ELT Student Teachers' Acceptance and Knowledge Base of Integrating Virtual Reality into Task-based Contexts

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Abstract

This qualitative study explored the acceptance and knowledge base of English language teaching (ELT) student teachers regarding the incorporation of virtual reality (VR) into oral tasks to promote learner engagement within the framework of task-based language teaching (TBLT). Twenty-six ELT student teachers, pursuing their Master of Arts degree at a university in Hong Kong, were interviewed about their acceptance of VR oral tasks and assessed on their knowledge of task engagement and VR. Content analysis, guided by the technology acceptance model and the technological pedagogical and content knowledge (TPACK) framework, was conducted to analyse their interview data. The findings indicated their acceptance of VR-based oral tasks, based on their overall positive perceptions of VR, and confirmed their existing pedagogical knowledge of task engagement. However, their concerns regarding the effectiveness of VR-based oral tasks were influenced by their insufficient TPACK. The findings highlight their urgent need for professional training, not only to enhance VR experiential opportunities but also to learn how to develop teaching materials that integrate VR.

Keywords

Teacher education, virtual reality, learner engagement, task-based language teaching, oral tasks, technology acceptance, TPACK

Introduction

The integration of virtual reality (VR) into second language (L2) teaching and learning has been widely advocated (York et al., 2021). VR creates immersive, real-world communication environments for L2 use that significantly enhance learner engagement (Shi et al., 2024). It is defined as 'a computer-generated 360° virtual space that can be perceived as being spatially realistic, due to the high immersion afforded by a head- mounted device' (Kaplan-Rakowski and Gruber, 2019: 552). It can be categorised into low-immersion/non-immersive VR, experienced on a flat two-dimensional monitor, and high-degree/immersive VR, which requires a VR headset (Khukalenko et al., 2022). VR is touted for its educational potential as it offers visually rich simulated

experiential learning, emphasises student-centred learning, allows for the experience of different real-life scenarios, enhances the sense of presence and immersion, and visualises abstract concepts (Khukalenko et al., 2022).

Scholars like Gonzalez-Lloret and Rock (2022) and Taguchi (2022) have suggested that VR holds substantial potential for integration into task-based language teaching (TBLT), a teaching approach emphasising the use of tasks to stimulate learners' L2 use in authentic communication environments (Ellis, 2012). These tasks, particularly oral tasks, are appealing to L2 learners as they are derived from authentic communication scenarios (e.g. making a doctor's appointment) and provide opportunities for learners to exploit their L2 repertoire to fill in a gap (i.e. information gap) and achieve a communicative outcome (Ellis, 2012). Performing these tasks in VR (e.g. making a doctor's appointment in an immersive VR clinic) may help learners better grasp L2 communication and increase their engagement (Mills, 2021). However, despite the effectiveness of oral tasks in improving L2 oral proficiency (Robinson, 2011; Skehan, 2014), L2 teachers, particularly those working in the Asian contexts such as China, often lack the confidence to effectively utilise tasks in their teaching. This is often attributed to insufficient professional development opportunities and contextual constraints (Chen and Wright, 2017; Liu and Ren, 2021). Designing and implementing VR-based oral tasks may pose additional challenges to them, as they need to be proficient in both content and pedagogical knowledge of English language teaching (ELT) and TBLT, as well as having techno- logical knowledge of VR. Although L2 research has explored the possibility of integrating VR into oral tasks, it remains uncertain what teachers' attitudes and perceptions are and whether they are ready and willing to implement it. While a few studies have explored teachers' acceptance of VR in education (Bower et al., 2020) and their knowledge base (Chen et al., 2023), there is limited understanding of the acceptance and knowledge base of ELT student teachers undergoing professional training.

To address these issues, this interview-based qualitative study explored ELT student teachers' acceptance and knowledge base regarding designing and implementing VR-based oral tasks to enhance L2 learners' task engagement. Teacher acceptance is based on Venkatesh and Davis' (2000) technology acceptance model (TAM), which hypothesises that teachers' perceptions of VR's usefulness and its ease of use in oral tasks can affect their attitudes toward VR, their behavioural intentions, and ultimately, the actual implementation of VR-based oral tasks. Their overall acceptance of integrating VR in oral tasks to promote learner engagement may be affected by their

knowledge base and other external factors, such as personal experience, approval and support from significant others, and learner characteristics (Huang and Teo, 2020). The knowledge base we refer to in this study is related to Mishra and Koehler's (2006) framework, TPACK (technological pedagogical and content knowledge), which underscores that, to effectively implement VR-based oral tasks in L2 classrooms and promote learner engagement, teachers need sufficient content knowledge (the speaking skills learners should acquire), pedagogical knowledge (understanding TBLT and task engagement and designing appropriate tasks), technological knowledge (using VR), and the integration of these knowledges. This study therefore aimed to address two research questions:

> RQ1. How do student teachers perceive the incorporation of VR into oral tasks for promoting learner engagement?
> RQ2. What is their knowledge base regarding VR-based L2 oral tasks and learner engagement?

Oral Tasks and Task Engagement

Recent task-based research has focused on how to design oral tasks to engage learners (Aubrey et al., 2022; Lambert and Zhang, 2019), as engaged learners are more likely to use L2 and may better develop their proficiency. Philp and Duchesne's (2016: 51) task engagement framework is the most widely used framework in task-based engage- ment research and thus is referred to in this study. Task engagement refers to 'a state of heightened attention and involvement, in which participation is reflected not only in the cognitive dimension, but in social, behavioral, and affective dimensions as well'. It contains four dimensions (see Figure 1). Cognitive engagement refers to mental effort and sustained attention such as self-regulation strategies. Behavioural engagement is characterised by time on task or participation, whereas affective engagement involves learners' feelings and emotional experiences during task performance. Social engagement pertains to a collaboration between peers, such as social support. An increasing number of studies are investigating how tasks can be designed and implemented to enhance task engagement (e.g. Aubrey and Philpott, 2023; Lambert and Zhang, 2019; Qiu, 2024).

One way of increasing task engagement is to integrate technology (e.g. VR) into tasks (Gonzalez-Lloret and Rock, 2022; York et al., 2021). However, this may be very challenging for ELT teachers, most of whom have studied humanities, arts, and social sciences disciplines and may lack strong digital literacy skills. Therefore, some teachers may be resistant to technology-incorporated ELT

because of their unpreparedness. Knowing about student teachers' acceptance and knowledge base is crucial for teacher educators to develop insights into their needs, so that effective training can be provided.

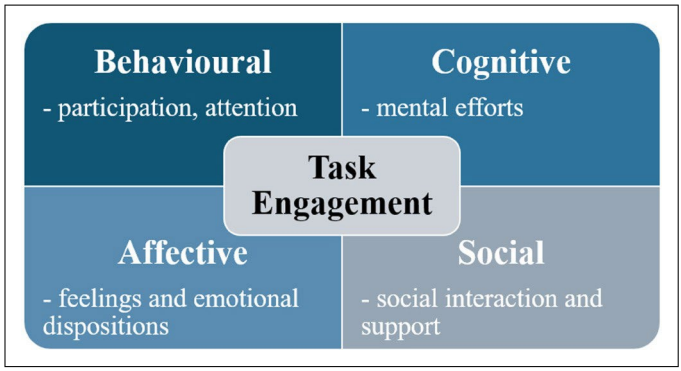

Figure 1. Task engagement framework (Philp and Duchesne, 2016).

VR Acceptance

This investigation into student teachers' willingness to integrate VR into oral tasks to promote learner engagement is grounded in a traditional theoretical framework – the technology acceptance model (TAM) (Davis, 1986; Venkatesh and Davis, 2000; see Figure 2). Specifically, teachers' intention to use VR to promote student engagement is determined by their perceptions of VR's usefulness (hereafter 'perceived usefulness'), its ease of use, and their attitudes. Their usage intention also influences their actual behaviour. Building on the earlier version of TAM (Davis, 1986), recent studies have revealed numerous external variables (e.g. subjective norms, self-efficacy, school policy) that affect perceived usefulness and ease of use of VR (Huang and Teo, 2020; Scherer et al., 2019; Sun and Mei, 2022). Previous studies (e.g. Jang et al., 2021) have shown that teachers' knowledge base or TPACK, social norms and motivational support affect their VR integration. However, as most existing studies either focus on teachers in hard science disciplines or do not distinguish teachers by discipline, it remains unknown how these variables may influence language teachers' VR acceptance, especially in teaching English as a second/foreign language (ESL/EFL) contexts such as China and Japan. L2 learning differs from content subject learning because it emphasises social interaction and communication and the provision of linguistic input and output opportunities. Therefore, language teachers' acceptance may also differ from those reported in the literature. Furthermore, there is even less information about how student teachers perceive the integration of VR into ELT. Student teachers' VR acceptance needs to be attended to because their adoption of technology will have a long-term impact on education; such findings could also

reveal their professional needs and shed light on teacher education more widely (Bower et al., 2020).

Knowledge Base: TPACK

Existing studies on VR and language teachers also reveal that, in addition to the traditional roles of monitoring and guiding language acquisition, teachers are expected to address technical glitches with the equipment and foster appropriate social cohesion in VR environments (Zheng et al., 2022). This requires teachers to obtain sufficient knowl- edge and digital competence in addition to their knowledge of content and pedagogy. To successfully implement VR-based oral tasks in their teaching, teachers should master technological knowledge (TK, i.e. knowledge of VR techniques), pedagogical knowledge (PK, i.e. TBLT and task engagement), and content knowledge (CK, i.e. subject matter). These three types of knowledge also merge to form technological pedagogical knowledge (TPK), pedagogical content knowledge (PCK), and technological content knowledge (TCK). The intersection of TPK, PCK and TCK is TPACK. The conceptual framework of TPACK was developed by Mishra and Koehler (2006) (see Figure 3), based on previous work by Shulman (1986). It illustrates the categorisation of the knowledge required to teach content, when exploring teachers' knowledge base. Teachers' TPACK may influence their technology acceptance and behaviour intention, and facilitate meaningful application of technology for educational purposes (Bai et al., 2024; Scherer et al., 2019).

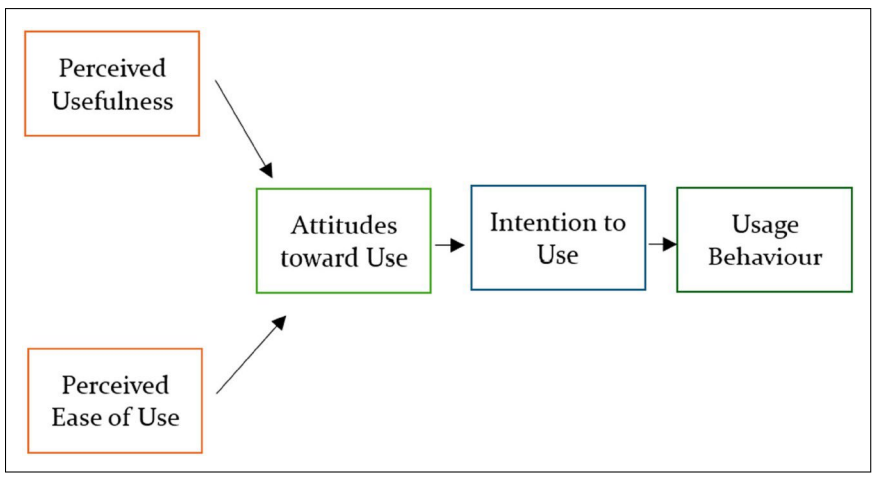

Figure 2. Technology acceptance model (Venkatesh and Davis, 2000).

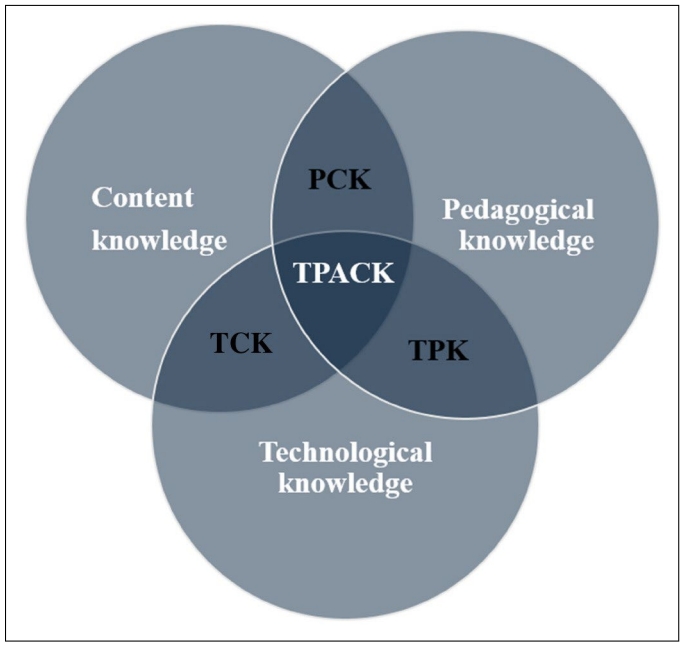

Figure 3. TPACK framework (Mishra and Koehler, 2006).

Methods

For a full understanding of the benefits of VR in education, it is necessary to consider the unique features of L2 teaching and learning and to explore whether L2 teachers are ready to integrate VR into their teaching based on their existing knowledge and in light of the potential external factors affecting this integration. This study paves the way with its interview-based qualitative exploration, which is part of a larger-scale project on student teachers' professional development in VR-based TBLT, and its investigation into student teachers' acceptance of incorporating VR into L2 oral tasks to promote learner engagement, and to broaden their own knowledge base.

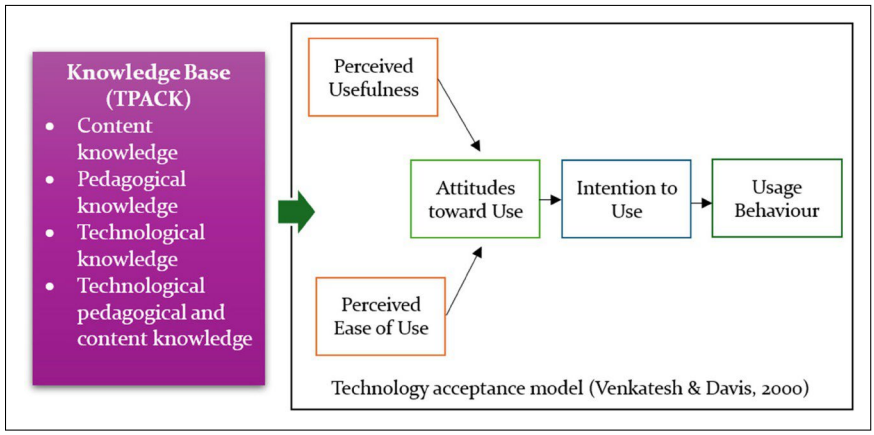

Figure 4. Integrating VR into oral tasks to promote learner engagement.

Participants of this study comprised 26 postgraduate students enrolled in a Master of Arts (MA) programme specialising in ELT at a university in Hong Kong. This one-year programme admits 150 students per cohort, with 90 to 100 of them specialising in the ELT stream. Students must achieve a minimum score 6.5 on the IELTS (International English Language Testing System) exam. This programme prioritises candidate students who possess prior knowledge of ELT. Consequently, most students have prior teaching experience, typically in tutoring centres or primary/secondary schools. The curriculum requires students to complete a certain number of courses related to L2 teaching and learning, including two compulsory courses (L2 learning, L2 teaching) and three elective courses (e.g. drama in language teaching and learning, syllabus design and planning). Students from this programme were selected for the study because they represented a typical ratio of student backgrounds (i.e. 'with-' versus 'without teaching experience') among Hong Kong universities. Another reason is that the target university strongly advocates for the integration of VR into learning and teaching, thereby emphasising the enhancement of these student teachers' TK and TPACK.

To recruit participants, the entire 2022–2023 cohort of MA students specialising in ELT ($N = 96$) was invited via email to voluntarily participate in this study. Of these, 26 volunteered and an information sheet was sent to brief them on the project. All participants signed a consent form before their online interview with the first author. The inter- views were conducted during the summer of 2023, after all participants had completed their coursework requirements. We chose to conduct the interviews in summer because, by the time of the data collection, they had been trained in the TBLT method and learner engagement and were familiar with the curriculum and course content of the programme. Participants

were thus also able to provide feedback on the programme and suggest how it could be fine-tuned to address their needs. The interviews were con- ducted on Zoom, because most students had already left Hong Kong. Each interview, conducted in Chinese, lasted approximately one hour. The recording function of the Zoom software was used to videotape the interviews.

The 26 participants were native Chinese speakers from Mainland China who used English as a foreign language (24 females and 2 males). Their mean age was around 26 years old. Among them, 15 had worked in primary/secondary schools or private tutor- ing for more than a year, whereas 11 had no formal teaching experience. Nineteen had obtained their bachelor's degree in English, English language education, or related programmes, while seven had earned their bachelor's degree in non-language-related programmes.

Semi-Structured Interview and Data Collection

A semi-structured interview, lasting around one hour, was conducted with each participant in Chinese. The interviews were preceded by an observation task based on videos featuring two Chinese ESL learners performing three interactive oral tasks (i.e. spotting the difference, story narration, and decision-making tasks), and included the development of a VR oral task (see Figure 5). The interview protocol was developed based on the TAM and TPACK models and existing literature (e.g. Mishra and Koehler, 2006; Venkatesh and Davis, 2000; see supplementary materials). The questions covered two main aspects: acceptance of incorporating VR into oral tasks to promote learner engagement and knowledge base. The videos were used to elicit prior knowledge of TBLT and task engagement. During the interview, the participants were first asked to introduce themselves and describe their past L2 learning and teaching experiences. Then, participants were asked about VR's perceived usefulness, ease of use, their behavioural intention, and actual usage of VR integration into ELT and oral tasks and factors affecting their acceptance of incorporating VR into oral tasks to promote learner engagement. The third part assessed their knowledge base. They shared their TK of using VR in ELT and knowledge of VR-based oral tasks. To assess their pedagogical knowledge, the participants dis- cussed their understanding of TBLT principles and task engagement, and assigned scores (1–100 points) to each learner in the task performance videos based on their engagement level in each task. They were told to provide a rationale for their scoring as no rubrics were provided. For the next task, participants were asked to choose a specific group of students in Hong Kong universities, identify their needs for improving L2 oral proficiency, and design a VR-based oral task to address these needs. This enabled the researchers to

develop insights into their CK and TPACK.

Data Analysis

The interview data were transcribed into written words via the software *i*fl*yrec* and then manually checked by a research assistant. The transcripts were also translated into English using ChatGPT (an artificial intelligence chatbot), and the translation was manually checked by the first author. Qualitative content analysis (Selvi, 2019) was conducted to analyse the interview data. The coding scheme was developed based on the TAM and TPACK models. The first author conducted the initial round of coding, during which the codes and themes were identified. A second round of coding was conducted after one month, and the codes and themes identified were compared with those from the first round. They were identical, indicating intra-coder reliability. Three student teachers' transcripts were sent to the second author, who proposed a similar coding scheme to the first author's, but the first author's coding scheme was more detailed. Based on the first author's coding scheme, the third author coded three student teachers' interview transcripts and compared her codes with the first author's. The codes were highly similar, so the coding scheme was finalised. The third round of coding was conducted by the first author based on the finalised coding scheme (Table 1).

Findings

Acceptance of Incorporating VR into Oral Tasks to Promote Engagement

Twenty-one out of the 26 student teachers expressed positive attitudes towards the use of VR in L2 teaching and perceived VR as useful when integrated into oral tasks (Figure 6). Their positive attitudes and perceived usefulness of VR were attributed to several reasons. They believed that the most prominent benefit of utilising VR in oral tasks was the creation of authentic and immersive communication environments, which enhances learner interest, engagement and participation. For example, ST14 explained,

Tasks are based on communicative scenarios. If we ask our students to buy food in a supermarket, VR can immerse them in the real context. It would be much more authentic than communication in traditional classrooms.

Echoing ST14's viewpoint, ST21 pointed out that VR tasks may 'trigger learners' positive emotions and enhance their interest and active participation' due to its three- dimensional (3D), multimodal and immersive environment. In addition, the student teachers perceived that they needed to embrace the

integration of VR into education, as this is a current trend. ST21 described VR as an advanced and new technology; she was very positive about utilising new technologies in L2 teaching, and firmly believed that 'VR will definitely appear in L2 classrooms in the near future'. Lastly, our participants expressed their personal preference for VR. ST5 shared with us that she was a technophile and enjoyed using VR very much. Hence, she was more than happy to introduce VR into L2 teaching.

On the other hand, five student teachers were neutral about the usefulness of VR (Figure 6). They felt it was unrealistic to truly integrate VR into oral tasks because of the significant investment required in terms of human labour as well as technical and financial support. ST25 commented,

More teachers are needed to provide sufficient support regarding how to use the VR headset/ equipment in the classroom. At the same time, learning outcomes should be met. We don't have sufficient manpower. The contact time is quite limited.

One other participant, ST15, had not used VR before and said, 'it's difficult to visualise how VR can be incorporated into oral tasks'.

Table 1. The coding scheme.

Self-introduction	▪ Demographic information ■ Educational background ■ L2 learning experience ■ L2 teaching experience VR
acceptance	Perceived usefulness ○ Benefits of VR and VR tasks ○ Perceived concerns, challenges, and difficulties that decrease VR usefulness Perceived ease of use ○ Ease of VR use ○ Perceived concerns, challenges, and difficulties that might decrease VR mastery Attitudes toward incorporating VR into oral tasks to prompt learner engagement Intention to use VR oral tasks Usage behaviour External variables ○ Prior VR experience ○ Subjective norms ○ Output quality ○ Class size ○ Age of learners
Knowledge base	▪ Pedagogical knowledge of TBLT and task engagement ○ Definition of task engagement ■ Behavioural ■ Cognitive ■ Affective ■ Social ○ Measurement of task engagement ○ Factors affecting task engagement ■ Face-to-face communication tasks • Task complexity • Personal interest • Relevance and authenticity • Visual aid • Topic familiarity • Game-like features • Novelty • Reward ■ VR tasks • Task complexity • Personal interest • Relevance and authenticity • Topic familiarity • Interlocutor familiarity • Visual aid • Game-like features • Reward • Physical movement • Problem solving ■ Technological knowledge of VR

■ TPACK
○ VR oral task
○ Self-evaluation

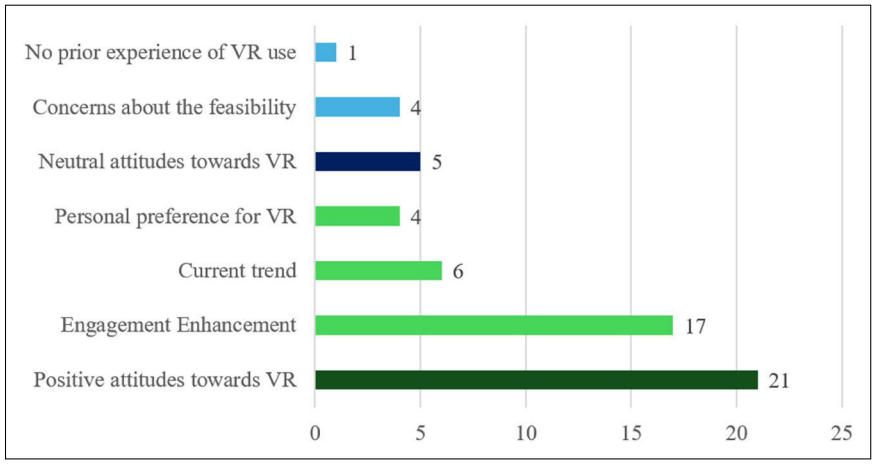

Figure 6. Attitudes towards VR and perceived usefulness.

Although all student teachers believed that using VR was not difficult and felt confident in their abilities to integrate VR into their lesson plans if training was provided, 10 expressed concerns about the ease of integrating VR into their actual classroom teaching. Their primary concern was whether they could use VR to monitor learners' task progress. Another cause for concern was the suitability of the available VR content. For example, ST24 commented,

There can be a huge gap between front end [teachers and learners] and back end [VR developers]. I am still unsure about how VR can be used in actual classrooms. Developers need the insights from teachers and learners.

ST16 and ST21 also noted how challenging it might be to manage learners' discipline if immersive VR tasks were implemented. This was mentioned particularly in the case for young learners who might be easily distracted by a variety of multimodal input, such as background music and videos. In addition, ST9 mentioned cybersickness as a potential issue that could affect ease of VR use, expressing a preference for non-immersive VR due to its inclusivity for those who experience cybersickness when using immersive VR. Regarding participants' future intention to use VR, seven clearly indicated a strong intention to utilise VR in oral tasks, while others referred to some of the aforementioned concerns to specify how they would proceed. Aside from starting with adult learners because 'young learners may be distracted by the immersive environment' (ST11), they would first like to have a better understanding of how to effectively manage the VR classroom. In addition, participants mentioned they would need to obtain support from their schools,

the students' parents and the students themselves. ST8 raised potential questions from parents, such as, 'Will using VR be a waste of time? Will there be any technical issues? Can VR really help to improve English speaking?'. She also believed that learners should be trained to use VR and that she should collect their feedback before deciding whether to adopt VR in her classes. In general, the participants explained that they needed to experiment with VR in their teaching before they could make a definitive decision on their intentions to permanently integrate VR into their teaching.

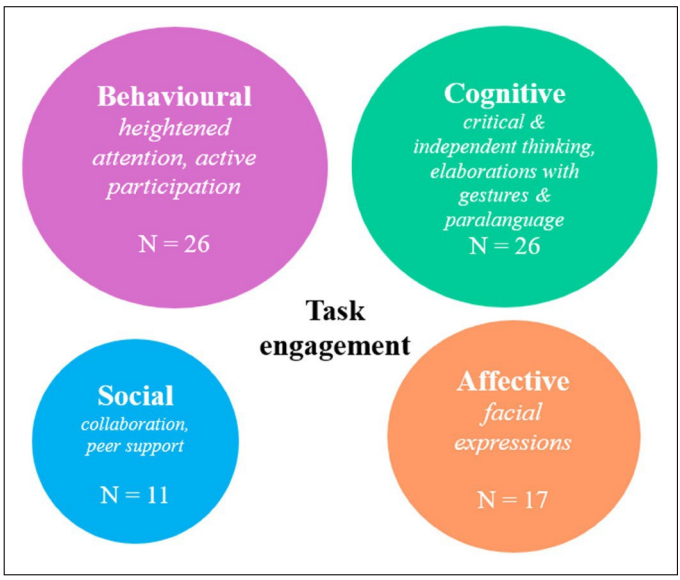

Figure 7. Learner engagement.

This study focused on participants' pedagogical knowledge of task engagement. During the interview, they were asked to define task engagement and to evaluate the engagement of the two students carrying out the tasks in the videos shown to them, and subsequently provide the rationale for their scoring. Figure 7 summarises the student teachers' under- standing of task engagement. The size of the circles represents the number of participants (*N*) who mentioned specific engagement subtypes: the larger the circle, the more participants discussed that subtype in the interview. The participants' description for each subtype was summarised into keywords and included in each circle. All student teachers demonstrated a good understanding of the behavioural and cognitive dimensions of the task engagement construct as defined in the current literature (see Introduction). For instance, ST1 believed that 'an engaged learner takes initiatives in task performance and actively participates in the task', which aligns with behavioural engagement. ST2 proposed her own four-dimensional construct

of task engagement, encompassing attention and focus, involvement in discussion, problem solving, and quality of contributions. The first dimension pertains to behavioural engagement, while the second and third dimensions are related to cognitive engagement. The fourth dimension covers both social engagement and quality of oral production.

However, the findings also indicated that the participants' knowledge about task engagement could be further enhanced. Firstly, not all of them recognised that learners' emotions reflect their engagement with the task. Only 17 participants attended to the facial expressions and gestures of the two learners in the video clips, with comments such as 'the learners look quite delightful and happy and thus are quite engaged' (ST3). Furthermore, an even fewer 11 participants included social engagement in their definition. ST16 highlighted the importance of peer support, noting that the two learners in the video clips provided varying degrees of support during task performance, as evidenced by the frequency of affiliative backchanneling (i.e. right and uh-huh produced by the listener). Moreover, seven participants perceived task performance or learning outcomes as an indication of engagement. For example, ST9 justified his scoring by saying,

I assigned 95 to Student A and 90 to Student B. B was less engaged because he did not use proper vocabulary. It should be plate, rather than licence.

Similarly, ST13 asserted, 'an engaged learner should use correct sentence structures and expressions and they would be more engaged if they self-study some advanced expressions and use them in speech production'. These comments reflected a limited understanding of task engagement.

Table 3. Task features.

Face-to-face	Virtual reality
■ Task complexity ■ Personal interest ■ Relevance and authenticity ■ Visual aid ■ Topic familiarity ■ Game-like features ■ Novelty ■ Reward	■ ~~Task complexity~~ ■ Personal interest ■ Relevance and authenticity ■ Topic familiarity ■ Interlocutor familiarity ■ Visual aid ■ Game-like features ■ Reward ■ Physical movement ■ Problem solving

During the interviews, the student teachers identified features of an engaging oral task, discerning differences between face-to-face communication and VR modes. The features listed (Table 3) largely aligned with current literature. For example, ST4 noted, 'In immersive VR, physical movement is crucial. Digital touch can deepen VR experiences and engage learners'. She explained that physical movement and digital touch could enhance learners' experience and make them feel that the environment and communication were authentic. This quote reflected her understanding of the benefits of digital technology (Jewitt et al., 2021).

Regarding TK, 19 participants reported using non-immersive/immersive VR equipment for playing games or watching videos/movies, and thus felt confident in their ability to use VR effectively. However, they also acknowledged the need for further training to fully equip themselves with VR knowledge in L2 teaching. ST3, who had integrated non-immersive VR in her prior teaching, felt competent in using VR for ELT. Nonetheless, her TK was limited to non-immersive VR, and she lacked proficiency in using immersive VR techniques. Six student teachers had no prior VR experience. These findings suggested an urgent need for TK training among all the participants.

The participants designed a VR-based oral task to address the identified needs of Hong Kong university students. All participants except for ST4 were able to identify the needs of their target learners and designed a relevant VR task, demonstrating their sufficient knowledge about the subject matters that should be taught in class. ST4 designed a film- watching activity in immersive VR, which is not an oral task. Although ST20 believed that he was able to effectively integrate VR into oral tasks to promote learner engagement because of his prior teaching experience and frequent use of VR, all the student teachers acknowledged their lack of TPACK. For example, ST16 designed a debate task (Table 4) in immersive VR and commented,

My ideas are somehow feasible but vague. I was uncertain if I should use immersive or non- immersive VR in this task. Or should I use both? If so, when should I use immersive VR? How to support learners during the VR task?

ST16's confusion was also raised by other participants, implying their professional development needs as regard to TPACK.

Table 4. A debate task (ST16).

Target learners	ESL learners in Hong Kong universities
	Goals Apply academic vocabulary and formal sentence structures within the debate context Enhance the cohesion and coherence of learners' speech production Improve learners' logical thinking skills
Task procedure (immersive VR)	Learners organise themselves into groups to participate in an international debate competition. Representing prestigious institutions such as Stanford University and Oxford University, they perceive themselves as elite students who must uphold high standards in their debate performances. They are allotted time to research the assigned debate topic and prepare for their debates in the physical world, and then they conduct the debates in VR.

Discussion

This study delved into ELT student teachers' acceptance of incorporating VR into oral tasks to promote learner engagement and also evaluated their knowledge in this context, providing insights into their professional needs.

Acceptance

The student teachers, in line with the findings of previous studies (e.g. Chen, 2016), were generally positive about the integration of VR into oral tasks. They believed that the 3D, multimodal, immersive, authentic task environments could enhance learner engagement and encourage active participation. Consequently, they embraced the new technologies, perceived VR to be useful, and believed that, after training, they would be able to use VR in their teaching. Similar to existing studies (Huang and Teo, 2020; Jang et al., 2021), the participants' perceived usefulness and ease of use predicted their intention to use VR. They were willing to try it out in their future teaching and testify to its effectiveness.

Their positive attitudes and perceived usefulness of VR may be due to the following reasons. First, technology-assisted ELT has been strongly advocated in the curriculum- related policies issued by the Chinese Government (MoE, 2022), which require teachers to integrate new technologies in their teaching. Second, they may have been inspired by current literature that purports the positive relationship between VR and learning. Third, their attitudes may also have been shaped by the positive comments about VR and other new technologies that are widely discussed in society. Fourth, our research site also reinforces the importance of integrating VR into education and has run various

trails using VR, which have confirmed its positive effects on learner engagement (Lai et al., forthcoming).

However, the participants showed hesitance and also had concerns, revealing that there were external factors that had an influence on their VR acceptance and caused them to reflect on their professional development needs. Their prior experience with and personal preference for VR affected their attitudes and behavioural intentions (Venkatesh and Davis, 2000). Those who had never used VR were unable to visualise VR-based oral tasks and thus held neutral attitudes. Although most participants played games or watched movies with VR, given their lack of experience of integrating VR into ELT, they were also uncertain about VR's effectiveness. Furthermore, their behavioural intentions could also have been affected by school policies and support (Huang and Teo, 2020). They perceived that VR oral tasks would not be possible if schools did not provide the required financial and technical support and professional training.

Such concerns could be partially alleviated through governmental support, top-down curriculum policies, and backing from technology companies (Strategy Analytics and Huawei, 2018). On the other hand, the findings also highlighted the necessity of updating teacher training courses by introducing VR. This approach would a serve dual purpose: it would not only act as a resource for student teachers but also equip them with content, demonstrating VR's potential in teaching. However, this would pose challenges for teacher educators who are similarly untrained and must start from scratch. Moreover, it is unrealistic to expect language teachers to develop the necessary skills to create classroom content, as this is both time-consuming and requires significant financial investment. Therefore, forming partnerships with content-development companies (e.g. Huawei) would present a more viable solution. However, this may not be straightforward, as most companies prioritise revenue from virtual gaming over virtual education.

Furthermore, the participants' intention to use VR would reportedly depend on their students' acceptance, learning outcomes and backgrounds. They would need to consider their students' age, VR literacy, and technological preference and acceptance when making their decision. Most importantly, they cared about whether VR facilitates L2 acquisition and, following critical analysis, surmised that VR could be a useful add-on only when teachers select appropriate task features. Participants' perceptions also indi- cated their professional needs. For one thing, they are eager to experience VR in ELT contexts and to acquire relevant knowledge. For another, they need to be convinced by more evidence demonstrating how VR can be incorporated into oral tasks and effectively implemented for L2 learners of different

demographic backgrounds.

Knowledge Base

With regard to the student teachers' knowledge base, having completed all the courses and received training on TBLT and task engagement, they were generally able to define oral tasks and task engagement. They also identified features that enhance task engagement. Those with teaching experience relied on their personal practical knowledge to define task engagement (Nguyen et al., 2023). Their responses largely aligned with existing literature (Philp and Duchesnes, 2016). However, their understanding was not always accurate. For instance, some confused task engagement with learning outcomes or oral performance. More than half overlooked the social dimension of engagement and nine neglected affective engagement. This indicated a need for further enhancement of their pedagogical knowledge.

Despite task engagement being well-defined in the literature, there appears to be a divide between theory and teaching practice. This gap was noted by Nguyen et al. (2023) whose student teachers also struggled to recognise all engagement subtypes, although in their case (unlike in this study) most student teachers (70%) recognised social engagement, 57% were aware of emotional engagement, but only 35% considered cognitive engagement. What these knowledge gaps suggest is that while student teachers are able to generate theories, identifying engagement subtypes in real scenarios is harder, probably due to the limited opportunities to observe what is effective in practice.

This study, while allowing us to identify areas for professional development, also represents an excellent initial step in allowing student teachers the time to observe and reflect on how engagement manifests in real classroom settings. Further classroom-based research and case studies are strongly recommended. In addition to student teachers' comments on learners' task engagement, the learners themselves could also be retrospectively interviewed to ascertain whether they concur with the student teachers' assessment.

Due to the lack of VR experience in this specific context, most student teachers found it challenging to connect VR with ELT or oral tasks and expressed urgency in relation to their need to acquire TPACK. The findings reinforced the amalgamation of different knowledge types in Mishra and Koehler's (2006) TPACK model, revealing that TK cannot be trained in isolation. Instead, it should be situated within a specific pedagogy related to a specific subject

matter. Therefore, if professional training is provided, it will be crucial to present teachers with tangible examples of how VR can be incorporated into oral tasks to engage learners.

Moreover, although this study solely included qualitative data and the findings may not be widely generalisable, we did observe a potential association between TPACK and student teachers' acceptance (Bai et al., 2024; Scherer et al., 2019; see Figure 4). This was because the student teachers who held neutral attitudes towards VR attributed their attitudes to a lack of TPACK. Our student teachers also expressed confidence that they would be able to effectively use VR after training. These findings imply that professional training, based on the TPACK model, could be implemented to enhance teachers' understanding of how to integrate VR into task design and implementation.

Conclusion

The findings of this study highlighted the student teachers' acceptance of incorporating VR into oral tasks to enhance learner engagement. However, they currently lack sufficient knowledge in this specific context. This led to uncertainties and concerns about the feasibility of VR-based oral tasks, and rendered them hesitant in their behavioural intentions. These findings revealed their urgent need for explicit professional development based on the TPACK model (Chen et al., 2023). To boost their pedagogical knowledge, it is essential that student teachers are given more time and opportunities to observe L2 learners' task performance and to discuss these learners' task engagement. Furthermore, student teachers need to observe how VR is used to begin thinking about how to implement it in class. This requires teacher educators to establish partnerships with companies and offer opportunities for student teachers to experience how to develop VR-based L2 teaching content in collaboration with such companies. Furthermore, if VR is to be implemented in L2 classrooms in the Chinese context, it may be necessary to reconsider the class size and pedagogies, as a teacher-centric approach is now prevalent in China but VR requires a more learner-centric approach.

Our results confirmed the association between TPACK and VR acceptance and rein- forced the essentiality of TPACK training (Bai et al., 2024). We also highlighted the importance of advancing teaching conceptions to boost TPACK. Teachers' perceptions and beliefs are strong motivators for innovation. For example, if teachers value the importance of cultivating students' unique ideas in their writing, they are more likely to adopt a student-centred pedagogy and integrate technology, pedagogy, and content to achieve this pedagogical goal. As the voices of L2 teachers are often absent, this study provides much needed

ground evidence as to the need for L2 teachers to shoulder more responsibilities than their L1 counterparts for creating real-time communication opportunities, despite facing more difficulties in designing speaking activities, especially authentic oral tasks, due to the lack of L2 communication environments in their local communities.

While this study can be viewed as a needs analysis targeting student teachers, and serve as a reference for professional development programme design, future research could focus on how student teachers might be trained and how they value and use VR in their actual teaching after the training. This line of research would provide teacher educators with more evidence on how to develop preservice teachers' digital competence and improve their teaching.

Despite its strengths, we acknowledge that this study has some limitations. For example, it would have been more beneficial if the researchers could have provided the student teachers with VR experiential opportunities (e.g. watching a VR video) before conducting the interview. In addition, the findings would have been more reliable if data from different sources had been collected. Furthermore, asking student teachers to plan a course or a lesson using VR and TBLT could have better evaluated their knowledge and understanding. Notwithstanding these limitations, we believe this study is meaningful as it illustrates the professional needs of student teachers and offers suggestions on what should be taught to this population.

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