English Medium Instruction on Spatial as a Virtual Reality Classroom

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Abstract

As a result of growing Artificial Intelligence technologies, many immersive Metaverse platforms have emerged for various purposes including teaching and learning. Although many studies have explored the use of immersive Virtual Reality (VR) platforms in university courses, little research on the application of these digital tools at English Medium Instruction (EMI) Higher Education institutions in Hong Kong has been conducted. Therefore, this paper aims to investigate the teacher and student perceptions about the effectiveness of EMI in the Metaverse supported by Spatial, an immersive VR platform. Twenty non-English-speaking university students from diverse academic backgrounds were invited to two-hour virtual classes and evaluating the effectiveness of EMI on Spatial by responding to the 5-point Likert Scale survey and the Spatial platform and a follow-up focus-group interview. The teacher also shared the teaching reflection on VR classes based on classroom observation notes. The responses of the students show that VR classes on Spatial can be more engaging than Zoom sessions in terms of motivating and facilitating and classroom interaction and communication, but they were still very different from face-to-face classes. The platform could also support the effective delivery of lessons about interesting cultural topics and allowed the teacher to provide students with adequate learning support. According to the teacher, although the classes seemed to be smoothly run, in immediate feedback provision and classroom management were sometimes difficult as the teacher could not supervise all students at the same time while they were navigating freely through different 3D portals.

Keywords: Virtual Reality, English Medium Instruction, Spatial, Hong Kong

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Introduction

The invention and growth of the Internet and Web 2.0 technologies in the 1990s enabled the implementation of online and remote education worldwide (Davies, Otto, & Ruschoff, 2013; Zawacki-Richter & Jung, 2023). Despite the contrasting findings about the effectiveness of this nontraditional instruction mode across the literature (Coman et al., 2020; Kemp & Grieve, 2014; Miao & Ma, 2022; Nasution, 2021; Rojas, 2023; Shea et al., 2015), it has been an alternative to face-to-face classrooms since the Covid-19 pandemic happened in 2020 (Zawacki-Richter & Jung, 2023). Hong Kong Higher Education (HE) institutions even adopted online teaching and learning even sooner because of the late 2019 political movement in the city (Yeung & Yao, 2021). However, it posed a challenge to many Hong Kong HE teachers, who had to deliver supposedly face-to-face courses on virtual learning with little online teaching experience (Moorhouse & Wong, 2022). Although some teachers adapted their pedagogy to be effective online educators and held positive perceptions about Zoom (a virtual learning platform) classes (Kohnke, 2022; Moorhouse & Wong, 2022; Xina, 2022), problems including limited classroom interaction, student distraction, ineffective knowledge delivery and acquisition, delayed feedback, and inadequate technical support still existed (Fung, 2022; Wang & Li, 2022; Yeung & Yao, 2021; Xina, 2022). As the unpredictable pandemic situations could not promise the resumption of face-to-face learning, some teachers considered other e-learning options that could offer the closest-to-real classrooms. Classes on the Metaverse, supported by VR platforms, were hence piloted in the hope of increasing student learning motivation and alleviating their "Zoom fatigue syndrome". Many studies have shown that VR learning could boost student motivation and engagement, classroom interaction and communication, and student learning outcomes (Makransky et al., 2019; Makransky & Lilleholt, 2018) while some revealed insignificant differences in the effectiveness between VR and other online learning platforms (Leder et al., 2019; Sacks et al., 2013). Parong and Mayer (2018) even ascertained that VR platforms negatively affected teaching and learning qualities. However, few of these scholarly works addressed the Hong Kong HE context, where many students can be introverted and passive learners who struggle to study in EMI institutions because of the lack of second language proficiency (Yeung & Yao, 2021). To fill this research gap, this paper examines the teacher and learner experiences on Spatial, a VR platform supporting immersive learning experiences, at Hong Kong tertiary institutions. Specifically, the paper will answer the following questions:

1. What are the perceptions of Hong Kong university teachers and students about teaching and learning on Spatial?
2. Can the teacher effectively deliver quality lessons to students through the VR platform?

Research Methods

To ensure the validity of research data and the reliability of research results, a triangulated empirical study was conducted using a survey, focus-group interview, and teaching reflection. One teacher and twenty students from undergraduate and graduate Teacher Education programs of a public university in Hong Kong were invited to participate in the study. Despite different levels of English proficiency, all students should have basic computer skills to participate in virtual classes. To avoid potential technical problems, a Spatial Guidebook with the account and avatar setup instructions and basic navigation steps on the platform was sent to the students before the classes. Since the students have conflicting study schedules, not all of them could attend the same class. The teacher was requested to conduct two VR classes, each with ten students, about World Cultures, an optional non-credit workshop series as part of the Informal University English Curriculum that aims to provide lower-level students with language support and intercultural knowledge.

The VR classes were designed based on the Sociocultural Theory (Vygotsky, 1978) and Task-based Instruction Approach with various scaffolding tasks and activities in different Spatial portals. The learning activity in each portal has a different level of difficulty and a learning task which can be performed on the 3D space or a separate worksheet. The students would begin the lesson at the portal with the easiest task and be directed to a more difficult one in another portal upon completion to ensure they would achieve their learning goals according to the Zone of Proximal Development. The Sociocultural Theory also suggests that the learning process of students is also involved in social interactions, so the given tasks and activities aimed to maximize collaborative learning, specifically by providing the students with peer scaffolding and peer feedback opportunities. While delivering the lessons, the teacher was also observing the student responses to and participation in the learning tasks and taking observation notes. Upon completing the classes, the teacher wrote a teaching reflection based on the notes while the students evaluated the quality of the lessons using a 5-point Likert scale questionnaire and participated in a follow-up focus group interview with the researcher. The teacher reflection and student responses to the interview and online questionnaires were then used for data analysis.

Findings

Online Questionnaire

Variables	Mean	SD
(1) The lesson was well-organized and prepared, and the teacher's instruction was clear.	4.82	.40
(2) My communication and interaction during the class was effective.	4.45	.52
(3) My learning interest was stimulated.	4.45	.52
(4) My learning needs were effectively addressed during the lesson.	4.45	.69
(5) was actively engaged in the learning tasks.	4.64	.50
(6) The representation of visual aids on the Spatial platform was effective.	4.64	.50
(7) The teaching and learning activities helped improve my learning performance.	4.36	.81
(8) There was no difference between learning on Spatial and face-to-face.	4.64	1.03
(9) The platform designs were suitable for the lesson content.	4.45	.69
Overall Mean	4.43	

Table 1: *Student evaluation of VR classes on Spatial*

Table 1 represents the student evaluation of the VR classes on Spatial. The overall mean of all statements is 4.43. The mean and standard deviation of statement (8) were the lowest (M=3.64) and highest (SD=1.03), respectively. This implies diverse opinions on the instruction platform, with fewer students believing VR and face-to-face classes provided the same experience. Whereas statement (1) had the most positive rating with the highest mean (M=4.82) and lowest standard deviation (SD=0.4), followed by statements (3) and (5) with

M= 4.64, and (2) and (4) with M=4.45. However, the mean of statement (7) is only 4.36, lower than the overall mean.

Focus Group Interview

Significant and repeated information in the student responses to open-ended questions during the focus group interview was doubled-coded for an in-depth understanding of learner experiences and perceptions about VR classes on Spatial. There emerged seven inductive themes including (1) the quality of the lesson and teacher instruction, (2) student learning interest, (3) student engagement, (4) classroom interaction and communication, (5) independent learning, (6) future application of Spatial for career purposes, and (7) learning difficulties. Most of them overlapped with the pre-determined variables in the online questionnaire.

Aligning with the online questionnaire results, the students showed optimistic views about themes (1), (2), and (3). All of them stated that the teacher delivered the lessons in an organized way using simple language and suitable learning activities, which made the instruction easy to follow. The technical design of Spatial effectively supported the representation of vivid visual aids and multimedia, making the lessons engaging and stimulating the learners' interests. "I hated Zoom lessons, but this platform changed my mind a bit about virtual learning. Longer hour classes may be more interesting if taught here", said one student. Another student shared "I usually just sat there and listened to the teacher talking on Zoom for the whole time, but this platform allowed me to move around the 3D space and do different tasks." However, when asked about theme (4), some students said it was far from being real because the avatars of Spatial users could not replace actual body language in face-to-face communication although some felt less shy to socialize through the avatars.

Themes (5), (6), and (7) which online questionnaire overlooked, emerged with new implications. Several students believed their independent learning skills were improved as they just needed to read the teacher's instructions and walk around the virtual space to work on the tasks with minimal teacher supervision. Nevertheless, the teacher-student communication was not interrupted as the teacher was still present to provide timely support, and all classroom participants could discuss and share about their work upon completing the tasks. Interestingly, some students said they may use Spatial to create a student-centered online classroom in their future teaching since most of them are pre-service teachers. However, some students were skeptical about this idea as not all topics and subject matter could be taught on VR platforms. Despite the overall positive perceptions, there were some challenges that the students faced during their learning process. Some students stated the Spatial Guidebook was useful for technical setup, but sometimes they were distracted from learning activities while roaming the large 3D space.

Teaching Reflection

While the online questionnaire and focus group interview inform the effectiveness of learning on the platform from the students' perspectives, the similar process of coding data from classroom observation notes and teaching reflection revealed the teacher perceptions. Most of the following themes of (1) technology-mediated pedagogy and (2) student engagement, (3) personalized learning environment, (4) lesson preparation, (5) classroom management, and (6) immediate feedback provision newly emerged except for (2).

From the teacher's perspective, Spatial could create student-centered virtual classes and support Task-based Instruction (1). Its technical functions such as opening different portals for different learning zones and tasks could also offer a personalized and engaging learning environment to students with diverse learning profiles (2-3). Before teaching on Spatial, the teacher had to initiate the conversation most of the time on Zoom, but the students were not very responsive to spoken communication. They also found it demotivational to have group discussions with their peers through a 2D screen in Zoom breakout rooms. However, they seemed to be more engaged in the tasks and interactive in the VR classes although written communication was still dominant. For example, some students actively complimented the task design on different Spatial landscapes such as the art gallery and museum when matching the English captions with the exhibited pictures. They also looked eager to give feedback on their peers' works by posting a sticky note next to the answers or dropping a like reaction. For group discussion on integrated tutorial videos in the virtual conference room, the students still needed the teacher's monitor. Regarding technical features, it can be time-consuming to build a learning space that fits all lesson topics and upload a large volume of learning materials on Spatial. Therefore, teachers with modest digital skills may find it difficult to prepare for and deliver their lessons on the platform. Furthermore, this is a 3D space where the participants could "teleport", so sometimes the teacher could not keep track of the students and ensure they all participated in the learning activities. Immediate feedback was also not well provided as the students mostly worked independently and could only showcase and discuss their works at the end of the classes.

Discussion

1. What are the perceptions of Hong Kong university teachers and students about teaching and learning on Spatial?

Both qualitative and quantitative data demonstrate positive perceptions about EMI in VR classes in general, which aligns with the conclusions of Makransky et al. (2019) and Makransky and Lilleholt (2018). The VR platform, which is in this case Spatial, could provide a student-centered and personalized learning environment, increase student engagement and motivation, and give them more confidence in in-class interaction and communication. VR lessons on Spatial seemed to be more effective than those on Zoom with respect to peer feedback and student communication confidence, which Parong and Mayer (2018) disagreed with. These positive results, however, might simply be the students' initial responses to a new learning platform and first-time immersive learning experience. Like Zoom lessons, the excitement of learning on Spatial can diminish later after the students interact with the platform for an extended period. In addition, most students who participated in the study attended only one VR lesson, which is not enough to form a firm conclusion.

2. Can the teacher effectively deliver quality lessons to students through the VR platform?

Although the student learning performances in VR classes were not rated as highly as other socioemotional factors, and VR classes were still very different from actual face-to-face classes, the students could still achieve their learning goals and showed better learning performances through the teacher's clear instruction. The students could enhance their independent learning skills through self-regulated learning while the teacher acted as a guide on the side. However, the teacher was still the primary monitor of group discussion because some students still found it hard to initiate and lead the conversations themselves in a larger group. There should also be more effective classroom management to ensure every student is engaged and lower-level students can receive timely support, especially when the teacher cannot be simultaneously present at all portals. Besides pedagogy, adequate technical training for both teachers and students is also required for proper teaching and learning experiences because some Spatial landscapes are quite large, and navigating through different spaces can be confusing.

Conclusion

This study gave HE teachers at EMI institutions the confidence to use VR platforms as a transformative pedagogical tool to bring their students new learning experiences. However, appropriate teaching approaches, lesson content, and socio-emotional support factors in the classroom should be highly considered. Although the study filled the theoretical gap about VR-supported immersive learning at the tertiary level in Hong Kong to some level, there were still some limitations, which prompted the expansion of this research topic. For instance, the VR classes in this paper were non-credit classes of the Informal Curriculum. Whether this instruction mode would work for compulsory courses of all academic disciplines has still not been confirmed. More importantly, the improved learning performance of students on Spatial stemmed from their subjective beliefs. No formal assessment instrument was used to test the academic performances of the students in the immersive classes, which should be properly investigated in future studies.

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