. For aviation English, curricula could explicitly mention simulated scenario training as a component of speaking practice or assessment. By formally integrating VR, institutions signal its importance and encourage both teachers and students to treat it as a valuable learning tool, not a novelty. This integrated approach is likely to maximize the benefits of VRALL, as suggested by both our data and other practitioners' reports. It also provides a structured way to evaluate VR's impact – if VR sessions are tied to learning outcomes, teachers can more directly assess improvements in those areas (e.g., better performance in role-play assessments or increased student confidence in spoken exams).

A vital implication for practice is the need for systematic teacher training and ongoing support for VRALL. Institutions looking to implement VR should not assume that teachers will intuitively know how to use it effectively. Our study's teachers explicitly request structured training, and this likely generalizes to many contexts. Thus, teacher professional development programs must incorporate VR components. Training should cover both technical and pedagogical aspects: how to set up and operate VR hardware/software, troubleshoot common issues, integrate VR activities into lesson plans, manage a classroom during VR use (e.g., ensuring students stay on task in virtual environments), and address student issues like motion sickness or confusion. Workshops or certification courses in educational VR could be offered. Additionally, mentorship from experienced VR-using teachers or online communities of practice could provide on-demand support and idea-sharing. School administrators should also consider the technical support infrastructure – for example, having an IT staff member or a "VR lab assistant" available, especially during initial implementation. This reduces the burden on teachers and minimizes class disruptions due to technical glitches. The implication is that budget and planning for VR integration must include funding not just for devices, but for training sessions, time for teachers to practice with VR, and technical support personnel or services. When teachers feel supported and competent, they are far more likely to use VR regularly and creatively in their teaching. In practice, one could start with a pilot program:

identify a few interested teachers, train them thoroughly, let them lead VR integration in their classes, and then have them share their experiences (successes, challenges, tips) with the broader faculty. This create-and-share model can build internal capacity. Ultimately, investing in teacher expertise is investing in the longevity of VRALL initiatives.

On a practical level, institutions must also anticipate and address the technical limitations that teachers highlighted. This means ensuring that the necessary hardware (VR headsets, capable computers or mobile devices, etc.) and software licenses are available in sufficient quantities for meaningful classroom use (e.g., enough headsets for group work, or scheduling rotations if devices are limited). It also means maintaining the equipment (charging, updates, hygiene for shared headsets, etc.) and providing reliable internet connectivity if the VR applications are online. Schools might implement a booking system for VR labs to avoid scheduling conflicts and give teachers certainty when planning lessons. Additionally, potential health and safety measures (like cleaning protocols for headsets, guidelines to prevent dizziness) should be put in place to make both teachers and students comfortable. An implication for management is to possibly start small – perhaps with a mobile-based VR solution or 360-degree video exercises – if high-end VR hardware for every student is not immediately feasible. Even with simpler VR, many of the engagement benefits can be realized, as suggested by some studies using low-immersion VR for language practice. Over time, as costs come down, the institution can scale up the infrastructure. The key is that technical issues should be proactively managed so that they do not erode teachers' and students' enthusiasm. Our teachers warned that technical hassles could quickly dampen the initial excitement around VR; hence, by ensuring strong logistical support, administrators can protect and nurture the enthusiasm needed to successfully integrate VRALL.

In conclusion, the practical implications center on a holistic support system for VRALL: relevant content, curricular integration, teacher capacity-building, and solid infrastructure. Adopting these measures can help vocational colleges and similar institutions move from experimental use of VR toward a more embedded, normalized use of VR as a powerful ESP teaching tool. The feedback from teachers in this study effectively serves as a checklist for implementation – if each of their recommendations is addressed, future VR integrations are far more likely to succeed and yield the desired improvements in student communication skills and engagement. Importantly, these implications also suggest areas where policy-makers and educational leaders can focus investment (e.g., teacher training grants, industry-education partnerships for content development) to foster innovation in language education. By heeding the voices of teachers and aligning with the best practices indicated by research, stakeholders can create an environment in which VRALL is not only technically possible but pedagogically transformative.

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