The Cross-Cultural VR 3D Painting Initiative at HungKuang University: A Pilot Study on a General Education Course via Curation and VR Creation

Gloria Shu Mei Chwo

schwo@hk.edu.tw **General Education Centre, HungKuang University, Taiwan**

Benedict Yu

benios.art.design@gmail.com **Goldsmith University of London by LASALLE College of the Arts, Singapore**

Abstract

Alert to student needs in today's globalized world, I report a ground-breaking initiative in which I aimed to enhance an existing cultural awareness and English language course for English non-majors at a Taiwan university, using cutting edge technology. I undertook the work initially within the MOE SPROUT ('Sustained Progress and Rise of Universities in Taiwan') project, followed by receiving sponsorship from the university.

Responsive to a pre-survey showing strong student self-reported English conversation needs and low VR experience, I conducted a three-week intervention in the usual course. I engaged a Singaporean expert in VR painting, who trained 101 L1-Chinese students to work in groups creating 3D paintings using Open Brush 3D painting in Meta Quest 2, and report on them, communicating in English. My aim was to assess the benefits of introducing four elements viewed favourably in the literature: teaching in a VR world, art creation, a foreign teacher, and focus on completing a non-linguistic project (3D VR painting) rather than working directly on the medium (English language).

Quantitative measures, such as a Cambridge test, showed considerable and highly significant gains in English proficiency scores, in the area of Interactive communication, pronunciation, and grammar/vocabulary, especially the first. Qualitative data from reflective essays showed a substantial reported impact on students in both linguistic and non-linguistic knowledge and skills. The latter, such as development of knowledge of VR, art skills and intercultural awareness, I interpret as having provided urgent communicative needs that drove the former, via student interaction in English with peers and teachers (both Taiwanese and foreign).

My findings from this pioneering intervention demonstrate how quite low proficiency students (typically CEFR A2) can benefit from a project-based / communicative English teaching approach, when the project is cutting edge and fascinating for the students.

Key words: SPROUT project, interactive VR, 3D painting, art in language teaching, English as a foreign language, cultural awareness, project-based teaching

Introduction

Around the world there are many countries which at tertiary level (BA) have a body of students with only limited English ability from school. They do not necessarily require academic English for their majors (which are in most subjects delivered in the language of the country, which is not English). However, the government of the country expects them to attain a good standard of English for

whatever they do in later life, so as to create a workforce that may help further the political and economic position of the country in the world. Taiwan is one such country. Others include Brazil, Argentina, Algeria, Russia, Thailand.

Running English courses for such a clientele presents many problems both in terms of what kind of English to focus on and how to motivate students who do not see this as very relevant to their major subjects, to which they devote their main attention. In Taiwan, HungKuang university has a track record of trying out innovative solutions to these problems and the present study reported in this paper is the latest of these, in part utilizing methods already successfully trialled (Chwo, 2024), but significantly adding a VR component. It continues to focus on a course, obligatory for non-English majors, dedicated to promoting undergraduate student basic general English skills with attention to cross-cultural awareness and communication.

Overall, then, the present study, informed by the literature reviewed below, aimed to investigate the benefits for language learning of the following four features, through an intervention:

> Use of a virtual space with students interacting with each other and teachers, and painting together, as avatars, not the usual in-person classroom
>
> Use of a challenging but interesting 'project' – 3D painting in VR - as the focus of attention and learning rather than English language itself directly.
>
> Engagement of artistic feelings and skills in the learning process, not just linguistic/cognitive mental activity, i.e. the whole person
>
> Involvement of a foreign teacher who generated opportunities for realistic intercultural communication (in our study communicating how art was treated differently in Hong Kong, Taiwan and Singapore).

Thus the instruction is through an integrated, immersion, approach based around an art project, via collaborative teaching with a foreign instructor, in our case, a Singaporean artist, in VR.

The research questions of this study are similar to those that one would ask about any pedagogical intervention or piece of Action Research in the classroom:

> Did the VR painting intervention, led by a foreign teacher, create benefits for the students?
>
> If so, how far, and in what ways, were they benefits to their English ability?

Literature review

This introduces the four novel features of the study intervention and provides literature support for their inclusion.

Use of a VR environment in teaching

The main novel feature of the intervention in the present study is the use of VR, which is supported by literature such as the following. In VR the user is typically represented by an image termed "Avatar" which provides a first-person perspective within the VR realm, notably in gaming, social environments, and increasingly within the educational sphere (Hirata, 2023). There it is held to benefit both the student's multimodal learning abilities and well-being (Ho et al., 2011; Dooly et al., 2023). Hirata (2023) specifically mentions benefits for student speaking confidence. In fact, the original usage of the term "avatar" comes from Hindu mythology where it denotes the deity Vishnu's incarnations in different

bodily forms (Merriam-Webster, n.d.). In VR however it is a manipulated visual representation which serves as a representation of a person, user, or character within an interactive environment capable of communication with other users. The dual interpretation of the term presents an intriguing intersection, inviting exploration of parallels between the spiritual and virtual domains.

Since the pandemic that occurred between 2019 and 2021, numerous educational sectors have been exploring the potential of utilizing virtual environments as learning spaces. Multiple scholars have discovered that employing virtual avatars for learning a foreign language is more effective in encouraging students' interactivity, reducing anxiety levels associated with speaking the foreign language in class, and fostering confidence in public presentation (Ho et al., 2011; Dooly et al., 2023; Hirata, 2023). Hirata (2023) observed that students prefer the use of virtual avatars over Zoom and in-person classroom settings, leading to a more positive attitude and increased motivation to learn (Ho et al., 2011). The three key advantages found in virtual reality over other digital platforms are: firstly, students feel secure due to the increasing familiarity with the environment with each interaction (Hirata, 2023); secondly, students can establish a personal connection through their own creative input into the learning process (Ho et al., 2011; Resnick, 1997); and lastly, the multimodal, gamified, and body-movement-based experiential learning enhances students' learning capabilities (Hirata, 2023; Mills et al., 2022).

Enhancing students' proficiency in learning a foreign language and fostering their desire to return are closely associated with their community of peers and the individuals they engage with. Forming this attachment hinges on two primary factors. Firstly, adapting the virtual reality (VR) environment into an "affinity space," as delineated by Gee (2004), essentially creates an informal setting distinct from traditional Zoom or in-person classes (Brevik & Holm, 2023; Gee, 2004; Hirata, 2023). Secondly, a collaborative learning framework is established where collective knowledge, experiences, and ideas are exchanged, personalized, and internalized among participants (Brevik & Holm, 2023; Ho et al., 2011).

Without a well-designed VR educational environment, however, an active learner will not be able to navigate the space to interact with its community effectively. Several key elements contribute to the success of building such an environment, including the importance of gamification, the perception of space, and the maintenance of constant attention (Hirata, 2023; Mills et al., 2022). In a gamified setting, students have reported that one of the most engaging experiences is the perception of anti-gravity, where their creations can be suspended in mid-air (Mills et al., 2022). They also appreciate the freedom of mobility, the opportunity to immerse themselves in their own creations, and the ability to utilize their bodies as interactive learning mediums within the environment (Ho et al., 2011; Hirata, 2023; Mills et al., 2022). Lastly, the VR space is designed to minimize distractions, with structured elements ensuring that students remain consistently engaged through visual, auditory, and haptic stimuli, described as "Sensory Orchestration" (Howes, 2014; Mills et al., 2022).

It has been suggested that students in an educational VR space, seeking to acquire new knowledge or skills, embark on a journey to discover their own learning (Counted et al., 2024), which in our study will be how to do 3D painting. Students form an attachment to the space, cultivating familiarity and a longing to return to the site (Counted et al., 2024). They experience emotions such as love, pride, and happiness, which stem from their interactions with familiar and recurring experiences, ongoing introspective reflection, and the self-realization of various concepts (Counted et al., 2024).

Returning to the dual meaning of the term "avatar," a student who immerses themself in a gamified environment under a different persona (in our study, as a 3D painter), can encounter a heightened

sense of empowerment distinct from their physical presence within their familiar surroundings (Yust et al., 2011). Such a student has sustained involvement in a multisensory interplay of visual, auditory, and tactile perceptions, with engagement across various emotional and sensory dimensions (Hornbeck & Barrett, 2008).

As previously noted, it becomes evident that the careful selection of a meaningful topic is paramount in fostering cohesive collaborative interactions among students. Such a topic holds the potential to enhance students' sensitivity, moving beyond mere enjoyment of gamified experiences to cultivate deeper emotional and communal bonds. Within this paper, we advocate for topics such as imaginative virtual painting as avenues for achieving this objective.

In the present study students forge their personal connections with the learning space through self-generated content creation in collaboration with their peers. This phenomenon is reshaping the teacher-student dynamic, with both assuming roles as active learners and knowledge providers, thereby fostering the expansion of the informal "affinity space."

Art in teaching

Aside from the VR nature of the art in the present study, art in general has been presented as valuable in foreign language teaching and for that reason formed part of the project in the present study. Soroko (2022) for example advocated that “the use of virtual museums can affect students' visual and auditory memory; accelerating the pace of learning and memorizing learning material” (p. 71). In the present study there was an art exhibition, but we also heeded Lightfoot (2023): “While many teachers use visual images to introduce a topic or language item, actually asking the students to engage with and respond to the piece of art can encourage students to become involved on quite a different level”. In the present study students did not just respond to art, they also created it.

Like the VR benefits already mentioned, art (whether in a VR context or not) can engage the learner at additional levels to the cognitive ones, such as social, cultural and emotional, indeed touching the whole person (Farokhi and Hashemi, 2011). This has effects not only on language performance (Zhang, 2022), but other related abilities, as shown next.

Art can impact on learners’ critical thinking skills (Eisner, 2002) since when prompted to discuss or create artworks, through the medium of a foreign language, they are obliged to reflect more profoundly (Ennis, 2001). Indeed, they may undertake genuinely communicative exchanges rather than responses where the meaning is maybe linguistically well-formed but not a true expression of a real feeling or message. In short, this may prompt them to 'push' their output (Swain, 1993). The communicative demands may reveal gaps in their language knowledge that they need to fill, in order to express themselves. This they do either by finding out and learning new words and expressions or by using their existing language in new and creative ways (using communication strategies: Maldonado, 2016).

A further benefit of involving art in foreign language teaching which is relevant in the context of the cross-cultural awareness aims of the course in which the present study is situated is that it can easily be made cross-cultural. Art is inherently a key feature of culture, and by exposure to the art of a particular culture, students can attain some understanding of the beliefs, values and customs of the people who speak the language associated with the culture (Margiotta and del Gobbo, 2018). Although little empirical research exists on this connection (Stancikas, 2019), it was deemed that evaluation and creation of paintings could potentially help our students become more culturally knowledgeable and aware, which it is becoming increasingly important to be in today's globalized world. Hence as in a

previous intervention (Chwo, 2024) we decided to once again involve art creation in the present intervention study.

A final reason to involve art in the present study is that it addresses the student's emotions/affect (Farokhi and Hashemi, 2011). That aspect is often overlooked even though the learner's 'affective filter' and the impact of negative emotions were prominent in Krashen's (1982) approach to language teaching. Indeed some entire theories of teaching such as 'suggestopedia' were mainly based on managing the learner's emotional state, e.g. by the use of art and music (Richards and Rodgers, 2001).

Foreign teachers in teaching cultural awareness

Nugent and Catalano (2015) indicate that having multiple cultures represented among students in the EFL class facilitates the teaching of cross-cultural awareness. It provides ready sources of differing cultural attitudes, phenomena or artifacts to discuss, more immediate and engaging than textbook descriptions. In Taiwan that rarely arises however, as classes are mostly of monocultural Taiwan Chinese students.

Less often mentioned is that the same applies to teachers. Use of foreign teachers, whether from the home country of the language being learned or (as in our case) not, is also a ready source of cross-cultural information and attitudes that is much more immediate than a textbook (White et al., 2005). Hence this resource was exploited in the present study, where the teacher leading the intervention was not only an expert in VR and 3D printing as the study project required, but also a Singaporean artist with experience of displaying work in Europe.

Project based language teaching

The fourth strand to the intervention involved in the present study was that it can be interpreted as an experiment in project based language teaching (PBLT), based on a most unusual activity. PBLT (often just termed PBL) is considered a specific form of 'Communicative language teaching' which has long been an aspiration but is rarely fully implemented in the true sense in Taiwan where it is not a widespread 'method-in-use' (Nunn, 2020). Like task-based language teaching (TBLT), which slightly antedates it in modern application to language learning and teaching, PBLT puts to the fore activities where real communication of information, reasoning or opinion occurs (Prabhu, 1987). All these approaches imitate the real life uses of a language where someone speaks or writes because they actually want to elicit or communicate a message rather than just practice language forms. PBLT however exhibits a broader scope of topics, multiple tasks, and longer duration compared with TBLT. It is also less structured, and more exploratory, with greater student autonomy and creativity involved. Hence we regard the present study as employing PBLT (Nunn et al., 2021).

According to BIE (2015), "Project Based Learning (PBL) is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects". This implies that the central feature of a lesson, or in the case of PBLT usually a series of lessons, is communicative activity (Ellis, 2003). In this connection, a language learning project, like a task, may be defined as a goal based activity whose execution draws on the use of the learners' existing language resources, and which leads to an identifiable outcome (Willis, 1996). Nunan (2004) summarises expert definitions by identifying two types of such communicative activity: target and pedagogical. Target activity involves doing something outside the usual language classroom and in the real world, and could be primarily non-linguistic. That includes in our case learning to do 3D painting in a virtual world. By contrast, pedagogical activity involves what students perform inside the classroom and more centrally involves

the target language, such as in our case reporting on the VR experience and painting in a group presentation.

Other accounts of PBL emphasise different characteristics, such as its connection to Activity Theory (Engeström, 2001), and its being predominantly learner-centred (Little, 2007). PBLT is seen to benefit students because it is more student-centered, allows for more meaningful communication in teams, using appropriate tools, and often provides for practical extra-linguistic skill building.

Research has shown that learner-centred focus on a real world activity, as in PBLT (and TBLT), can be effective in language teaching so long as there is some incidental focus on language, often misleadingly called 'focus on form' (Ellis, 2003). The teacher and peers ensured this happened in the present study where the training and support in using VR painting was accomplished in English and the later presentations were in English.

The present study may be compared with Tang et al. (2015), conducted with very similar students to ours in Taiwan. That study showed clear English language improvement benefits of TBLT rather than PBLT. However, unlike the present study, the core activity was very linguistic and pedagogical (giving impromptu oral presentations on reading texts). The present study is ground breaking in Taiwan in its foregrounding, in true PBL style, of a non-linguistic target activity (3D painting) which by its nature would not necessarily be expected to lead to language improvement. Perhaps most comparable is Chen's study (2020), targeting EFL students planning for later oral performance, using a 3D multi-user virtual environment. The reported result was that this could: "optimize the quality of learners' linguistic performance. Tasks that are real-world oriented and targeting learners' cultural repertoires and world knowledge also positively impact their virtual learning experiences. These significant implications add new research and pedagogical dimensions to the field of computer-assisted language learning."

Method

This study is quasi-experimental in that it investigates the effect of a novel intervention. Due to university policy, however, and consistent with Action Research thinking, it was not possible to set up, for comparison, a control group that did not receive the special VR painting intervention. Educationally it was deemed unethical to rob any student of the possible benefit of the intervention.

Participants

These were majors in subjects other than English at a university in central Taiwan, taking an obligatory course in English language and cultural awareness. This course aims at improving basic general English, not academic English since most majors are taught Chinese-medium. Part of this course consisted of the novel VR intervention which all 101 students on the course (in two separate classes) had to take. A subset of these agreed to participate in the research and provided data in response to the instruments (see below).

The vast majority self-rated their English proficiency as elementary (53.4%) or elementary-intermediate (22.4%), so perhaps high A2 in CEFR terms. The areas that students most wanted to improve were speaking (56.9%), casual conversation (55.2%) and vocabulary (44.8%). Professional conversation was wanted by only 29.3%. Furthermore 89.7% said they had no familiarity with any of the VR systems listed. Only 5.2% had used Meta 1. Those who had used VR at all before used it mainly for gaming (74.1%) or social purposes (15.5%). Only 8.6% claimed to have ever tried 3D painting in VR. Therefore, the intervention was for almost all a total novelty.

The VR painting intervention

Overall, the intervention was designed to implement in integrated fashion the four ideas that we have introduced earlier, which were deemed likely to enhance student inter-cultural awareness and language ability (especially conversational): a VR environment, art creation, a foreign teacher, and focus on a (non-linguistic) project (learning to do VR 3D painting). This heavily contrasts with a typical drill based, test driven, Freshman English course, that so often divides English learning from culture literacy. It has aims beyond accuracy and fluency e.g. for students to become effective cross culture communicators, critical creative thinkers, and second language lifelong learners in this increasingly globalized world. No prior knowledge of VR or painting was assumed.

The part of the course that we are concerned with, when the VR-centred intervention took place, occupied three lessons, from 13 March to 27 March 2024. During this time each student was attending the course for one two-hour session each week.

The usual classes of the course, taught by the lead researcher alone, focused on English taught through cross-cultural themes supported by a special textbook and video material which students studied before each classroom session (in flipped style). The intervention was presented to the students under the name 'Cozy Corner Project' with the objective to enable them to construct an ideal collaborative, shared space within the virtual realm, where they could, in teams, express themselves in virtual painting in any way they wanted. The pivotal inquiry presented to the students was, "What does an inclusive digital space signify for you?"

This project fosters an environment where students not only learn through sharing their narratives but also develop the capacity to comprehend diverse interpretations of stories, especially with the cultural stories shared by a visiting interdisciplinary art practitioner (Ben) from Singapore who had also shown work in Berlin. Over three weeks, students were encouraged to create, revisit and modify their virtual creations periodically.

Consistent with the tenets of communicative and project-based language teaching, the emphasis was on a real non-linguistic project to be completed and not directly on the goal of language improvement. The act of painting, particularly within a virtual reality (VR) space, was exploited as an avant-garde yet highly accessible method for all students to transcend the barriers of language and interpersonal hesitation. It was anticipated that students will experience growth both artistically and in their English communication skills through interactions with an artist, instructor, and fellow teammates.

During the intervention, the following happened. All sessions were led by Ben, who was essential for his expertise in the VR that was being used and the use of it for doing 3D painting. Ben only spoke English with the students. No prior familiarity with VR or digital painting was assumed.

The initial lesson included cultural observations drawn from the instructor's experiences of Chinese, Singaporean and European cultures. There were also art tours of an exhibition of Ben's 3D painted artworks (in 2D printout form). This gave students some idea of what could be achieved and how it could be presented. Note that in this study not only does the VR create a 3D world for the painting to be done in, but the paintings themselves are also 3D, not on a flat 2D virtual canvas in the virtual world. There was also training in art creation techniques. Especially there was familiarization with the VR device Meta Quest 2 and specifically the Open Brush 3D painting tool (namely Google Tilt Brush), requiring the use of headsets and hand controls. Students were guided to create their personal avatars that would represent them in the virtual world and were introduced to the kinds of virtual 'brushes' etc. that could be used to create painting effects there. The first lesson proved challenging, as students

had to acquaint themselves both with the instructor and VR technology. Language barriers (i.e. exclusive use of English) further complicated instruction delivery.

The second lesson focused on VR device review and presentation techniques, emphasizing visual analysis, artistic inspiration, and audience engagement strategies. Improved student-teacher rapport facilitated smoother communication, allowing for more nuanced instruction delivery. Students pursued their main activity which was to have their avatars work together in groups in the virtual space Cozy Corner, using English all the time, to create a 3D painting. They also had to work on preparing a group presentation after two weeks providing the interpretation of their painting. Ben facilitated constructive feedback sessions, offered insightful suggestions, and promoted interactive dialogue in person among students to enhance the quality and depth of their work.

In the third lesson/presentation day, prior to the group presentations, Ben oversaw the finalization phase, working closely with each group to refine and polish their creations for print out and presentation in the Library display. Students also received guidance on articulation, eye contact, and pronunciation when talking about their work. Examples and reminders bolstered student preparedness and engagement. Students then actively shared insights either on the conceptualization behind their chosen printed works or by offering constructive and positive feedback on the printed works of their peers. Significant student progress was observed, with increased confidence and articulation skills noticed during presentations. Students' paintings then formed an exhibition left on show in the library in 2D printed out form. That formed the end of the intervention.

The data gathering required for the present study took place before during and after that sequence of events, as described in the next section.

Equipment

Due to the limited budget, the study was lucky to be able borrow the Meta Quest 2 VR devices from the Department of Multimedia Game Development and Application for a whole term. There were not enough for all students to use at once so the virtual world was visited in turn by each of the groups into which the students were separated for group 3D painting and presentation.

Instruments and data analysis

Four data gathering instruments were used.

Before the intervention, the participants (n=58) responded to a needs analysis questionnaire. This gathered a little background data, then had two questions on their self-perceived English ability and English wants, and four extended questions concerning their prior familiarity with any of the VR software, equipment and 3D painting activities that were going to be used. The findings are reported above under participants.

Participants were also pre, mid and post-tested for their English proficiency using versions of a Cambridge English exam. This was scored out of 5 (reported as out of 100 percent) for each of three features: grammar and vocabulary, pronunciation, interactive communication. The test was given three times: 13/3/2024 just before the intervention (tester: Cambridge examiner); 27/3/2024 at the time of the oral presentations about the ongoing artwork (tester: one of the co-teachers); 10/4/2024 after the end of the intervention (tester: Cambridge examiner). 53 students completed the test on all three occasions, 68 did so on the first and last occasions. Data was quantitatively analysed in Excel and JASP.

During the intervention, when participants gave group presentations about their work, which were scored separately (as percent) by the teacher for seven characteristics: Information collection; Participation in discussion; Substance of contribution; Enthusiasm; Responsibility; Work quality; Attendance (participants n=67).

Last of all, participants also answered open response questions eliciting their reflective response to the intervention. This material (121 responses, including 20 from students who did not participate in the whole intervention so are not included in the quantitative results), averaging 200 words per person, was qualitatively analysed bottom-up, so as to uncover the themes that they spontaneously focused on.

Results

Pre-post changes in proficiency

The overall mean scores on the three testing occasions were: 56.1%, 75.1%, 68.7%. The reason for the second occasion scoring higher than the last could be that this one was not scored by a trained Cambridge examiner, as the tests on the other two occasions were. It is possible that the teacher scoring on the second occasion was a little more generous in his marking. Alternatively, maybe this evidences novelty effect, which wore off slightly after the first two weeks. We will therefore pay most attention to the evidence of the first and last testing occasions.

The differences among the three overall means were significant (one way repeated measures ANOVA F=12.67, p<.001, η^2=.196). On Conover post hoc tests, the differences between the pretest and each of the later tests were highly significant (both p<.001). Only the difference between the latter two tests was not significant (p=.611). This testifies to the considerable impact of the first two weeks of the intervention, including the preparation for the presentations.

Among the three features separately scored, between first and last occasions, the improvement was greatest for interactive communication (15.1%), with pronunciation and grammar/vocabulary at a similar lower level of increase (10.9%, 11.7%). All three separate pre-post changes were significant (p<.01). The size of the impact of quite a short intervention, of only around 8 contact hours (2hrs per week for 3 weeks) is quite remarkable. Possibly it represents not so much the learning of new language but rather an improvement in participants' willingness and ability to exploit the language that they already knew.

Presentation performance

Performance on the presentations was uniformly high on all the seven criteria, means for which varied little (between 85.7 and 88.7%). Data collection was rated marginally highest overall and Enthusiasm marginally the lowest. The main significant differences among the seven traits scored showed only that Attendance scored differently from most of the others, which were focused more on the quality of the presentation itself (Conover post hoc tests were used with threshold of p<.05). The greatest variation in scores between students was also recorded for Attendance (SD=23%), which again shows its different nature from the other scored aspects of the presentations. Overall the high levels of performance attest to the beneficial effect of the intervention seen also in the language post-tests above.

Reflective open responses

Although conceived as a method of data gathering to reveal to the researcher the effects of the intervention, this elicitation also demonstrated pedagogical usefulness in the amount of writing practice it prompted. The length of response was high for students of relatively low proficiency (A2) and one (c1) even complained that the length allowed was too short for what they wanted to say.

A great deal of comment, nearly all very favourable, was about the VR and painting aspect of the intervention and its effects, and about the teachers delivering it, especially Ben, i.e. not directly about the English learning/teaching aspects of the intervention.

Some just voiced an overall emotional effect of interest due to novelty effect of the intervention, not distinguishing between English and non-English related aspects:

- "It was the first time I experienced this type of course, and I was filled with excitement." (c34)

For others a key motivating factor was the teacher:

- “Instructor Benedict is not only proficient in virtual reality technology, but also has extensive teaching experience, making his courses lively, interesting and engaging." (c13)

A few experienced an affective epiphany:

- “When I put on a VR helmet and entered the virtual world for the first time, the immersive feeling was really indescribable. Being in it feels like being in a brand new universe. It feels so amazing and makes me feel very unbalanced. When actually painting, not only can I adjust the tones and change brushes, I feel an unprecedented self-focus and freedom. I am not restricted by the real world. I can express my creativity and paint whatever I want in my heart. In this virtual world, I seem to be the creator of my own universe.” (c39)

Others mentioned artistic merits of the intervention:

- "Through VR painting, we can break the constraints of traditional art forms and maximize our imagination.” (c81)

Others saw further merits of VR, again unrelated to English language:

- At the same time, this is also a good opportunity for teamwork. We can observe, learn from each other and make progress together." (c81)
- "This class also gave me a clearer understanding of where VR technology combined with AI can be used, in addition to artistic creation. It can also help children with autism, allowing them to significantly improve their social interaction and concentration." (c33)
- “Using VR to conduct virtual walkthroughs can help students better prepare for real-world situations such as sales presentations and negotiations.” (c38)
- "This teaching experience gave me a deep understanding of the potential of virtual reality in teaching. I believe that in future teaching practices, more similar innovative teaching methods will be applied and explored." (c12)

They also recognised the cross-cultural dimension:

- "I really enjoyed this international exchange activity. I am very grateful to the teacher for giving me the opportunity to expand my knowledge. This experience really opened my eyes to cross-cultural communication in this way." (c19)
- "The participation of foreign teachers added to the diversity and interest of the activities. They brought different cultural perspectives and teaching methods, allowing students to enjoy more fun and gains in learning." (c17)
- "These few weeks have exposed me to the art of other countries (c87)

While not directly about English, the above benefits are very relevant to this study since, in any project or communication based teaching, the project/topic needs to be engaging. Our study activities were clearly for most participants super-engaging, which must have contributed to the favourable English learning outcomes noted above through generating need and desire for a high volume of communication using English, both spoken and written.

Some saw only a loose connection between the VR and English:

- "In this class, I not only learned how to use VR to draw, but also practiced a little English. This project is valuable to me." (c24)

Others perceived the researchers' intention more clearly:

- "The teaching method is to have fun while learning and to learn while completing…." (c9)
- "I hope that I can use VR to learn English. Maybe it will make me more interested in learning English, hahaha, because sometimes I still find English difficult, but if I use the game, I won't feel that way." (c58)
- "I feel that VR painting is actually just a medium. The most important thing is the communication between us and the foreign teachers throughout the process and the courage to express our own ideas in English." (c97)

There were only a few negative comments:

- "There are also some challenges with using VR. Prolonged use may cause discomfort such as eye fatigue and dizziness, so you need to pay attention to controlling the use time." (c42)

More specifically on English, there were comments on a number of themes such as the following.

The intervention improved English oral skills:

- "In this class, I not only learned the VR operation, but also learned how to talk to the teacher. Speaking, the teacher will also wait for your answer slowly and quickly know what you want to talk about. I think my biggest gain in this class is conversation and listening." (c103)

In particular, speaking:

- "My English is not very good. I may be OK in listening or writing, but I am really bad at speaking. This time also allowed me to practice how to speak English bravely." (c10)

- "In this class, the teacher's English was so good …. I haven't spoken for a long time in English, I have started to rekindle my old enthusiasm for English." (c9)

Including pronunciation:

- Although I was nervous at first because I wouldn't be able to pronounce the English part well, the teachers cheered us on so that we wouldn't be nervous." (c94)

Also vocabulary:

- "I learned a lot of English words." (c94)

This all extended to appreciation that there was genuinely communicative interpersonal ambience created, as if between friends in normal conversation, rather than traditional English teacher-student classroom interaction:

- "Through this cross-cultural appreciation and English communication class, we first learned how to use English to communicate with others, and later combined it with VR. We use spoken English to create works belonging to our group, which combine our professional fields and are presented in the form of English reports." (c102)
- "What I like most is that the teacher will talk to you in English and ask you questions as if ….. teaching a friend." (c9)
- "Although I really don't understand English, the teacher still works hard to express it to me. The overall feeling is like a friend teaching me how to draw." (c104)

The presence of cross-cultural English communication was also recognised:

- "Through the guidance of foreign teachers, we not only learned the concept of cross-cultural appreciation, but also learned how to use English to communicate to express your ideas and understanding." (c118)
- "By participating in VR assignments on cross-cultural appreciation and English communication, I deeply realized the importance and challenges of cross-cultural communication. In virtual reality, I have the opportunity to interact with people from different cultural backgrounds." (c84)

Finally, it was recognised that sometimes their existing English proficiency was stretched too far, and in order to maintain communication, L1 had to be resorted to:

- "Although it is very difficult for me because my English is very poor and I can't understand what the foreign teacher is saying. Fortunately, there are translations from teachers and classmates, but it also tells me the importance of English." (c20)

Discussion

Answering the research questions, it can be seen from the qualitative data that there were many general benefits recognised by the students in areas such as knowledge of VR, artistic development, inter-cultural awareness, and interest/motivation. However, the quantitative results also show a huge impact on English ability in relation the small time period of the intervention. In particular, interactive communication showed the best improvement. This is no doubt due to the project tasks requiring oral conversation for their completion: there had to be interchanges between teachers and students to teach the students how to work the VR and painting tools, and there had to be interchanges between

students (or their avatars) to collaboratively paint a 3D picture and produce a group presentation about it. Only the final written reflective reports were done individually. In this way, then, the intervention produced improvement primarily in exactly the skills that were most required to deal with the perceived need for conversational skill that the students had originally voiced.

We cannot readily compare the amount of improvement with that in other studies due to differences in the measures used to assess changes in aspects of language ability or other variables. However, in terms of areas of language improvement there are some differences from Tang et al. (2015), with similar participants in a very similar context to ours. Tang et al. report the greatest increases in the area of syntactic complexity, followed by mid-clause pauses and intonation at a similar lower level, while accuracy and listening did not significantly improve. In the present study, grammar/vocabulary (the nearest equivalent perhaps of syntactic complexity) did not show the greatest increase, which was in interactive communication (which includes an element of listening). The difference could be due to the target activities, which were all linguistic in Tang et al. (reading and presenting), but, at their core, non-linguistic in the present study (i.e. painting).

Comparison can be made with the lead researcher's own previous intervention in the same context, which included elements similar to the art creation, foreign teacher and project based features of the present study, but had no involvement of VR (Chwo, 2024). By representing the language proficiency improvement as a percent of the pre-intervention score in each study, it is found that the improvement in the present study is 18.3% while that in the previous study, although also significant, was only 8.7%. This difference must be attributed to the added impact of the VR in the present study. This is supported by the qualitative comments elicited from the participants which in the present study were considerably more extensive, and predominantly focused on the benefits of the VR aspect of the intervention.

In other respects, the expectations raised by our review of literature on the values of VR, art creation, a foreign teacher, and project based teaching were all fulfilled. In particular the qualitative evidence confirmed the perceived value for cultural awareness raising of the foreign teacher, quite apart from his VR and practical 3D painting expertise. The VR and 3D painting experience further triggered a whole range of positive emotional responses and reports of general knowledge widening that did not specifically involve English. However, that was matched by awareness of the ways in which their English proficiency had also got developed by the ancillary training and reporting aspects of the project. There was also interesting confirmation of them noticing, and welcoming, the genuinely communicative aspects of TBLT in the English communication that occurred. Although there was some reported need to revert to L1 in order to communicate vital information, this was reportedly uncommon since Ben did not speak Chinese.

Conclusion

It might at first seem a bizarre idea to teach students English by getting them to create paintings in virtual reality. However, when a non-linguistic project both fascinates students and secondarily requires the use of English to be accomplished, the present study has shown that considerable progress in language ability can be achieved within quite a small length of time. Possibly this finding has interest not only for language learning/teaching researchers but also more widely for practising teachers with classes that do not see an immediate use for English: that is, like ours, they are not English majors nor taught other subjects through the medium of English. For them, therefore, any

need for English seems distant and non-urgent, …until they are presented with an opportunity to do something really cool that requires some English ability to access.

The novelty of this paper lies perhaps in the central prominence afforded to a project that was itself not English centred, but involved a visual rather than linguistic channel of communication. Task-based teaching is far more often devoted to tasks that are themselves linguistic, like Tang et al.'s (2015) reading and presenting task (cf. Ellis, 2003). The present study illustrates the benefit of the broader and more holistic concept of project-based teaching (Nunn et al,. 2021). For the future it is necessary to consider what other non-linguistic activities can be as fascinating for students as the one used for the project in this study. Also for the future we need to address whether something similar but more sustainable can be employed to achieve a similar effect, with less reliance on costly specialist resources and a teacher with special skill.

A final facet that we would like to pursue in future is that of the symbiosis between VR as an educational tool and as a spiritual development experience. This was hinted at both in the literature and in the comments of some of the participants.

Acknowledgment:

We would like to thank the office of international affairs at HungKuang University for the 113 A-3-2 SPROUT funding for our project. enabling us to take a leading role on a national scale by integrating innovative VR teaching into our General Education Course. We are grateful for all the kind support received from HungKuang University library staff, the Department of Multimedia Game Development and Application. and the Office of the Secretariat. With their generous support, we have been able to identify learning results that will benefit our future curriculum plans and instruction design.

References

BIE. (2015). What is Project-based learning?, Retrieved from http://bie.org/about/what_pbl

Brevik, L.M. & Holm, T. (2023). Affinity and the classroom: Informal and formal L2 learning. *ELT Journal, 77*(1), 83-93. doi: 10.1093/elt/ccac012.

Chen, J. C. (2020). The effects of pre-task planning on EFL learners' oral performance in a 3D multi-user virtual environment. *ReCALL: the Journal of EUROCALL*, *32*(3), 232-249.

Chwo S-M, Gloria (Accepted for publishing in Dec, 2024). Enhancing cultural learning in the English class through flipped learning and art creation. *Studies in the Humanities and Social Sciences (*HungKuang University), *22*, 115-136. ISSN: 1813-999X.

Counted. V, Meagher. B, & Cowden. R, (2024). The nature of spiritual ties to place: A conceptual overview and research agenda. *Ecopsychology, 16*(1). Retrieved from: https://doi.org/ 10.1089/eco.2022.0078

Dooly, M., Thrasher, T., & Sadler, R. (2023). "Whoa! Incredible!": Language learning experiences in virtual reality. *RELC Journal, 54*(2), 321-339. Retrieved from: https://doi.org/ 10.1177/00336882231167610

Eisner, E. (2002). *The arts and the creation of the mind*. New Haven: Yale University Press.

Ellis, R. (2003). *Task-based language learning and teaching*. Oxford, New York: Oxford Applied Linguistics. ISBN 978-0-19-442159-1.

Engeström, Y. (2001). Expansive learning at work: Toward an activity theory reconceptualization. *Journal of Education and Work, 14*(1), 133-156. doi:10.1080/13639080020028747

Ennis, R. (2001). Goals for a critical thinking curriculum and its assessment. In A. L. Costa (Ed.), *Developing minds: A resource book for teaching thinking* (3rd ed.) (44- 46). Alexandria, VA: ASCD.

Farokhi, M. & Hashemi, M. (2011). The impact/s of using art in English language learning classes. *Procedia - Social and Behavioral Sciences, 31,* 923 – 926. doi:10.1016/j.sbspro.2011.12.170

Gee, J.P. (2004). *Situated learning and language: A critique of traditional schooling*. Routledge.

Hirata. Y (2023). Do avatar-assisted virtual classrooms work for students with low speaking confidence? A qualitative study. *Interactive Technology and Smart Education, 20*(3), 335-349. Retrieved from: https://doi.org/10.1108/ ITSE-10-2022-0142

Ho, C., Nelson, M. & Müller-Wittig, W. (2011). Design and implementation of a student-generated virtual museum in a language curriculum to enhance collaborative multimodal meaning-making. *Computers and Education, 57*, 1083-1097. 10.1016/j.compedu.2010.12.003.

Hornbeck, R.G, & Barrett, J.L (2008). Virtual reality as a 'spiritual' experience: A perspective from the cognitive science of religion. *Northern Lights Film and Media Studies Yearbook 6*(1):75-90. https://doi.org/10.1386/nl.6.1.75_1

Howes, D. (2014). Anthropology and multimodality: The conjugation of the senses. In C. Jewitt (Ed.), *The Routledge handbook of multimodal analysis* (2nd ed., pp. 225–236). Routledge.

Krashen, S. (1982). *Principles and practice in second language acquisition*. Pergamon Press.

Lightfoot, A. (2023). Art in the classroom. *Articles*, British Council.

Little, D. (2007). Language learner autonomy: Some fundamental considerations revisited. *Innovation in Language Learning and Teaching 1*(1), 14-29.

Maldonado, M.R. (2016). Communication strategies used by different level L2 English learners in oral interaction. *Revista Signos (Valparaiso), 49*(40). http://dx.doi.org/10.4067/S0718-09342016000100004

Margiotta, U, & Del Gobbo, G. (2018). *Developing intercultural competences through art*. META Methodological Report Dlv.2.2 (Short version).

Merriam-Webster. (n.d.). *Avatar*. In Merriam-Webster.com dictionary. Retrieved April 10, 2024, from https://www.merriam-webster.com/dictionary/avatar

Mills, K.A., Scholes, L, & Brown, A. (2022). Virtual reality and embodiment in multimodal meaning making. *Written Communication, 39*(3), 335-369. Retrieved from: https://doi.org/ 10.1177/07410883221083517

Nugent, K. & Catalano, T. (2015). *Critical cultural awareness in the foreign language classroom*. University of Nebraska – Lincoln Faculty Publications: Department of Teaching, Learning and Teacher Education.

Nunan, D. (2004). *Task-based language teaching*. New York: Cambridge University Press. ISBN 978-0-521-84017-0.

Nunn, R. (2020). Project-based learning: Learning about PBL from successful freshman writing projects. *English Scholarship Beyond Borders, 6*(1), 41-56.

https://www.englishscholarsbeyondborders.org/wp-content/uploads/2020/08/Roger-Nunn-2020.pdf

Nunn, R, Oladiji O., Ali, E.M., Spyropoulos, C., Khan, J., & Dileep, N. (2021). Developing socially-responsible informational competence through Project-Based Learning, *English Scholarship Beyond Borders, 7*(2), 89-108. https://www.englishscholarsbeyondborders.org/esbb-journal-publications/esbb-volume-7-issue-2-2021-2/

Prabhu, N. S. (1987). *Second language pedagogy*. Oxford University Press.

Resnick, M. (1997). Beyond the centralized mindset. *Journal of the Learning Sciences, 5*(1), 1– 22.

Richards, J.C. & Rodgers, T.S. (2001). *Approaches and methods in language teaching* (2nd ed.). Cambridge: Cambridge University Press.

Soroko, N. (2022). Methodical Aspects of Using Virtual Museums of the Educational Process in General Education Institutions. *Physical and Mathematical Education*, *35*(3), 71-76.Stancikas, E. (2019). Cultural awareness concept and content in adult self-education. *Journal of Contemporary Education, Theory & Research, 3*(2), 24-28. http://doi.org/10.5281/zenodo.3635034

Swain, M. (1993). The output hypothesis: Just speaking and writing aren't enough. *Canadian Modern Language Review, 50*, 158-164.

Tang, H.S., Chiou, J.S., & Jarsaillon, O. (2015). Efficacy of task-based learning in a Chinese EFL classroom: A case study. *English Language Teaching, 8*(5), 168-176.

White, K., Zion, S., Kozleski, E. & Fulton, M.L. (2005). Cultural identity and teaching. *On Point*. National Institute for Urban School Improvement, Arizona State University.

Willis, Jane (1996). *A framework for task-based learning*. Longman.

Yust, K.M, Hyde, B., & Ota, C. (2011). Cyber spirituality II: Virtual reality and spiritual exploration. *International Journal of Children's Spirituality, 16*(1), 1-3. Retrieved from: https://doi.org/10.1080/1364436X.2011.564846

Zhang, Q. (2022). *Arts integration for foreign language teaching and learning: A three paper dissertation*. University of Arkansas - Graduate Theses and Dissertations. Retrieved from https://scholarworks.uark.edu/etd/4464

Appendix: Example of students' art work