EXPLORING THE POTENTIAL OF VR IN ENHANCING AUTHENTIC LEARNING FOR EFL TERTIARY STUDENTS IN VIETNAM

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Abstract

For language learners situated in contexts where there is limited exposure to the target language, an authentic learning environment is important. Virtual Reality (VR) has been increasingly used in education to simulate realistic scenarios; however, little is known about whether VR can enhance the nature of authentic learning for learners of English as a foreign language (EFL). Motivated by that reason, this study was conducted to examine the affordances of VR when integrated with language tasks to facilitate authentic learning for EFL learners. Herrington et al.'s (2010) model of authentic tasks was adopted to evaluate the VR-integrated tasks. Twenty-four students participated in the VR technology intervention and were followed up with individual interviews. The results showed VR has the potential to enhance many of the ten attributes of Herrington et al.'s (2010) authentic tasks. Suggestions are provided to further extend the model to be more applicable in EFL contexts, alongside implications for practice and future research.

Key words*: authentic learning; authentic tasks; EFL; virtual reality; VR-integrated tasks

1. Introduction

Virtual Reality (VR) is now increasingly popular with the booming development of free or low-cost VR applications for smartphones to reach more users (Claudio et al., 2017; Woodford, 2019). In education, VR is a promising teaching tool to foster experiential education (Schott & Marshall, 2021) or provide students with experiences that are not available in the physical world (Alhalabi, 2016; Theelen et al., 2019). In English language teaching, the application of VR has also become popular over the last decade, but its use in language education still

remains low (less than 2%) compared to its use in other fields of instruction (Radianti et al., 2020).

For English learners in contexts where there is limited exposure to the target language, opportunities to learn a language in an authentic environment are crucial (Zainuddin, 2011). With the specific potential to enhance authentic learning environments, VR has been found to create real situational interactions and virtual target language communities, simulate realistic scenarios, and immerse learners in learning (Dobrova et al., 2017; Schwienhorst, 2002; Wang et al., 2017). Studies have shown that VR applications supports learners with additional opportunities to be exposed to the target language (Popova & Nenasheva, 2016; Schwienhorst, 2002). Despite these affordances, research into the application of VR in English language learning and teaching is still in its infancy and has lagged behind technological developments or usage in educational contexts (Bonner & Reinders, 2018; Bower & Jong, 2020). There have been very few empirical studies that provide comprehensive evidence into the use of VR in general, let alone the facilitation of authentic learning in contexts where English is learned as a foreign language (EFL). Hence, this study was conducted to investigate the affordances of VR integrated into Task-Based Language Teaching (TBLT) to facilitate authentic learning from language learners' perspectives. A group of 24 EFL undergraduate students at a public university in Vietnam were invited to participate in the qualitative research, which addressed the following research question:

- To what extent can VR-integrated tasks facilitate authentic learning from EFL undergraduate students' perspectives?

2. Literature review

2.1. Authenticity

Authenticity has been mentioned in the use of materials for foreign language learning as far back as the 19th century (Gilmore, 2007). However, it was not until the 1970s that it became prominent with the advent of the Communicative Language Teaching (CLT) approach (Buendgens-Kosten, 2014; Gilmore, 2007). Authenticity refers to *realness* or *realism* in language learning materials and activities (Buendgens-Kosten, 2014). Hence, it also refers to the use of a first language in EFL teaching and learning (Kirkpatrick, 2006). However, Kachru (1992) argued that although "native-like" use was appropriate for most language learning situations, whether it could be applied to the status of English in all situations should be reconsidered.

Another aspect of authenticity is the learning context itself (Roberts & Cooke, 2009; Wee, 2008; Widdowson, 1996, 1998). For communities that are served by a language other than English, native-speaker contexts cannot be replicated (Widdowson, 1996), and learners do not usually "have the contextual knowledge to authenticate English in native-speaker terms" (Chen & Wright, 2017, p. 518). Van Lier (1996) argues that authenticity not only denotes authentic materials, it also refers to the process of engagement in learning situations, the process of self-actualisation, intrinsic motivation, respect, and moral integrity. This viewpoint is relevant to contexts where EFL learners have limited opportunities to use English for meaningful and purposeful communication outside the classroom (Kessler et al., 2020). Authenticity in language learning is needed to motivate students and engage them in the actual use of the target language.

For communities where English is not the first language, pedagogic strategies are helpful to ensure or achieve authenticity in English language teaching and learning (Widdowson, 1998). TBLT is a popular pedagogical approach that views authenticity as the central characteristic of tasks (Ellis, 2017; Widdowson, 1996, 2003). A task is authentic when it resembles tasks that learners encounter in their everyday lives (Widdowson, 2003) or when it creates interactionally-authentic contexts that require the use of the target language (Ellis, 2003). Categorising tasks as real-world tasks and pedagogical tasks, Ellis (2017) argues that both categories of tasks aim at authenticity, that is, real-world tasks focus on situational authenticity, and pedagogical tasks give primacy to interactional authenticity.

Technology integration is also potential to enhance authentic learning. Researchers claim that EFL learners now have more opportunities than ever before to engage with the target language due to the proliferation of and access to new technologies (Chong & Reinders, 2020; González-Lloret & Ortega, 2014a; Lai & Li, 2011). This means that authenticity is becoming increasingly achievable in EFL contexts with the facilitation of technology.

2.2. The use of VR in language education

Virtual reality is defined as a state of mind that occupies a person's awareness in a way that is similar to that of real environments, and VR devices are those that contribute to creating virtual reality (Macpherson & Keppell, 1998). With the recent development of VR technology, VR is categorized into non-immersive VR, semi-immersive VR, and fully immersive VR (Di Natale et al., 2020; Woodford, 2019). With the increasing use of VR in education, immersive VR has been found to be more effective in learning performance than non-immersive VR tools (Wu et al., 2020). Immersive VR offers first-hand experiences for learners that would not be possible

to have in the real world, provides unique opportunities for experiential and situated learning (Di Natale et al., 2020), and assists the cognitive process and language transfer (Araiza-Alba et al., 2021).

To date, research on the use of VR for language education purposes has shown mixed results in language learning outcomes. For example, Chen et al. (2019) used Google Earth to explore English learners' expository writing at a middle school in the USA. The study results showed a positive increase in both students' writing skills and their attitudes and engagement in using Google Earth VR. On the contrary, also related to writing skills, a study by Dolgunsöz et al. (2018) with the use of Samsung VR Goggles among EFL freshmen students in Turkey showed no effect of VR technology on EFL writing performance. In other studies, VR tools were found to potentially improve oral skills, confidence, and cultural awareness among EFL students (Ebadi & Ebadijalal, 2020) and significantly impacted young EFL learners' pronunciation (Alemi & Khatoony, 2020). Bonner and Reinders (2018) suggested using 360-degree videos and low-cost VR headsets to practise presentation skills with a virtual audience in the VR environment. In addition, VR was reported to reduce communication anxiety (York et al., 2021) and increase classroom collaboration (Donally, 2018; Singh, 2018).

Although the application of VR in language education is still in its infancy, a number of studies have pointed to the benefits of VR in increasing the exposure to authentic language and contexts for language learners (Dobrova et al., 2017; Popova & Nenasheva, 2016; Wang et al., 2017). To minimise the challenge of foreign language learning in contexts where there is a lack of exposure to authentic environments, VR is a promising tool to create real situational interactions or virtual communities to unite conversation partners in a virtual learning environment (Dobrova et al., 2017), simulate realistic scenarios to immerse learners in learning contexts (Wang et al., 2017), and enable language learners to communicate synchronously and asynchronously with native speakers (Popova & Nenasheva, 2016).

2.3. The synergy of TBLT and VR technology

Various studies have recently pointed to the reciprocal benefits of the combination of TBLT and technology (Chapelle & Sauro, 2017; González-Lloret & Ortega, 2014a; Thomas & Reinders, 2010). TBLT can be potentially enriched by the infusion of technology, while technology can become uniquely useful for language learning when used in conjunction with TBLT (González-Lloret & Ortega, 2014b). In other words, technology can enhance the benefits of TBLT, while TBLT serves as a framework to conduct research with technology (Ziegler, 2016). Technology-mediated tasks, the outcome of the synergy, can help minimise students'

fear of failure, raise their motivation, promote their creativity, enable them to meet other speakers in different locations, and increase exposure to authentic language environments and cultures (González-Lloret & Ortega, 2014b).

Among emerging technologies, VR has potential benefits to facilitate authentic learning, as discussed above. The advantages of TBLT and the affordances of VR mobile technology suggest that the synergy of the two has the potential to enhance and augment authenticity in language learning for EFL learners. Teaching methods and technology have an interrelated relationship that may support the active participation of students in the learning process, which has been recently found to be more effective in VR (Klingenberg et al., 2020).

As revealed from the literature review, VR has been used in various ways to support the learning of different language skills and language aspects. However, there is a lack of empirical research providing insight into the specific use of VR to facilitate authentic learning in EFL contexts. Despite the largely common use of TBLT approach in language teaching, little is known about the integration of this immersive technology tool in a task-based language learning approach with the aim to facilitate authentic learning. Hence, this study was conducted to explore the affordances of VR-integrated tasks in enhancing authentic learning for EFL students at the tertiary level. The following section discusses a theoretical framework of authentic learning and explains the reasons why it was selected for this study.

2.4. Theoretical framework of the study

Since TBLT has been increasingly implemented in technology-mediated learning environments, researchers have agreed that it is time to broaden the conceptualisation of "tasks" and allow for the possibility of freer and less structured tasks (Lai & Li, 2011; Ortega, 2009). The traditional definitions of tasks (Ellis, 2003; Long, 1985; Nunan, 1989; Skehan, 1998) emphasise the psycholinguistic approach of language learning, but this dominant focus on the linguistic aspect has been called into question when TBLT is applied in technology-enhanced language learning contexts (Lai & Li, 2011; Ortega, 2009). Although the definitions of tasks by Long (1985) and Ellis (2003) refer to the real-world relevance of tasks, they do not provide a specific framework to achieve authenticity of tasks, particularly tasks integrated with technology.

Given the challenges associated with the concept of tasks and task authenticity when integrated with technologies, we found the framework of authentic tasks designed by Herrington et al. (2010) the most suitable to characterise authentic tasks integrated with digital technology with its ten attributes as follows:

1. Authentic tasks have real-world relevance.

2. Authentic tasks are ill-defined, requiring students to define the tasks and sub-tasks needed to complete the activity.

3. Authentic tasks comprise complex tasks to be investigated by students over a sustained period of time.

4. Authentic tasks provide the opportunity for students to examine the task from different perspectives, using a variety of resources.

5. Authentic tasks provide the opportunity to collaborate.

6. Authentic tasks provide the opportunity to reflect.

7. Authentic tasks can be integrated and applied across different subject areas and lead beyond domain-specific outcomes.

8. Authentic tasks are seamlessly integrated with assessment.

9. Authentic tasks create polished products valuable in their own right rather than as preparation for something else.

10. Authentic tasks allow competing solutions and diversity of outcomes.

(Herrington et al., 2010)

This framework has been used to investigate authentic learning environments with different technologies in a range of educational contexts, such as web-based learning of English as a foreign language (Ozverir et al., 2016; Ozverir et al., 2017), or authentic mobile learning in higher education (Chiu et al., 2018). Pedagogically, these ten attributes align with methodological principles of TBLT in distant learning of less commonly taught languages by Doughty and Long (2003) in the way that it uses task – not text – as the unit of analysis and promotes learning by doing, collaborating, reflecting, and obtaining rich input from a variety of resources. Compared with the definition of tasks and criterial features of a task by Ellis (2003), the authentic tasks model by Herrington et al. (2010) not only covers the main elements of tasks such as a "work plan" (Ellis, 2003) with complex task sequences, clear goals and outcomes, students' active roles, and real-world processes, but also adds more specific details of authentic tasks in technology-enhanced learning environments, such as task complexity, authentic assessment, reflection, polished products, and diverse outcomes. Most importantly, underpinned in the situated learning theory, the model places emphasis on task authenticity, which is also an important element of TBLT (Ellis, 2003). For all reasons discussed above, this framework was selected to evaluate the use of VR in facilitating authentic tasks in language learning with technology.

3. Methodology

3.1. Research design

The study adopted a qualitative research design to investigate students' perspectives on the use of VR-integrated tasks to support authentic learning based on their lived experience of using VR in EFL learning. Qualitative research allows researchers to focus on participants' meanings of a topic and develop a holistic picture of the problem from multiple perspectives of the participants (Creswell & Poth, 2018). Qualitative research also enables researchers to collaborate with participants interactively and use both deductive and inductive reasoning to develop patterns and themes (Creswell & Poth, 2018). This study aimed to understand EFL students' perceptions of their experience of using VR in TBLT and accordingly interpret the affordances of VR-integrated tasks in facilitating authentic learning. Therefore, a qualitative research design was suitable to seek the answer to the research question of the study.

3.2. Participants

Participants were 24 EFL students enrolled in an undergraduate language program at a public university in Vietnam. Participants were recruited on a volunteer basis, and consent was given before data were collected. Ethics was approved by the Human Research Ethics Committee at an Australian university.

3.3. Procedure

In order to examine the potential of VR affordances to facilitate authentic tasks in EFL learning, participants were invited to take part in a VR technology trial over a semester before they were interviewed about their lived experience of the phenomenon.

Google Expeditions was selected to be used in the VR technology trial. It was a free VR application developed by Google for educational purposes. The VR technology trial followed the existing syllabus of the course that participants were taking. Based on the syllabus, the VR trial activities were designed to provide students with supplementary opportunities to be exposed to the target language. It focused on extending the decontextualised activities in the textbook with VR tours from Google Expeditions. Table 1 shows an example of the textbook activity, which was extended with a VR-integrated task.

Table 1. A sample VR-integrated task

Textbook activity	VR-integrated task
Work in groups. Compare humans and technology. Think of two more advantages or disadvantages for each.	**Pre-task:** Students downloaded suggested Google Expeditions VR tours about robots and technology to their phones. They experienced the tours and noted down the ideas they learned from the tours.
(Unit 8 – Technology, adapted from Hughes et al. (2015))	**Task:** Students formed groups and performed the discussion tasks in the textbook using the ideas they learned from the VR tours.
	Post-task: The teacher gave corrective feedback on students' use of language. Students shared their feelings about experiencing the VR tours.

The VR-integrated tasks ranged from simple to complex ones. The simple ones included tasks to explore the selected VR tours related to the textbook topics for discussion. More challenging tasks required students to deliver PowerPoint presentations or poster presentations based on their VR explorations. The most challenging task required students to create their own VR tours, which were then synced into the Google Expeditions mobile application.

3.4. Data collection and analysis

Interviews were the main data collection instrument of the study. They were designed with a semi-structure and conducted face-to-face with individual participants. Observation was also used as a secondary data source to supplement the interview findings. At the end of the trial, 18 students were selected on a volunteer basis for individual face-to-face interviews. The interview questions were designed based on the ten attributes of authentic tasks by Herrington et al. (2010).

A hybrid approach to interview data analysis was used, which began with a deductive or theory-driven coding system (Boyatzis, 1998). With the support of NVivo, the deductive approach was used first with ten attributes of authentic tasks (Herrington et al., 2010), forming the pre-determined themes as described by the theoretical framework of the paper. Initial codes were drawn from these pre-determined themes. An inductive approach was also used to identify the sub-themes under each pre-determined theme. This approach helped to reveal unanticipated and emerging themes/subthemes from the raw data and to avoid missing valuable findings. Evidence of themes, subthemes, patterns, and unexpected evidence beyond the pre-determined

themes within the data were then identified and counted for frequencies and consistencies. Coded data were then put into hierarchies and further analysed. Figure 1 is a screenshot of the NVivo analysis, illustrating the pre-determined themes based on the selected framework and the subthemes that emerged from the data analysis.
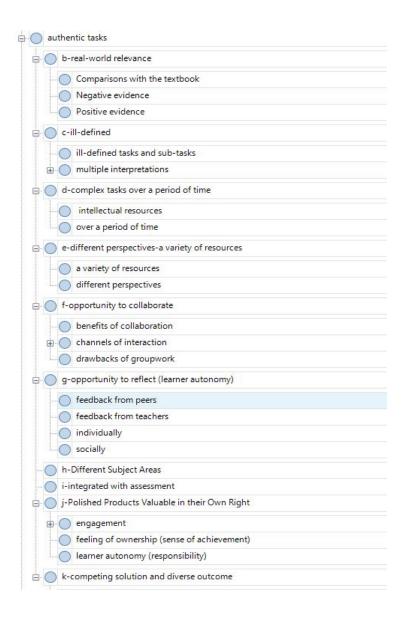

Figure 1. Themes and subthemes emerging from the data analysis

Observation notes were also used to support the analysis of the interview data in order to avoid any missing phenomena or factors happening during the technology trial.

4. Findings

The interview analysis revealed strong evidence of the support of VR to enhance authentic tasks derived from the framework by Herrington et al. (2010). The frequency of the patterns occurring in the ten pre-determined themes is presented in Table 2.

Table 2. Frequency of patterns occurring in attributes of authentic tasks

Attributes of authentic tasks	No. of participants	No. of NVivo references
1. Real-world relevance	18	107
2. Ill-defined tasks	18	63
3. Complex tasks	18	50
4. Different perspectives, using a variety of resources	17	93
5. Opportunity to collaborate	18	99
6. Opportunity to reflect	18	105
7. Different subject areas	15	30
8. Seamlessly integrated with assessment	3	5
9. Polished products	18	172
10. Competing solutions and diversity of outcomes	12	50

Out of these ten attributes, most of them were found to have been facilitated by VR technology. The attribute least supported by VR was *authentic assessment*. Due to the word limit, the following sections present major findings on seven attributes of the framework, namely Attribute #1 – Real world relevance, Attribute #4 – Different perspectives and a variety of resources, Attribute #5 – Opportunity to collaborate, Attribute #6 – Opportunity to reflect, Attribute #9 – Polished products, Attribute # 10 – Diversity of outcomes, and Attribute #8 – Authentic assessments.

4.1. Real-world relevance (Attribute #1)

Regarding the attribute of *real-world relevance*, the evidence emerged via the perceived authentic contexts brought about by the VR application and students' immersion in these perceived authentic contexts. First, foreign language learning tasks were perceived to be more authentic and life-like than the textbook tasks due to the add-on supplementary materials multimodally represented within the 360-degree environment. Students commented on the perceived authenticity that the VR application brought to them as being "so real", "lively", "genuine", "direct", "magnificent", "magical", or "triggering all senses".

The multi-sensory language materials were reported to be the main reason for perceiving the VR contexts as authentic. For example, one student pointed out that she could watch, listen, and read at the same time within the VR tours thanks to its multi-sensory input, which was impossible with the textbook:

> I can only listen when it comes to the listening part in the textbook... However, in the VR tours, I can watch, listen, read and know more vocabulary at the same time ... I can listen directly while I am watching the VR images. It evokes all my senses like in real life.

In addition to the real-life panoramic 360-degree view, participants reported two technical affordances of the VR application that added an extra dimension to the multi-sensory language materials. These affordances were the *guide* and *point of interest* function. The *guide* function allowed the presenter to lead participants to certain VR scenes or points within a VR tour, and the *point of interest* highlighted interesting locations on a VR scene. These two functions helped the VR viewers to move around with guided purposes, collaborate with others, or interact with texts in the VR environment. These functions assisted participants in learning the language in an interactive way.

In addition to the perceived authentic contexts, participants reported a strong sense of real-world connection from their immersion in the VR learning environment. For example, students reported being immersed in the 360-degree virtual environment when they put the VR headsets on. The lesson became a "tour or a field trip" to them while they could walk around experiencing the VR scenes.

> I felt like I was there. It was so real. I felt like I was a local, and I spoke a little bit more naturally because I was in there, among them. It was hard to describe.

In an EFL learning class, the feeling like a *local* is very important to language learning because it gave students the impetus to produce language more naturally.

4.2. Different perspectives and a variety of resources (Attribute #4)

The analysis indicated that the VR application provided students with different perspectives and a variety of resources to complete the textbook tasks. Google Expeditions application covered a wide range of topics with various content. At the time of the technology trial, there were nearly 1000 360-degree expeditions distributed in some major themes, including Arts & Culture, Landscapes, Science, Environment, The World Today, Careers, Colleges, and AAPI Month (i.e., Asian American Pacific Islander Heritage Month). Each tour comprised five to nine scenes, each of which covered a subtopic of the tour. Therefore, it can be said that the application itself was a huge language resource for the students.

> There was less information in the textbook, particularly topics related to technology and animals. The VR tours supplemented us with more information, so we learned more vocabulary.

In addition, the VR application added additional perspectives to the same topic presented in the textbook. All of the related VR tours were produced by different authors, telling different stories about the same topic. Therefore, students could investigate the topics from different points of view and varying language input on the same theme. An example of this is illustrated in the tasks about nature exploration. After experiencing the VR tours about nature, students had a range of different approaches to the topic and designed different presentations. One commented she felt like a biologist "exploring things and places that I have never known or been there before". This was a new experience to the student, which was impossible to experience in real life or from the textbook. As a result, he was highly engaged in exploring the VR tour to complete the task.

4.3. Opportunity to collaborate (Attribute #5)

The findings of the study showed that students had numerous opportunities to work in groups in VR-mediated tasks, and, more importantly, they strongly perceived the incentive structure for group performance. The first perceived reward of collaboration was mutual support in completing sub-tasks based on each person's strength. For example, those who had good technology skills were responsible for technical tasks like creating 360-degree images and merging each person's scene (including scene narration and audio) into one complete VR tour. Those with higher-level English competence were in charge of editing the written texts and helping others to rehearse for the narration recordings. Students were able to collaborate to finish these sub-tasks on a VR tour-creating platform before they could view their group products on Google Expeditions.

4.4. Opportunity to reflect (Attribute #6)

Students reported that they had numerous opportunities to reflect on their learning. Via collaboration on VR-integrated tasks, students could re-evaluate their learning experiences with peer feedback and teacher feedback:

> When we made mistakes, we helped each other to correct them. Whoever recognised the mistake would correct it immediately. For example, we corrected our pronunciation while rehearsing the presentation or our notes for the narration.

The reflection process was also evident in students' comparison of their language use with the expert performance demonstrated in VR tours. During the VR tours, they paid attention to the audio narration, echoing the narrating voice to practise intonation or replaying the VR tours made by professional designers to check the pronunciation of the vocabulary. Many of them mimicked the voice in the application and imitated the intonation, pausing, and stress patterns. One commented that he realised many of his pronunciation errors from experiencing the VR tours.

In addition, the VR technology enabled students to download VR tours to their own devices. This helped them to digitally store and revisit the learning materials anytime and anywhere. This affordance supported the reflection process in the way that it helped them access the expert performance easily.

4.5. Polished products (Attribute #9)

In the current study, students' learning outcomes were polished as a result of time and intellectual investment, collaboration, and ongoing reflection. All students reported that they invested a large amount of time and great intellectual effort in completing tasks. Notably, the willingness to invest a lot of time, energy, and intellectual effort in the VR-mediated tasks revealed great enjoyment and engagement in task completion. One student commented that she was so engaged in the VR tasks that she almost lost her sense of time. Unlike taking notes during lectures or learning new knowledge by heart, she had more motivation to learn English. She could continue to learn for hours without getting bored.

In addition, students expressed their feelings of ownership plus achievement, which all resulted from the efforts to produce polished task products in their own right. Students reported their strong feelings of ownership and achievement when they completed the tasks as a whole product for the sake of their own learning process but not for anything else.

> It feels like triumph. I was so happy to have one [VR tour] of my own. I couldn't believe it. Some weeks ago, I said "they are super!". Now I say, "I'm super!" to myself.

This was a typical feeling shared by other students when they finished creating and uploading their VR tours on Google Expeditions. Figure 2 shows a screenshot of student-generated VR tours – a complicated task that they all completed for their first time with the VR technology. This was the evidence of their learning outcomes as a combination of language practice and other skills needed for the VR production.
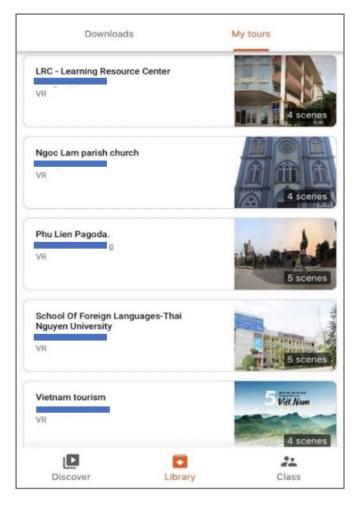
Figure 2. VR tours designed by students

4.6. Diversity of outcomes (Attribute #10)

There was strong evidence of the diversity of students' task products and performances characterized by students' multiple interpretations of tasks. For example, in the VR design task, one group introduced a church, another one a Buddhism pagoda, yet another one a Resource Learning Centre within their institution, while one virtualised their own school (Figure 2). Each student-generated VR tour consisted of four to five scenes, and each student was in charge of at least one scene. They all contributed to the process of creating the VR tours, leaving their digital footprints and identities in language use and product presentation.

Observations of VR tours designed by students revealed the diversity not only in the topic content but also in visual and technical presentation. For example, in the VR tour introducing students' institutions, students captured important images and information about popular places on campus like the administration building, the lecture halls, the dormitory, and the sports facilities. They even added some points of interest on the scene, a technical feature that some other groups could not do, as shown in Figure 3.

Figure 3. Points of interest in a VR tour designed by students

4.7. Authentic assessment (Attribute #8)

The attribute that was least supported by VR was *authentic assessment*. In this study, no traditional standardised assessment was used. Instead, students were all assessed based on their performances or task products. Students were effective performers, and direct examination of student performance was conducted. However, as observed, the VR affordances were not used as digital assessment tools. Authentic assessment was seamlessly integrated as a result of the teacher's assessment techniques but not strongly supported by the affordances of the VR technology in this study. The affordances of the VR application were not technically used to support real-life assessment to the full.

5. Discussion

The study revealed that VR-integrated tasks had the strong potential to facilitate authentic learning. The participants of the current study reported their perception of authentic contexts with multi-sensory input and their immersion in those perceived authentic contexts. This finding of real-world relevance facilitated by VR technology is consistent with findings from previous studies using immersive or non-immersive VR in language and culture learning (Shih, 2015; Xie et al., 2019). Early work by Herrington et al. (2003) and Herrington et al. (2007) also suggested that cognitive realism – the immersion of learners in engaging tasks – is more important than the real-life likeness of the learning design. The finding of the current study

indicated that VR, when integrated into task-based language teaching and learning, had the potential to create real-world relevance to support authentic learning in EFL contexts.

The study findings revealed significant evidence of students' perceptions about the support of VR in learning reflection. VR enabled students to revisit their digital products anytime and anywhere, share them with their peers, and consequently reflect on their learning experiences. These findings support those related to mobile affordances in general, which enabled students to create their own digital content, share it, and discuss it with their peers (Shadiev et al., 2017). In addition to these common affordances, VR allowed students to access expert performances (Herrington et al., 2010), which was important for reflection in language learning.

The findings related to a variety of resources, different perspectives, and diversity of outcomes are not unique in this study. A number of previous studies have realised the affordances of technologies in providing learners with access to rich media, resource connectivity, resource collections, and tools for the construction of knowledge representations (Howland et al., 2012; McQuiggan et al., 2015). However, different from other technologies, VR allowed students to obtain a real-life panoramic view of places they could not visit in real life and experience the perspectives of the persons who provided these VR tours. This adds to the authenticity of learning contexts for EFL students who may not have the opportunity to be exposed to the real-life materials or cultures of the language they are learning.

The findings of the study revealed that students not only invested an enormous amount of time in their tasks but also perceived time differently. They were so engaged in their tasks that they lost their sense of time, as reported by a number of students. This finding was in line with those of studies related to flow experience with emerging technology like augmented reality (for example, Bressler and Bodzin, 2016). This study added another possibility of VR in creating flow experience for learners in a foreign language learning context.

VR appeared to least support authentic assessment in the framework of authentic tasks in this study. It can be argued that whether the assessment was authentic or not depends a lot on the teacher. Even though using VR technology for assessing was a possible option, it depends on whether the teacher uses it for assessment or not. This finding further supports the assertion by Herrington and Herrington (2006), which sees the neglected alignment between an authentic task and its assessment and the common teacher-driven role in assessment in higher education. Another possible reason was the unfamiliarity with using VR technology in assessment that hindered the teacher from making the assessment role more authentic.

The findings of the study suggested that one attribute in the authentic task model by Herrington et al. (2010) could be modified to make it more specifically applicable and appropriate for technology-mediated tasks in EFL learning. This model was once extended in another study with EFL students in online learning (Ozverir et al., 2016). In that study, motivation was added to the model as an additional attribute of authentic tasks. However, the current study revealed that motivation was found to be inherent in many of the existing attributes. Therefore, it was not relevant to make it a separate attribute. Unlike the study by Ozverir et al. (2016), the current study revealed important evidence related to EFL learning that may help to extend the attribute *real-world relevance*. First, the feature of real-world relevance was perceived by the participants to be authentic contexts with multi-sensory materials that the VR-integrated tasks provided. This represented the use of language in simulated real-life contexts with exposure to multi-sensory materials. Participants were immersed in the VR environment and engaged in language learning activities integrated with VR. In addition, tasks for EFL learners need to involve processes of language use and any of the four language skills in the TBLT approach (Ellis, 2003). However, the language element does not specifically feature in the adopted model. Hence, the study suggested expanding the attribute of *real-world relevance* to include real-world processes of language use as presented in the definition of tasks by Ellis (2003) and authentic contexts and authentic language input as revealed in the study. The suggested extension of the attribute is as follows:

> *Authentic tasks have real-world relevance:* Activities match as nearly as possible the real-world tasks of professionals in practice rather than decontextualised or classroom-based tasks. Tasks provide authentic language input and authentic contexts which involve real-world processes of language use.

6. Limitations and suggestions

Regarding the implementation process, compelling evidence of VR support in achieving authentic learning emerged from exploring participants' perspectives. The study did not aim to statistically compare the achievement of each attribute with one another. This can be an open direction for future studies to statistically quantify the evidence of the technology support in each attribute in the authentic task framework. Regarding limited findings in authentic assessment, future studies may need to consider selecting more appropriate technologies or designing relevant assessment methods which involve the technology itself or real audience in assessing students' work.

7. Implications and conclusion

The study indicated that VR mobile technology had a strong possibility to support authentic tasks, covering almost all elements in the continuum of authentic tasks proposed by Herrington et al. (2010). EFL students had numerous opportunities to learn the language in simulated authentic environments, real-world collaboration, and real-world materials via completing VR-integrated tasks. What should be noted is that the VR technology used in this study is a free VR mobile application and requires a low-cost VR viewing device like a Google Cardboard, which is affordable to a majority of students and teachers in comparison to expensive high-immersion VR devices. The study findings should encourage both administrators and educators to consider integrating VR in developing syllabi or designing authentic tasks for students. Teachers may consider using VR inside and/or outside the classroom to provide students with an alternative to real-life contexts. Students can also expose themselves to multi-sensory language learning materials in VR environments with free or low-cost VR applications with their own devices. Findings from the study strengthened the point that future research on technology in education should consider the affordances of VR in language education in general and EFL learning in particular.

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