Effects of Immersive Virtual Reality on English Learners' Speaking Self-Efficacy

Weijian Yan

Department of Curriculum and Instruction, Purdue University

EDCI 591: Literature Review

Dr. Victoria Lowell

April 28, 2022

Abstract

English learners' speaking self-efficacy can be defined as English learners' beliefs in their capability to speak English. It can predict English-speaking success because people's views about their abilities shape their emotional states, motivations, and behaviors (Bandura,1997). Moreover, the learning environment affects students' choice of learning strategies and their language performance. Virtual Reality (VR) is believed to have the potential to transform the conventional ways of language teaching and learning as the affordances of VR such as immersion, authenticity, and interaction (Lan, 2020) provides a unique learning environment for improving English speaking skills. Even though self-efficacy is usually strongly associated with language performance in general (Pajares & Graham, 1999), little is known about the learners' speaking self-efficacy in the context of VR application. This literature review provides an overview of the extant literature on self-efficacy, VR, the research conducted on the relationship between English learners' speaking self-efficacy and VR application in speaking lessons. It is expected to shed light on the background and current progress of studies, exploring the potential of VR to enhance English learners' speaking self-efficacy.

Keywords: English learners, speaking self-efficacy, virtual reality

Effects of Immersive Virtual Reality on English Learners' Speaking Self-Efficacy

Students who decide to learn a second language or a foreign language bear various kinds of beliefs about the target language and about their abilities to learn it. The assumptions and beliefs that learners hold about language learning can affect their ability to successfully learn the target language (Horwitz,1988; Pintrich &De Groot,1990; Bernat & Gvozdenko, 2005). Stevick (1980) argued that learner's beliefs and assumptions are more important than the strategies and materials in language classrooms for the success of language learning. Knowing that learners' beliefs influence their performance in the classroom will allow teachers to enhance their teaching techniques and approaches so that they can better coach, facilitate, and guide students to acquire language proficiency (Bernat & Gvozdenko, 2005; Suwanarak, 2015).

Bandura (1997) defined self-efficacy beliefs as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainment" (p.3). Self-efficacy beliefs are considered to be good predictors of language learning success (Açıkel, 2011) as people's views about their abilities shape their emotional states, motivations, and behaviors more than their actual competence, as Bandura (1997) stressed. Self-efficacy can therefore predict people's performance because it enables them to exert effort and spend time to reach their goals, as well as regulate their environment, thoughts, affections, motivation, and actions. The inverse of self-efficacy is if people believe they lack the ability to accomplish goals, they will not make the effort (Bandura, 1997). Self-efficacy influences English learning in that students' beliefs about their capabilities in speaking, reading, writing, and comprehending English can either boost or impede their test scores and performance.

Not only self-efficacy but also learning environment affect students' choice of learning strategies and their language performance. English learners have found it difficult to improve

their English-speaking skills due to a lack of practice environments (Chen & Hwang, 2020). Lan (2020) holds that immersion, participation, interaction, and authenticity are main factors in successful language learning. But many English learners still use textbooks, which provide very few opportunities to engage in authentic, interactive, immersive and meaningful learning contexts (Yang et al., 2022). The development of learning technology has enabled learning tools and softwares to facilitate the learning process. One technology, virtual reality (VR), is believed to have the potential to revolutionize the traditional ways of language teaching and learning (Damio & Ibrahim, 2019). A virtual reality is an emerging technology that reproduce a real or imaginary world that can be used for a range of educational purposes, including learning a second language (Bahari, 2021). It transforms traditional learning materials into live, self-directed, interactive learning experiences that increase motivation and proficiency in the language (Yang et al., 2020). Although the potential of VR technology is increasingly acknowledged in the foreign language education (Blyth, 2018; Lan, 2020 & Tai et al., 2020) and believed to create a fundamental change in education, educators haven't made the best use of VR affordances to support language learning yet (Nicolaidou et al., 2021).

Although much research (Chen & Hwang, 2020) has been done to study the effect of VR on English reading, writing, speaking and listening, Bahari (2021) found from a systematic literature review that listening and speaking skills have been more investigated than reading and writing skills. This finding corroborates that affordance of listening and speaking can be better realized in the virtual environment (Scavarelli et al., 2021) as the affordances of VR such as immersion, authenticity, participation and interaction (Lan, 2020) provide a unique learning environment for improving English speaking skills.

Even though self-efficacy is generally closely associated with language performance (Pajares & Graham, 1999), little is known about the learners' speaking self-efficacy in the context of VR application, specifically. Therefore, this study aims to investigate the impact of immersive VR on English learners' speaking self-efficacy. The following sections provide an overview of extant literature on self-efficacy, VR, the research conducted on the relationship between English learners' speaking self-efficacy and VR application. It is expected to further investigate the application potentials of VR on English teaching and learning and provide some suggestions for English educators to integrate the VR technology into the instructions.

Literature Review

Self-efficacy: sources and impacts

Self-efficacy plays an important role for English learners in improving their oral proficiency. A person's self-efficacy can be described as confidence that they can exert control over their behavior, motivation, and social environment. "Enactive mastery experience, vicarious experience, verbal persuasion, psychological and affective states" are the four main constructs of self-efficacy (Bandura, 1997, p.79). Enactive mastery experiences occur when one takes on a new challenge and succeeds at it. Enactive mastery experiences reveal a person's capabilities. Because information is derived from authentic experiences and evidence, so enactive experience is considered the dominant source for bolstering self-efficacy beliefs. Bandura (1997) adds that success is the best source for building self-efficacy while failure undermines people's self-efficacy, especially when a person performs the action with a sense of efficacy and then fails at achieving it.

Vicarious experiences occur when people compare their abilities with others (Bandura, 1997). Seeing that a peer who has similar abilities achieved something successfully may

encourage a student to believe that he or she can also achieve it. A student may believe, similarly, that if his/ her peers fail, he/she won't be able to succeed either.

By convincing people that they have the competence and abilities to perform a specific task, verbal persuasion can strengthen self-efficacy beliefs. The belief in self-efficacy can be increased by positive feedback and encouragement based on reality. It is important to avoid giving verbal encouragement that does not align with reality, because if someone is convinced that he/she can do something, but he/she fails, this failure may impact their sense of self-efficacy. In turn, Bandura warns, the persuaders' credibility will be undermined, and they will be distrusted; in addition, the person may be hesitant and afraid to try again.

Physical accomplishments, health functioning, and stress management are components of psychological and affective states (Bandura, 1977). Stress, tension, or agitation decreases an individual's chances of success and performance. Consequently, reducing classroom stress and effective filters is one way for teachers to boost self-efficacy as it is detrimental to a person's self-efficacy if they feel uncomfortable, nervous, tense, or anxious in a situation.

Walker et al (2006) found that self-efficacy enhances behavioral, cognitive and motivational engagement. Skunk (2003) believed that people with high self-efficacy can exert more effort and engage themselves more in completing a task in a persistent way.

Self-efficacy in English speaking context

According to Bandura's definition of self-efficacy, English speaking self-efficacy can be defined as English learners' confidence in their ability to speak English effectively. It can determine the effort, involvement, and determination a person puts into achieving a goal (Schunk, 2003). Thus, it can be expected that English learners’ beliefs on their speaking competencies will influence their English-speaking performance. Zhang et al. (2020) found

English Public Speaking (ESP) self-efficacy and speech performance both showed substantial improvement throughout the semester after examining the relation between ESP self-efficacy and the performance among 82 English-majored students enrolled in an EPS course in China. Wijaya and Mbato (2020) concluded English learners could communicate effectively in their target language when they believed in their speaking abilities after investigating English learners' perceived self-efficacy in Public Speaking class.

Self-efficacy has a tremendous impact on the English learners' language performance and there is a positive correlation between English self-efficacy and achievement (Açıkel, 2011; Rahimi & Abedini,2009; Mahyuddin et al., 2006; Rahemi, 2007). As the English learners with high self-efficacy are more confident with their own capability to speak a foreign language, how to enhance English learners' speaking self-efficacy deserves more attention from researchers and teachers. If teachers have the knowledge of how learners' beliefs affect their performance, they can adopt the strategies and techniques to better teach students to improve their language proficiency.

VR definition and important features

With the advancement of educational technology, more varied educational tools have been adopted in language classrooms to increase learners' self-efficacy. Virtual reality tools, which can provide unique features like immersion, interaction, and authenticity (Lan, 2020), are gradually implemented in the language learning context, and play an increasing role in changing the education technology paradigm.

Virtual reality applied in language learning has been captivating the attention from researchers and teachers for nearly 20 years (Lan, 2020). Therefore, the definitions have been evolving with the deepening understanding of its unique features. Rizzo et al. (2013) though it

included a wide array of interaction devices, sensory display systems, and the design of settings presented in a computer-generated graphic world. Maples-Keller et al. (2017) defined it as a technological interface to create virtual environment generated by computer in which the user can control the setting. Barrett et al. (2020) characterized VR as interaction through computer or mobiles to combine associated devices and functions as a 3D graphics.

One of the main characteristics of VR is immersion, which increases the situated experience of users. A sense of presence can be achieved through the sensation of being there (Flower,2015; Eiserlauer, 2020). This feature enables English learners to escape the geographical limitation and learn the language in the intercultural contexts while still staying in the classroom or at home (Wang et al., 2017). The immersion feature can create an illusion of presence simulated by VR, which trigger the brain to activate the schema and enhance learning experience (Xie et al., 2019; Yeh et al., 2020). VR also entails high levels of authenticity, immersion and interaction to facilitate learning (Alqahtani et al., 2017). Knowledge sharing and community building can be achieved through interaction (Cochrane, 2016) and personally meaningful moments can be created to help learning process (Hu-Au & Lee, 2017).

VR classification

VR can be categorized through different criteria. It is commonly classified as being immersive versus non-immersive (Robertson et al., 1993). It was further classified into three groups: immersive, semi-immersive and non-immersive (Ma & Zheng, 2011). According to Howard-Jones et al. (2014), immersive VR underscores spatial immersion where the users wear a head-mounted display (HMD) to immerse themselves completely in the virtual environment and interact with others from a first-person view in which audiences see through the eyes of a character, as if they are the character.

Contrary with immersive VR, Lan (2020) defines non-immersive or desktop VR allows users to interact directly with 3D environments via a mouse, a keyboard, and a computer monitor. Without wearing HMDs, the users in the form of avatars usually explore the world from a third-person view in which viewer perceives the story from a removed vantage point rather than having a role in the experience, although some non-immersive VR platforms allow the user to switch to a first-person perspective by using the mouse. Ma and Zheng (2011) characterize the semi-immersive VR as the combination of high-performance graphics computing system with a large screen monitor, or a projector, or multiple television projection systems.

Based on the function, VR can be grouped as games-based versus socially based (Papagiannidis et al., 2008). Lan (2020) further elaborated on this classification by providing the following examples. In game-based VR like *World of Warcraft* (WoW), the players mainly engage themselves in playing games in a freestyle and entertaining themselves. In socially based VR, such as *Second Life*, the players can get rid of physical limitation to socially network with their avatars and create social connections.

In addition to the classification based on the immersive features and function, Lan (2020) classified the VR applications in the context of language education. Based on varied didactic functions, she groups VR into five areas: “virtual experiences, entertainment, social networking, operation, and creation” (p.3). Virtual experiences allow students to experience places they would never normally be able to experience, such as the Mars and ancient Egypt. In the classroom, it enables students to experience events and places from a new perspective they didn't have before.

VR for entertainment refers to VR games. Digital game-based language learning (DGBLL) uses digital games as tools to facilitate language learning with a purpose to boost learning outcomes or increase learning motivation (Lan, 2020). Massively multiplayer online role-playing games (MMORPGs) such as *WoW* that provide learners with in-game, real-time, cooperative learning environments and have the potential to create extramural communities on target languages (Hung et al., 2018).

Social networking is one of the essential characteristics of VR which enables users to explore the environment and befriend other users around the world. For example, in *Second life*, while users can have free-style interpersonal interactions, they can engage in teacher-guided, student-centered language tasks.

A VR operation includes two categories: manipulation and simulation. In manipulation VR, students can operate a virtual object for practice or learning. For example, science teachers can manipulate a virtual insect to teach students its anatomy. In simulation VR, students experience a simulation of how a real-life process or system is performed, such as presenting in a meeting, checking in at the airport.

VR creation refers to using tools to help users to develop their own VR artifacts or environments, such as Omni-Immersion Vision (OIV), Minecraft Realms, Tilt brush, Google Blocks, and Tinkercad (Lan, 2020). In the VR creation process, students working as a team to develop critical-thinking skills, collaborate, solve problems, and take responsibility for their learning (Grover, 2015).

VR and English learners' speaking self-efficacy

Some research has been done to investigate the application of VR in English speaking lessons. VR environment can facilitate cognitive processing and making meaning, therefore,

decrease speech anxiety and increase higher order thinking (Sun et al., 2021). Damio and Ibrahim (2019) examine UiTM faculty of Education TESL postgraduates' perspectives in using VR speaking applications to reduce their presentation apprehension. They find that VR speaking applications improve their oral presentation skills to a great extent and the learners use it in their presentation preparation to reduce their apprehension.

Some researchers compared the use of VR and smartphones in English speaking activity. Kassim et al. (2019) explored students' perceptions on the possible benefits of VR in comparison to smartphone in an English-speaking activity in ten Japanese university students. Students thought VR's immersive nature stimulated communication, created a sense of presence, and enhanced the enjoyment of speaking.

Chien and Hwang (2020) explored the effect of two learning formats, namely, interactive spherical video-based VR (SVVR) and conventional multimedia and learners' cognitive style on English students' speaking presentation, anxiety and learning motivation in two classes of college students in Japan. They conclude that VR-assisted learning reduces speaking anxiety and increases learners' motivation.

Yang et al., (2020) examined the effectiveness of their self-developed VR learning system *Virtual reality life English* (VRLE) on English communicative ability and sense of presence among low achieving junior high students in Taiwan. They emphasized VR provides an enhanced sense of presence in an English context and students' overall perception of VR learning experience is very positive.

VR has been believed to be an efficacious instrument to enhance learners' self-efficacy because language learning experiences can be facilitated via VR in a way that is simply not possible in other technology-based environments (Jensen & Konradsen, 2018; Parmaxi, 2020).

Lin and Lan (2015) believed it has the potential to provide a social environment that is immersive and authentic for language learners to communicate with native speakers and VR studies have shown that learners become more autonomous and have more confidence and creativity and less anxiety. Eisenlauer (2020) emphasized VR enables users to experience a sense of presence through physical interaction with virtual worlds. Hu-Au & Lee (2017) held that during the interaction, knowledge is shared, communities are built, and personal meaningful moments are created as an aid to the learning process.

Conclusion

Lan (2020) believes English learning and teaching with VR is still in its infancy. Virtual reality language learning offers a great deal of potential, however more empirical evidence will be needed to fully realize the possibilities of the technology (Nicolaidou et al., 2020; Makransky et al., 2019; Kaplan-Rakowski & Wojdynski, 2018). Lin and Lan (2015) believe in the technology-based learning field, virtual reality appears to be among the least published topics, and they call for more research to investigate affordances and limitations of VR as well as its impact on language learning. In a systematic review conducted by Parmaxi (2020), she summarized the current progress in VR empirical studies conducted from 2015 to 2018 on language learning. In contrast to non-immersive VR systems, she finds there are few studies of fully immersive VR systems, however, fully immersive VR systems are believed to be more efficient and provide a richer user experience than non-immersive VR systems. In addition, she calls for more quantitative studies on the impact of VR in the field of language learning (Parmaxi, 2020). Furthermore, the study of Tai et al. (2020) indicates that immersive VR outperformed desktop VR applications, but VR research has tended to be more focused on semi-immerse VR than fully immersive VR, which leaves the potential of fully immersive VR less

explored. She also discovered the majority of studies used short-term programs in limited backgrounds, therefore, she proposed VR interventions should be examined over a long period of time and with a larger sample size so that long-term effects of VR can be understood.

In order to fill these gaps, the current study plans to use a quasi-experimental pretest posttest design to compare English learners' self-efficacy and speaking performance in non-immersive VR and fully immersive VR in the hope of providing some suggestions on how to integrate the application of VR to the English-speaking activities.

References

Açıkel, M. (2011). *Language learning strategies and self-efficacy beliefs as predictors of English proficiency in a language preparatory school* (Master's thesis, Middle East Technical University).https://hdl.handle.net/11511/20986

Alqahtani, A. S., Daghestani, L. F., & Ibrahim, L. F. (2017). Environments and system types of virtual reality technology in STEM: A survey. *International Journal of Advanced Computer Science and Applications (IJACSA)*, *8*(6): 34-55.

Bahari, A. (2021). Affordances and challenges of teaching language skills by virtual reality: A systematic review (2010–2020). *E-Learning and Digital Media*, 20427530211036583. https://doi.org/10.1177/20427530211036583

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Barrett, A., Pack, A., Guo, Y., & Wang, N. (2020). Technology acceptance model and multi-user virtual reality learning environments for Chinese language education. *Interactive Learning Environments*, 1-18.https://doi.org/10.1080/10494820.2020.1855209

Bernat, E., & Gvozdenko, I. (2005). Beliefs about language learning: Current knowledge, pedagogical implications, and new research directions. *TESL-EJ*, *9*(1), 1-21.

Blyth, C. (2018). Immersive technologies and language learning. *Foreign Language Annals*, *51*(1), 225-232. **https://doi.org/10.1111/flan.12327**

Chen, M. R. A., & Hwang, G. J. (2020). Effects of experiencing authentic contexts on English speaking performances, anxiety and motivation of EFL students with different cognitive styles. *Interactive Learning Environments*, 1-21. https://doi.org/10.1080/10494820.2020.1734626

Chien, S. Y., Hwang, G. J., & Jong, M. S. Y. (2020). Effects of peer assessment within the context of spherical video-based virtual reality on EFL students' English-speaking performance and learning perceptions. *Computers & Education, 146,* 103751. https://doi.org/10.1016/j.compedu.2019.103751

Damio, S. M., & Ibrahim, Q. (2019). Virtual reality speaking application utilisation in combatting presentation apprehension. *Asian Journal of University Education*, *15*(3), 235-244. https://doi.org/10.24191/ajue.v15i3.7802

Eisenlauer, V. (2020). Digital literacies in virtual reality learning contexts. *Augmented Reality and Virtual Reality,* 269-281. Springer, Cham.

Fowler, C. (2015). Virtual reality and learning: Where is the pedagogy?. *British Journal of Educational Technology*, *46*(2), 412-422. **https://doi.org/10.1111/bjet.12135**

Grover, S., Pea, R., & Cooper, S. (2015). Designing for deeper learning in a blended computer science course for middle school students. *Computer Science Education, 25*(2), 199-237. https://doi.org/10.1080/08993408.2015.1033142

Horwitz, E. K. (1988). The beliefs about language learning of beginning university foreign language students. *The Modern Language Journal*, *72*(3), 283–294. https://doi.org/10.2307/327506

Howard-Jones, P., Ott, M., van Leeuwen, T., & De Smedt, B. (2015). The potential relevance of cognitive neuroscience for the development and use of technology-enhanced learning. *Learning, Media and Technology*, *40*(2), 131-151. https://doi.org/10.1080/17439884.2014.919321

Hu-Au, E., & Lee, J. J. (2017). Virtual reality in education: A tool for learning in the experience age. *International Journal of Innovation in Education*, *4*(4), 215-226.

Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. *Education and Information Technologies*, *23*(4), 1515-1529.

Kaplan-Rakowski, R., & Wojdynski, T. (2018). Students' attitudes toward high-immersion virtual reality assisted language learning, Future-proof CALL: Language learning as exploration and encounters–short papers from EUROCALL 2018, pp. 124–129.

Kassim, S., Witkin, N., & Stone, A. (2019). Student perceptions of virtual reality use in a speaking activity. In Meunier, Fanny; Van de Vyver, Julie; Bradley, Linda; Thouësny, Sylvie (Eds), *CALL and complexity – short papers from EUROCALL 2019*, 223-228. Research-publishing.net. https://doi.org/10.14705/rpnet.2019.38.1013

Lan, Y. J. (2020). Immersion, interaction and experience-oriented learning: Bringing virtual reality into FL learning. *Language Learning & Technology*, *24*(1), 1–15. http://hdl.handle.net/10125/44704

Lin, T. J., & Lan, Y. J. (2015). Language learning in virtual reality environments: Past, present, and future. *Journal of Educational Technology & Society*, *18*(4), 486-497. https://www.jstor.org/stable/jeductechsoci.18.4.486

Ma, M., & Zheng, H. (2011). Virtual reality and serious games in healthcare. In *Advanced computational intelligence paradigms in healthcare 6. Virtual reality in psychotherapy, rehabilitation, and assessment* (pp. 169-192). Springer, Berlin, Heidelberg.

Mahyuddin, R., Elias, H., Cheong, L. S., Muhamad, M. F., Noordin, N., & Abdullah, M. C. (2006). The relationship between students' self-efficacy and their English language achievement. *Malaysian Journal of Educators and Education*, *21*, 61-71.

Makransky, G., Terkildsen, T. S., & Mayer, R. E. (2019). Adding immersive virtual reality to a science lab simulation causes more presence but less learning. Learning and Instruction, 60, 225–236. https://doi.org/10.1016/j.learninstruc.2017. 12.007

Maples-Keller, J. L., Bunnell, B. E., Kim, S. J., & Rothbaum, B. O. (2017). The use of virtual reality technology in the treatment of anxiety and other psychiatric disorders. *Harvard Review of Psychiatry*, *25*(3), 103-113. http://doi.org/10.1097/HRP.0000000000000138

Nicolaidou, I., Pissas, P., & Boglou, D. (2021). Comparing immersive Virtual Reality to mobile applications in foreign language learning in higher education: a quasi-experiment. *Interactive Learning Environments*, 1-15. https://doi.org/10.1080/10494820.2020.1870504

Pajares, F., & Graham, L. (1999). Self-efficacy, motivation constructs, and mathematics performance of entering middle school students. *Contemporary educational psychology*, *24*(2), 124-139. https://doi.org/10.1006/ceps.1998.0991

Papagiannidis, S., Bourlakis, M., & Li, F. (2008). Making real money in virtual worlds: MMORPGs and emerging business opportunities, challenges and ethical implications in metaverses. *Technological Forecasting and Social Change*, *75*(5), 610-622. https://doi.org/10.1016/j.techfore.2007.04.007

Parmaxi, A. (2020). Virtual reality in language learning: A systematic review and implications for research and practice. *Interactive Learning Environments*, 1-13. https://doi.org/10.1080/10494820.2020.1765392

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, *82*(1), 33-40. https://doi.org/10.1037/0022-0663.82.1.33

Rahemi, J. (2007). Self-efficacy in English and Iranian senior high school students majoring in humanities. *Novitas-ROYALl*, *1*(2),98-111.

Rahimi, A., & Abedini, A. (2009). The interface between EFL learners' self-efficacy concerning listening comprehension and listening proficiency. *Novitas-Royal*, *3*(1),14-28.

Robertson, G. G., Card, S. K., & Mackinlay, J. D. (1993). Three views of virtual reality: Non immersive virtual reality. *Computer, 26*(2), 81. http://doi.org/10.1109/2.192002

Rizzo, A., John, B., Newman, B., Williams, J., Hartholt, A., Lethin, C., & Buckwalter, J. G. (2013). Virtual reality as a tool for delivering PTSD exposure therapy and stress resilience training. *Military Behavioral Health, 1*(1), 52-58. https://doi.org/10.1080/21635781.2012.721064

Scavarelli, A., Arya, A., & Teather, R. J. (2021). Virtual reality and augmented reality in social learning spaces: a literature review. *Virtual Reality*, *25*(1), 257-277.

Schunk, D. H. (2003). Self-efficacy for reading and writing: Influence of modeling, goal setting, and self-evaluation. *Reading &Writing Quarterly*, *19*(2), 159-172. https://doi.org/10.1080/10573560308219

Stevick, E. W. (1980). *Teaching languages: A way and ways*. Rowley, MA: Newbury House Publishers.

Sun, F. R., Pan, L. F., Wan, R. G., Li, H., & Wu, S. J. (2021). Detecting the effect of student engagement in an SVVR school-based course on higher level competence development in elementary schools by SEM. *Interactive Learning Environments*, *29*(1), 3-16. https://doi.org/10.1080/10494820.2018.1558258

Suwanarak, K. (2015). Learning English as Thai adult learners: An insight into experience in using learning strategies. *English Language Teaching*, *8*(12), 144-157.

Tai, T. Y., Chen, H. H. J., & Todd, G. (2020). The impact of a virtual reality app on adolescent EFL learners' vocabulary learning. *Computer Assisted Language Learning*, 1-26. https://doi.org/10.1080/09588221.2020.1752735

Walker, C. O., Greene, B. A., & Mansell, R. A. (2006). Identification with academics, intrinsic/extrinsic motivation, and self-efficacy as predictors of cognitive engagement. *Learning and individual differences*, *16*(1), 1-12. https://doi.org/10.1016/j.lindif.2005.06.004

Wang, Y. F., Petrina, S., & Feng, F. (2017). VILLAGE—Virtual immersive language learning and gaming environment: Immersion and presence. *British Journal of Educational Technology*, *48*(2), 431-450. **https://doi.org/10.1111/bjet.12388**

Wijaya, K. F., & Mbato, C. L. (2020). English language education students perceptions of self efficacy in public speaking class. *Journal of English Language Teaching and Linguistics*, *5*(1), 29-43.

Xie, Y., Ryder, L., & Chen, Y. (2019). Using interactive virtual reality tools in an advanced Chinese language class: A case study. *TechTrends*, *63*(3), 251-259. https://doi.org/10.1007/s11528-019-00389-z

Yang, F. C. O., Lo, F. Y. R., Hsieh, J. C., & Wu, W. C. V. (2020). Facilitating communicative ability of EFL learners via high-immersion virtual reality. *Journal of Educational Technology & Society, 23*(1), 30-49.

Yeh, H. C., Tseng, S. S., & Heng, L. (2021). Enhancing EFL students' intracultural learning through virtual reality. *Interactive Learning Environments*, 1-10. https://doi.org/10.1080/10494820.2020.1734625

Zhang, X., Ardasheva, Y., & Austin, B. W. (2020). Self-efficacy and English public speaking performance: A mixed method approach. *English for Specific Purposes*, *59*, 1-16. https://doi.org/10.1016/j.esp.2020.02.001