A Systematic Review of Research on Effects of VR Technology on Reducing EFL Learners' Foreign Language Speaking Anxiety

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Abstract: Foreign language speaking anxiety is one of the considerable affective variables that influence English as foreign language learners' communicative ability and speaking fluency. It is evident that technology plays an important role in alleviating foreign language anxiety, yet few studies have conducted in the context of technology-assisted language learning. Thus, this study presents a systematic review of research on effects of VR technology on reducing EFL learners' foreign language speaking anxiety. The review explores the published literature in relation to the review question as follows: What is meant by concepts of foreign language speaking anxiety and VR-supporting language learning, and how they assumed to relate to each other?

Keywords: VR technology; Foreign language and oral anxiety; Influence; Research

Introduction

The communicative competence is one of the fundamental competencies for English as Foreign Language (EFL) learners (Chen & Hwang, 2022; Leslie & Russell, 2006). As a result of the examination-oriented English learning and lack of using English in an authentic language environment, English speaking is considered to be the most challenging and anxiety-provoking language skill for EFL leaners (Chen, 2022; Zhang, 2009). During my eight-year work as an English teacher teaching undergraduates college English in a university of China, "mute English" is not an uncommon phenomenon. In spite of finishing almost 10 years' English learning, many college students could not commute well in English and some students even suffer from nervous feelings when they are required to speak English in public. In this context, conventional classroom activities could not ensure that students are given the meaningful language training tasks and are well equipped with the authentic language communication contexts. EFL learners require a contextual environment for target language practice (Mayo & Pica, 2000). With the rapid development and widespread application of information technology, CALL (Computer Assisted Language Learning) has become the main focus of research and has provided new solutions to improve language learning. Among the various technological innovations, VR (Virtual Reality) technology regarded as a potential technology-supporting solution to provide realistic sociocultural context for language learning may be used as supplements in the conventional classroom (Chen &Huwang, 2020). Some researchers proposed that the role of VR technology applied into language learning will change from learning tools to a virtual environment where learners can interact and cooperate with native speakers (Schwienhorst, 2002). The practical teaching dilemma and VR's noticeable contribution to creating an immersive language environment for EFL learners stimulated my research interest. Therefore, the significance of my research is to explore why EFL learners are anxious to speak English and to explore the potential of the idea of VR technology fostering new opportunities reducing foreign language speaking anxiety and enhancing speaking performance.

This critical literature review aims to examine what is known and the limits of what is known about the possible effectiveness

of VR technology on reducing foreign language speaking anxiety and enhancing speaking performance, and to assess what practical implications there may be for improving EFL speaking teaching practice in schools. The review explores the published literature in relation to the review question as follows: What is meant by concepts of foreign language speaking anxiety and VR-supporting language learning, and how they assumed to relate to each other?

For clarity, this critical literature review will be divided into two parts addressing the the review question. The main ways in which the concepts of foreign language anxiety are defined and common assumptions about the interrelationship, especially how VR technology impacts on EFL speaking anxiety are compared in the former two parts from theoretical perspective and case analysis respectively.

1. Research on Foreign Language Anxiety (FLA)

In most of the early studies which are published before 2000 on foreign language anxiety (Horwitz , et al, 1986; Lamb, 1972; Young, 1990; Modsen, et al, 1991; Trylong, 1987; Gardoner, et al, 1987; Macltyr & Gardner, 1991)，researchers established the concept of foreign language anxiety and investigated the effect of FLA on foreign language performance. The concept of foreign language anxiety arose in the 1980s. The definition of Foreign Language Anxiety (FLA) was coined by Horwitz (1986) that it is a distinct complex construct of self-perceptions, beliefs, feelings and behaviors related to classroom learning that arise from the uniqueness of the Language learning. According to Horwitz (1986), there are three conceptual foundations underlying foreign language anxiety: a) communication apprehension b)fear of negative evaluation c)test anxiety.

A wide variety of definitions related to the concept of FLA were illustrated by Macltyr and Gardner (1988). But these various types of anxiety including facilitating/debilitating anxiety, state anxiety, worry emotionality, social evaluative anxiet, trait anxiety did not completely encompass the kind of anxiety experienced by language learners.

Among the early studies several researches suggested consistently the FLA negative impact on foreign language performance (Young, 1996; Macltyr & Gardner, 1991; Swain &Burnaby, 1976). Young (1990), for example, examined anxiety and speaking from the student's perspective and instructor's perspective respectively. 135 university-level Spanish beginners and 109 high school students were enrolled in to the questionnaire. The results of the data analysis suggest that speaking in the foreign language is not exclusively the source of student anxiety. Furthermore, the instructors' positive and relaxed error-correction can alleviate the learners' foreign language anxiety. Both of the studies reported a statistically significant negative correlation between anxiety and student oral performance. Findings from Gardner, Moorcroft and Maclntryre(1987) also indicated that French vocabulary production correlated negatively with language anxiety. In the study conducted by Aida(1994), Horwitz, Horwitz and Copes's theoretical model of FLA was used as a research framework to test it by validating and adopted Foreign Language Classroom Anxiety Scale (FLCAS) for Japanese learners. The findings of the study suggest the significant role played by teachers is to create a supportive atmosphere and to identify students' foreign language anxiety reducing the fear of embarrassment.

In order to measure language anxiety in instrumental settings, Gardner developed a French Classroom Anxiety Scale (FCAS). Horwitz, Horwitz and Cope (1986) set up the Foreign Language Classroom Anxiety Scale (FLCAS) based on three existing scales: a)Macroskey's (1970) Personal Report of Communication Apprehension b)Watson and Friend's (1969) Fear of Negative Evaluation Scale and c)Sarason's (1978) Test Anxiety Scale. Both of the measurement scales have produced data on the construct validity and reliability. The development of such measures of anxiety specific to the language learning process is useful to measure students' perceived foreign language anxiety level at the beginning of the course or prior to incorporating a pedagogical intervention such as the application of VR technology in EFL classroom and then to measure students FLA level at the end of the course, which allows class instructors or the researchers to assess the effectiveness of the instructional interventions.

Although old, the accounts by the above researchers are a useful starting point for my further research. Firstly they established the concept of foreign language anxiety. Then they investigate the negative relationship between language anxiety and foreign language performance within a novel theoretical perspective. Finally the Foreign Language Anxiety Scale put forward by them could be regarded to be potential effective measurement tool to assess the effectiveness of VR-supporting language learning.

However, one of the limitations of the early studies is that many of the studies had different research objectives, conceptual schemata, definitions and comparisons. There seems not to be consensus in terms of the definition of foreign language anxiety and measurement scale, which may make the interpretations and generalization of the research issues difficult. For example, whether the anxiety definition given by Horwitz (1986) or Macltyr and Gardner (1988) were consistent with the observable behaviors chosen to measure; whether the anxiety type such as facilitating/delbilitating anxiety, state anxiety, worry emotionality, social evaluative anxiety and trait anxiety was the single research aim. Another limitation of those early studies is that most of the early studies are still conduct-

ed in the process of understanding the concept. More empirical investigations to test the effectiveness of instructional interventions on FLA-reducing are needed. It is essential to know more about what those negative experiences in language learning are and how we prevent them.

2. Research on Reducing FLA in VR-supporting Language Learning Environment

Recent studies on Foreign Language Anxiety(FLA) solutions focus more on the effects of using technology, as technology is considered to be a significant tool to facilitate foreign language learning and teaching (Higgins, 1995). As a newly-invented technology, VR is a combination of multiple technologies including computer graphics, emotion computing and sensor technologies (Wang et al, 1996). VR technology's potential advantage over traditional multimedia is to create an immersive environment for foreign language learners. Among the studies exploring the VR effects on promoting language learning, most studies show the effective and positive influence (Chen, 2022; Tai and Chen, 2022; Chen and Hwang, 2020; Eryilmaz, et al, 2018; Hassani and Ahmadi, 2016; Qiu, et al, 2021; Garrido-Iñigo and Rodríguez-Moreno, 2015).

In Chen and Hwang's study, for example, Interactive Spherical Video-based Virtual Reality (ISVVR) was adopted as the learning mode to provide realistic sociocultural contexts for English speaking. A pretest-posttest quasi-experiment was conducted to investigate the effects of the SVVR approach on the English speaking performances and anxiety of the EFL students with different cognitive styles. Chen and Hwang show convincingly that the ISVVR decreased the speaking anxiety and increased the learning motivation of the foreign language learners, but no evidence is cited that the participants' technology competency meets the requirement of the ISVVR system. Some participants may be unclear about the VR technology working system and application features. Therefore, the data from the experiment seems not to be convincing. But this study identifies the development of an ISVVR-based English learning environment and provides a helpful literature review of other studies on VR-supporting language learning research. It will be useful as a model in terms of the quasi-experiment design.

Another two studies also provide evidence supporting the positive effect of VR technology on foreign language learning. Hassani, et al (2013) integrate a virtual environment into the intelligent computer-assisted language learning with an intelligent architecture with the aim to improve speaking and listening skills. Their findings show that the architecture IVELL enhances the learners' grammar, pronunciation duration and proper reply. The researchers created a scenario-based virtual environment in which language learners are immersed via interaction provided by multi-sensory hardware. They manipulate and explore the environment by interacting as role players. This makes it possible evaluate learners and provide proper feedback. The evaluation agent of this study makes up the gap of other similar studies (Hassani and Ahmadi, 2016; Chen and Hwang, 2020). But the shortcoming of this study is the insufficient sample size. The evaluation system was implemented on 10 graduate students. Hassani, et al aimed to provide both quantitative measurement and qualitative studies, but the number of the participants for such a research aim seems to be insufficient.

Similarly, Gruber and Kaplan-Rakowski explored how the two settings, practicing speaking in VR or on Zoom, influence the participants' FLA levels. The results show that practicing speaking in VR was correlated with significantly lower anxiety scores. They show convincingly that practicing speaking English in VR can be beneficial for simulations of foreign language and could prepare learners for talking in the target language.

After analyzing the previous studies, I found two limitations. Firstly, most studies investigated the positive effects of VR on language education, but the specific aspects concerning VR enhanced language learning were not been thoroughly discussed. To be specific, the process of how VR technology was applied into language learning and how VR technology promotes language acquisition are not discussed in detail. Moreover, although these previous studies are related to VR-supporting language learning, most studies focus more on VR technology but few put the emphasis on the language learning. In the discussion part of those studies, technical tools design, VR equipment variables, VR content type, VR content purpose and VR drawbacks are the main discussion topics. Few topics such as language acquisition, language motivation, language anxiety are employed. For example, in Lear(2020)'s study named "The Use of Virtual Reality to Reduce L2 Speaking Anxiety", he introduced the concept of Foreign Language Anxiety in the introduction part, but in the following parts introducing the definition of VR, VR exposure therapy, student responses, implementation, standalone units, software, current VR drawbacks and implication for future development, he did not integrate the FLA concept into VR-enhanced language learning. In the literature review part of these previous studies, few theories related to language leaning such as situational theory, sociocultural theory, top-down and bottom up theory are reviewed.

3. Conclusion

With the research aim to explore the effects of VR technology on reducing EFL learners' foreign language speaking anxiety

based on constructivism theory this review has focused on two review questions. The question of what is meant y concepts of foreign language speaking, VR-supporting language and the relationship between them is well answered. Although the definition of FLA seems to be no consensus, FLA scale is a useful measurement tool in my further research. Four cases on reducing FLA in VR-supporting language learning environment revealed the positive effects of VR on language learning. The second review questions related to constructivism theory is also well answered from theoretical perspective and case study analysis perspective. Four elements—context, collaboration, communication and meaning construction are the significant evidence that using the target language in an authentic language environment assisted by VR technology is helpful to reduce foreign language anxiety. Two cases revealed that active learning process, authentic situations and collaboration are of significance in foreign language learning.

In spite of these significant arguments answering the two review questions, more work is also needed. Among the literature reviewed, there is no research focusing the specific relationship between reducing FLA and VR-supporting language learning form the perspective of constructivism theory. It is hoped that the further research will better reveal these elements and fill the research gap.

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