Initiating Meaningful Social Interactions in a High-Immersion Self-Access Language Learning Space

Kristi Jauregi-Ondarra

Utrecht University

k.jauregi@uu.nl

Maria Christoforou

Cyprus University of Technology

maria.christoforou@cut.ac.cy

Dimitrios Boglou

Cyprus University of Technology

dimitrios.boglou@cut.ac.cy

Kristi Jauregi-Ondarra is Associate Professor at Utrecht University. Her main research focus is the role virtual exchanges play in language learning processes, the development of intercultural awareness, and changes on teachers' pedagogical methodologies. Her recent research explores the affordances of immersive Virtual Reality (VR) for linguaculture learning.

Maria Christoforou is pursuing a doctoral degree in the pedagogical application of VR in the domain of foreign language learning. She specializes in Technology-Enhanced Teaching and Learning, Multimodality, and VR-assisted Language Learning. She works as an English language instructor at the Cyprus University of Technology Language Centre.

Dimitrios Boglou is a German and English instructor at the Language Centre of the Cyprus University of Technology and director of the CUTing Edge Makerspace Innovation Centre. His main areas of research interests revolve around technology-enhanced teaching and learning, the impact of VR in education, and leadership development.

Abstract

Virtual Reality (VR) has paved the way for learner interaction in immersive environments, simulating authentic cultural conditions in the target language and encouraging collaborative opportunities. This article describes how the high-immersion VR social application AltspaceVR served as an immersive Self-Access Language Learning (SALL) space in a collaborative online international learning (COIL).

バーチャルリアリティ（VR）は、没入型環境での学習者交流への道を開き、ターゲット言語における本物の文化状況をシュミュレートし、共同作業の機会を促進する。この記事では、高浸透型VRソーシャルアプリケーションAltspaceVRが、共同オンライン国際学習（COIL）または仮想交換（VE）体験における没入型自己アクセス言語学習（SALL）空間としてどのように機能したかについて説明します。

Keywords: SALL, COIL, virtual exchange, telecollaboration, social high immersion, virtual reality

Virtual Reality (VR) is being embraced by educators as it facilitates immersive situated experiences to participants logging into a given VR app. From a language learning perspective, social immersive apps are particularly interesting, as they enable communication among participants, simulating authentic cultural conditions in the target language and encouraging collaborative opportunities. This article describes how the high-immersion VR social application AltspaceVR served as an immersive Self-Access Language Learning (SALL) space in a collaborative online international learning (COIL) or Virtual Exchange (VE) experience. AltspaceVR is a social platform for remote collaborations, live interactions, and events, where participants represent themselves through the creation of custom-made avatars. The present intercultural project aimed at increasing students' digital literacy skills (Hafner et al., 2015), as well as their intercultural communicative competences (Abrams, 2020) by providing a virtual immersive setting for students to engage in authentic communication with peers abroad. In addition, the project sought to enhance the pedagogical skills of language education students in the Netherlands. Twenty-nine students from two higher education universities in Cyprus (n=14) and the Netherlands (n=15) engaged in meaningful communicative and social interactions, using English as a Lingua Franca, in times of their own convenience. Students used the standalone VR headsets Oculus Quest (the Netherlands) and Oculus Quest 2 (Cyprus) for the VEs. In the present paper, we describe the pedagogical experience of a high-immersion SALL space for linguaculture learning (Risager, 2007).

Literature Review

COIL

COIL projects describe the engagement of learners in online intercultural interactions and projects with partners from other cultural contexts or countries as a part of their educational program. Depending on the educational context and focus, these international online projects have adopted different names, for example, online intercultural exchange, telecollaboration, networked interaction, VE, or COIL. In the last decades, computer-mediated communication tools have been used with the purpose of promoting intercultural awareness and second language acquisition (Canto & Jauregi Ondarra, 2017). In fact, the implementation of Web 2.0 tools in intercultural exchanges has gained great popularity because of their ability to empower learners and enhance their autonomy (Fuchs et al., 2012). This relates to the affordances of the tools which enable learners to design, edit, and publish

content, a process which makes students more aware of their role in the intercultural activity (Fuchs et al., 2012). Research studies show that VE projects have a positive impact on language students' communicative competence development, their autonomy, and online literacies (Çiftçi & Savaş, 2018). Some scholars go even further, as they argue that VEs are more advantageous to learning than more traditional in-class face-to-face interactions (Canto & Jauregi Ondarra, 2017). Students engaged in VEs have been found to increase their intercultural awareness, develop knowledge of their own culture and other cultures (Dugartsyrenova & Sardegna, 2018), and adopt positive intercultural attitudes (Helm & Van der Velden, 2021).

Virtual Reality

One of the most innovative technologies that is starting to gain attention in language education is VR, as it allows for students to engage in experiential learning by interacting and taking action in an immersive world, where participants, mostly represented as avatars, have the sense of being present in the virtual space. Within VR, three different levels of immersion have been described: low-immersion, semi-immersion, and full or high immersion (Lege et al., 2020; Melchor-Couto & Herrera, 2022). Low-immersion VR technology includes a desktop computer-based 3D graphic system that projects the virtual world on the computer screen, where avatars move and take action by using a keyboard and a mouse. An example of low-immersion VR are virtual worlds, like Second Life or Minecraft. Most of the VR studies relating to language education to date address the use of low-immersion VR technologies. The major research findings of studies addressing language learning in these immersive environments show students' positive perceptions and motivation towards using VR while lowering speaking anxiety (Melchor-Couto, 2018) and improving students' learning outcomes (Canto & Jauregi Ondarra, 2017).

Semi-immersive systems are advanced but quite costly systems, with graphical displays being projected on large screens surrounding the user (e.g., CAVE system). To our knowledge, no experiences have been reported for language learning purposes.

Finally, high-immersion VR is a fully immersive experience, created by a head-mounted system, which provides a sense of a user's full immersion in the virtual environment. The use of high-immersion VR (HIVR) technology for language education purposes has increased in the last few years, probably caused by a reduction in the price of

these devices. Language experiences in HIVR have been found to improve vocabulary acquisition (Lai & Chen, 2021; Tai et al. 2020), oral communication competence (Yang et al., 2020), and motivation (Berns & Reyes-Sánchez, 2021; Scrivner et al., 2019; York et al., 2020). The most salient feature of HIVR, immersion, has also been addressed by scholars. Although in most studies students report feeling immersed in the VR world (Herrera, 2020; Yang et al., 2020), Rupp et al. (2016) found contradictory results, as in their case, the technology was felt as a distracting factor by their participants. In the last few years, the first attempts of combining HIVR and COIL have emerged (Jauregi-Ondarra et al., 2020, 2021). The results of these studies indicate that participants experienced HIVR positively and enjoyed interacting with international peers in this environment, which was perceived as non-threatening. However, a small number of students reported feeling dizzy during the interactions, a phenomenon that has also been observed in previous studies (Scrivner et al., 2019).

The present study was influenced by two main theoretical approaches to the conceptualization of language learning in relation to HIVR-mediated COIL: social constructivism and autonomy. According to social constructivism, language learning is a creative process of co-construction that requires its speakers to collaboratively interact to construct and negotiate meaning (Vygotsky, 1986). In addition, preparing students for authentic communication requires them to take charge of their own learning process by acquiring agency and becoming autonomous learners (Little, 2022). Hence, achieving autonomy should be one of the main objectives of language learning programs, with instructors adopting student-centered practices and facilitating enriched self-access language learning experiences to empower the learners in their learning process.

In the present study, students, represented as avatars, engaged in VR-mediated COIL practices, making use of head-mounted display devices that provided experiences of simulated cultural conditions and a sense of presence. The task-based interactions were carried out in the immersive SALL space called AltspaceVR.

AltspaceVR: From a High-Immersion VR Application to an Immersive SALL Space

Founded in 2013, AltspaceVR (Figure 1) was acquired by Microsoft in 2017 and has continued to be a virtual community for users worldwide. Some examples of live events that

have been featured are virtual fashion shows, comedy events, and partnerships with NBC News during the U.S. presidential elections in 2016. It is available on many tethered VR headsets like Oculus Rift and HTC Vive and on standalone VR headsets like Oculus Quest 2.

Figure 1

A Student Dyad Interacting in one of the Several "Worlds" Available in AltspaceVR

Even though AltspaceVR was not specifically designed with a pedagogical orientation in mind, it has been integrated in other COIL projects (Jauregi-Ondarra et al., 2021). It can offer users immersive opportunities for international synchronous interaction and socialization. Students access the immersive world autonomously at a time of their own convenience to engage in meaningful interaction with their international peers. Our approach to SALL is obviously technology-mediated, where interaction and authentic communication is placed at the heart of the autonomous and personalized learning process. In fact, the whole concept of SALL has escaped the limitation of self-access centers (SACs) due to the unprecedented proliferation of new technologies that can foster language learning autonomy beyond the physical boundaries of a SAC (Alzahrani & Wright, 2016). Examples of such technology include virtual worlds like Minecraft (Remmerswaal, 2022) and Sansar in intercultural projects (Chateau et al., 2019).

As an immersive space, AltspaceVR served as an ideal SALL for the present intercultural project not only because of its social character but also because it aligns with the VR Application Analysis Framework (Lege et al., 2020). This framework refers to the need to

analyze some applications with no direct educational purpose for classroom activity use according to the following lenses: immersive capacity, cognitive load, purpose, and communicative capability.

Immersive Capacity

A defining characteristic of VR is that it gives you the sense of "being there." This means that the students' ability to engage in the virtual environment does not solely revolve around mental immersion, but it also involves physical immersion. In our project, AltspaceVR enabled students to experience high immersion and access its various environments where they could interact with each other in the target language, interact with virtual objects, and perform meaningful situated activities (Fuhrman et al., 2021) (such as playing basketball in a virtual court) using English as a lingua franca.

Cognitive Load

Cognitive load refers to the amount of mental processing that is required during a task. In immersive VR environments, the multi-sensory experiences that take place combine detailed environments, spatial audio, and realistic navigation for users (Frazier et al., 2021). According to Chandler and Sweller (1991), the three types of cognitive load are: a) intrinsic, b) extraneous, and c) germane. Based on the definition of each category, we can underpin the immersive SALL space in our COIL project under the extraneous cognitive load (ECL). In order to conduct our project, multiple processes were involved that were not tightly coupled with the intended learning tasks due to the overwhelming exposure of participants to vast amounts of optical data in the VR environment. For example, a number of digital distractions, such as digital objects inside the VR environment irrelevant to the learning process, inhibited the interaction between the participants up to a certain point. In their study, Frederiksen et al. (2020) highlight such contributing factors that increase the ECL during immersion. In addition to the aforementioned VR environment exposure, other processes were needed to prepare and assist participants in how to navigate and interact in the AltspaceVR environment.

Purpose

Even though all VR applications are designed with an intended purpose in mind (i.e., to entertain, to inform, to communicate, and to design), these purposes might be combined depending on the target audience (Frazier et al., 2021). The immersive SALL in our COIL

project was used with the purpose of students *communicating* in the target language and enhancing their linguacultural learning. In this sense, the Dutch and Cypriot students engaged in task-based social interactions through the embodiment of customized avatars that resembled their real selves.

Communicative Capability

Communicative capability refers to the ability to communicate with other users using some built-in features in the application. In AltspaceVR, this was exemplified through the students' gestured-based movements (head movements through the goggles and hand gestures and movements facilitated by the hand controllers), their ability to engage in text chat and oral communication, and the discovery of new knowledge about their partners' cultural background and identity while being immersed in the SALL. In addition, the built-in search engine machines like Google or YouTube would contribute to facilitating and enriching communication processes.

Designing the Immersive SALL Experience

As previously stated, the intercultural project between Dutch and Cypriot students aimed at increasing their digital literacy as well as their intercultural competences and providing a virtual setting for practicing a foreign language by stimulating authentic communication with peers abroad. The different environments in AltspaceVR, known as "worlds," served as language spaces where students could meet and communicate in the target language. Students used their own private spaces in which they could invite their international peers to carry out the communication tasks. In addition, they eventually interacted with the immersive virtual space, for example, by playing in a virtual basketball court (see Figure 2). In this case, the specific scenario would trigger meaningful interaction, where peers would exchange information about how to play basketball, how to throw the ball, score, and win. Students chose different places to carry out the communication tasks with their peers. Some chose a living room (Figure 1), while others preferred to conduct their conversation outside on the terrace (see Figure 3). These scenarios, in combination with the colorful graphics, contributed largely to creating a positive and safe atmosphere to conduct the interactions in a language they are learning.
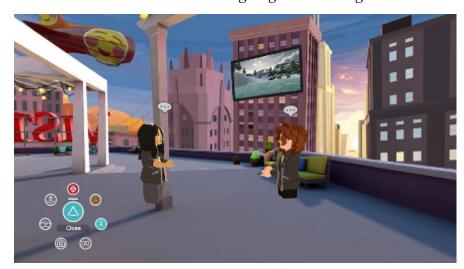
Figure 2

COIL Partners Interacting at the Basketball Court

Figure 3

Intercultural Conversations on the Terrace using English as a Lingua Franca

The intercultural project took place in the spring semester in 2022 between 15 students from Utrecht University in the Netherlands and 14 students from the Cyprus University of Technology in Cyprus. None of the students knew each other prior to the course. The project was implemented in the students' courses "Language Education and ICT" (for the Dutch students) and "English for Chemical Engineering" (for the Cypriot students). The Cypriot students had a proficiency level in English ranging between B1 and B2 (CEFR) and the Dutch students between B2 and C1. Students were paired up for the whole project. Access to the immersive language space did not take place during class hours, nor did the

instructors interfere in the students' exchanges. The project aimed at increasing student autonomy (Little, 2022) as a crucial factor to empower students in their learning process, while stimulating their positive attitudes, motivation, and engagement in the communication exchanges. The Dutch and Cypriot partners conversed synchronously in dyads in the SALL immersive space after making appointments that fitted their time schedule. Student autonomy was stimulated as much as possible in the VE project. The Dutch students borrowed the VR headsets at the university and took them home for the period of the project. They were responsible for charging them and keeping them in good condition for the conversations with their partner. The Cypriot partners could only access their headsets through their institution's Makerspace, CUTing Edge. This was because the necessary number of headsets were not available. The COIL experience helped participants become more digitally literate in VR since all students learnt how to turn on the Oculus headsets, navigate themselves within the virtual space, and interact with the immersive world and other avatars.

Technology-Mediated Task-Based Language Learning

Technology-mediated task-based language learning involves a fusion between technological innovation and tasks (Gonzalez-Lloret, 2016). Traditionally, task-based language learning (TBLT) is a communicative approach that focuses on authentic uses of the language through the implementation of real-world, purposeful tasks that make use of language one would use outside the classroom (Ellis, 2003). A conceptual basis for task-based language teaching and learning is experiential learning which involves the learners' engagement and reflection on several meaningful tasks. The reason why the authors decided to integrate TBLT in the present COIL project was to help students be responsible for their own learning and help them bring their personal experiences and contributions to share with their partners. Table 1 shows the tasks the students engaged in while being immersed in the SALL space.

As can be seen from Table 1, the tasks were created to stimulate an open conversation among the partners on topics relevant to them. Moreover, the affordances of the immersive SALL space also provided both partners with the opportunity to upload videos, access Google Translator, or find a YouTube video while being immersed in the virtual environment. Specifically, for Task 2, students watched a 3D video of each other's university premises and town to exchange ideas and comment on intercultural similarities and differences, which

would contribute to reshaping their cultural identities. Another example of the students' autonomy in the project is the design of Task 3 by the Dutch students to carry out with their Cypriot partner. The main objective of the course Dutch students took was to provide them with both theoretical and experiential know-how about the varied ways in which technology can contribute to enriched language teaching pedagogies. Accordingly, once students had carried out two tasks in AltspaceVR and had learnt from their experience, they created the third task in small teams. One of these tasks involved the organization of an international party. During the interaction, the speech partners focused on the similarities and differences in their cultures. In terms of cultural learning, students first exchanged information about the specificities of the parties they had been to (number of people, music, general atmosphere, party themes, clothing, food, drinks, etc.), and then organized an international party incorporating cultural artifacts of these cultures. Linguistically, the communicative dialogues here helped students teach their partners some new words, for example, drinks and types of food from each culture in their own language. Google Translator allowed students to search for some words in their partners' native language in an attempt to bridge differences and become more interculturally literate.

Table 1

The Four Tasks in the COIL Project

Tasks	Topic of task
1	Getting to know each other
2	Familiarization with the partners' student and university life
3	(Free task) designed by the Dutch students
4	Reflecting on the COIL project

Students' Experiences

Eleven Dutch and ten Cypriot students filled out a final questionnaire that aimed at gauging how participants perceived the innovative experience of engaging in a COIL project using a social high-immersion SALL VR space. Students found it easy to use the VR space (see Table 2). Although in general participants were positive about the whole VR exchange experience, a discrepancy was noticed between the perceptions of the Dutch and Cypriot

students, the latter ones being more enthusiastic. However, all of them valued the international dimension of the project highly and liked meeting and communicating with the international peers in the VR environment.

Table 2

*Students' Reported Experiences in the SHIVR Space (*N = 21*)*

Item	NL		CY	
	M	SD	M	SD
I found the VR environment difficult to use	1.8	0.9	1.9	0.7
I like to communicate in this VR environment	3.3	0.9	4.6	0.5
I like to meet students from other countries in this VR environment	3.9	1.1	4.5	0.5
I enjoyed the VR sessions	3.7	0.8	4.5	0.5
This VR environment is nice	3.6	0.7	4.7	0.5
I think VR is an effective system for practicing a foreign language	3.4	1.1	4.4	0.5
I liked the tasks I carried out with my partner	3.8	0.8	4.6	0.7
The international dimension made the VR sessions more interesting	4.5	0.8	4.5	0.5
The VR sessions helped me discover new things about other people's views, another culture	4.0	1.0	4.4	0.7

Note. Responses are on a 5-point Likert-scale (1. Strongly disagree - 5. Strongly agree).

A possible reason that could explain this difference in perceptions between both groups of students could be related to cybersickness. Indeed, some Dutch students reported feeling nausea and headaches when using the Quest goggles for a long period of time. This occurs when someone enters the VR world for the first time; the person gets overwhelmed by the digital visual information overload, which is caused by increased usage of brain processing. In addition, the application itself could cause discomfort due to the technical aspects of the hardware. For example, the Quest 2 refreshment rate is better than the Quest 1. Refreshment rate refers to the frequency in which an image is updated in the VR display. A high refresh rate means that any possible discomfort or motion sickness is avoided, therefore

making the users' experience more comfortable. This technological difference could be causing this physical discomfort experienced by the Dutch students.

When asked what was positive of this VR-mediated self-access COIL experience, students mentioned "learning the ways in which VR can be used," "to communicate with someone from a different cultural background," "learning from each other in terms of differences between our cultures, universities, etc." or "having an entirely new experience, which is fun to have tried out." This student's quote clearly shows the added value of using immersive SALL spaces to meet, collaborate, and communicate with international peers, while getting the sensation of being together in the same place.

"I loved meeting somebody from a different country with a different culture and traditions. It's really cool how you're able to be in the same room at the same time and communicate with each other when in reality your over 500km apart."

Conclusion

The implementation of immersive SALL spaces in COIL projects is starting to gain attention. It holds great educational advantages for learners in the future as it opens up new venues for enriched language learning practices by placing meaningful intercultural communication processes mediated by a growing typology of technologies at the heart of linguaculture learning. In this line of thought, the social high-immersive VR environment favors situated contextualized linguaculture learning, where participants "sense" the self and the other as being present and immersed in the same space. This sense of presence in the immersive world, in conjunction with an avatar representation, seems to contribute to lowering speaking anxiety and enhancing student engagement in communication processes (Jauregi-Ondarra et al., 2021). In addition, learners can navigate themselves freely within the environment and gain control over their interactions without the interference of the instructor or the constraints of the physical space, hence contributing to empowering the autonomous learner (Little, 2022).

Although students enjoyed the COIL experience, some of the Dutch students were critical about the use of VR for communication and language learning purposes. Although immersion might be beneficial for some students, others might feel it claustrophobic, especially when experiencing nausea and headaches from long usage of the goggles. Future research studies should continue to investigate cybersickness issues, as language learning and COIL experiences should be safe and engaging without provoking any physical hindrances.

In the present paper we have described a pedagogical experience aiming at enriching linguaculture learning processes and student digital literacy skills by enhancing learner autonomy in an international VE project using a social high-immersion VR environment as a SALL space. Future studies will need to provide additional results into how a blended approach to learning combining both instruction and technology-mediated SALL can best be implemented for linguaculture learning in diverse educational settings.

Acknowledgements

References

Abrams, Z.I. (2020). *Intercultural communication and language pedagogy.* Cambridge University Press. https://doi.org/10.1017/9781108780360

Alzahrani, S., & Wright, V. (2016). Design and management of a self-access language learning space integrated into a taught course. *Studies in Self-Access Learning Journal*, *7*, 136–151. https://doi.org/10.37237/070203

Berns, A., & Reyes-Sánchez, S. (2021). A review of virtual reality-based language learning apps. *Revista Iberoamericana de Educación a Distancia*, *24*(1), 159–177 https://doi.org/10.5944/ried.24.1.27486

Canto, S., & Jauregi Ondarra, K. J. (2017). Language learning effects through the integration of synchronous online communication: The case of video communication & Second Life. *Language Learning in Higher Education*, *7*(1), 21–53. https://doi.org/10.1515/cercles-2017-0004

Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, *8*(4), 293–332. https://doi.org/10.1207/s1532690xci0804_2

Chateau, A., Ciekanski, M., Molle, N., Paris, J., & Privas-Bréauté, V. (2019). Adding virtual reality to the university self-access language centre: Brave new world or passing fad? *European Journal of Language Policy*, *11*(2), 257–274. https://doi.org/10.3828/ejlp.2019.15

Çiftçi, E. Y., & Savaş, P. (2018). The role of telecollaboration in language and intercultural learning: A synthesis of studies published between 2010 and 2015. *ReCALL*, *30*(3), 278–298. https://doi.org/10.1017/S0958344017000313

Dugartsyrenova, V. A., & Sardegna, V. G. (2018). Raising intercultural awareness through voice based telecollaboration: Perceptions, uses, and recommendations. *Innovation in Language Learning and Teaching*, *13*(3), 205–220. https://doi.org/10.1080/17501229.2018.1533017

Ellis, R. (2003). *Task-Based Language Learning and Teaching*. Oxford University Press.

Frazier, E., Lege, R., & Bonner, E. (2021). Making virtual reality accessible for language learning: Applying the VR application analysis framework. *Teaching English with Technology*, *2021*(1), 131–143. http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-c298241b-f65d-45ce-834f-63c7e13df4dd

Frederiksen, J. G., Sørensen, S. M. D., Konge, L., Svendsen, M. B. S., Nobel-Jørgensen, M., Bjerrum, F., & Andersen, S. A. W. (2020). Cognitive load and performance in immersive virtual reality versus conventional virtual reality simulation training of laparoscopic surgery: A randomized trial. *Surgical Endoscopy*, *34*(3), 1244–1252. https://doi.org/10.1007/s00464-019-06887-8

Fuchs, C., Hauck, M., & Müller-Hartmann, A. (2012). Promoting learner autonomy through multiliteracy skills development in cross-institutional exchanges. *Language Learning & Technology*, *16*(3), 82–102. https://www.lltjournal.org/item/10125-44301/

Fuhrman, O., Eckerling, A., Friedmann, N., Tarrasch, R., & Raz, G. (2021). The moving learner: Object manipulation in virtual reality improves vocabulary learning. *Journal of Computer Assisted Learning*, *37*(3), 672–683. https://doi.org/10.1111/jcal.12515

Gonzalez-Lloret, M. (2016). *A practical guide to integrating technology into task-based language teaching*. Georgetown University Press.

Hafner, C., Chik, A., & Jones, R. (2015). Digital literacies and language learning. *Language Learning & Technology*, *19*(3). 1–7. https://www.lltjournal.org/collection/col_10125_45831/

Helm, F., & Van der Velden, B. (2021). *Erasmus+ virtual exchange: Intercultural learning experiences: 2018 impact report*. Publications Office. https://data.europa.eu/doi/10.2797/668291

Herrera, B. (2020). *Realidad virtual inmersiva en Facebook Spaces: análisis del grado de interacción oral y copresencia en un curso online de español como lengua extranjera* [Doctoral dissertation, Universidad Complutense de Madrid]. https://eprints.ucm.es/id/eprint/64682/

Jauregi Ondarra, K., Gruber, A., & Canto, S. (2020). When international avatars meet – intercultural language learning in virtual reality exchange. In K. M. Frederiksen, S. Larsen, L. Bradley & S. Thouësny (Eds), *CALL for widening participation: short papers from EUROCALL 2020* (pp. 138–142). Research-publishing.net. https://doi.org/10.14705/rpnet.2020.48.1178

Jauregi-Ondarra, K., Gruber, A., & Canto, S. (2021). Pedagogical experiences in a virtual exchange project using high-immersion virtual reality for intercultural language learning. *CALL and professionalisation: Short papers from EUROCALL 2021*, *2021*(2021), 155–160. https://doi.org/10.14705/rpnet.2021.54.1325

Lai, K. W. K., & Chen, H. J. H. (2021): A comparative study on the effects of a VR and PC visual novel game on vocabulary learning. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2021.1928226

Lege, R., Bonner, E., Frazier, E., & Pascucci, L. (2020). Pedagogical considerations for successful implementation of virtual reality in the language classroom. In M. Kruk & M. Peterson (Eds.), *New technological applications for foreign and second language learning and teaching* (pp. 24–46). IGI Global.

Little, D. (2022). Language learner autonomy: Rethinking language teaching. *Language Teaching*, *55*(1), 64–73. https://doi.org/10.1017/S0261444820000488

Melchor-Couto, S. (2018). Virtual world anonymity and foreign language oral interaction. *ReCALL*, *30*(2), 232–249. https://doi.org/10.1017/S0958344017000398

Melchor-Couto, S. & Herrera, B. (2022). Immersive Virtual Reality: Exploring possibilities for virtual exchange. In A. Potolia & M. Derivry-Plard (Eds.). *Virtual exchange for intercultural language learning and teaching: Fostering communication for the digital age* (pp. 92–114). Routledge. https://doi.org/10.4324/9781003024620-5

Remmerswaal, R. (2022). Minecraft in a self-access language learning center. *JASAL Journal, 3*(1), 121–135. https://jasalorg.com/minecraft-in-a-self-access-language-learning-center/

Risager, K. (2007). *Language and culture pedagogy: From a national to a transnational paradigm*. Multilingual Matters.

Rupp, M. A., Kozachuk, J., Michaelis, J. R., Odette, K. L., Smither, J. A., & McConnell, D. S. (2016). The effects of immersiveness and future VR expectations on subjective-experiences during an educational 360° video. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *60*(1), 2101–2105. https://doi.org/10.1177/1541931213601477

Scrivner, O., Madewell, J., Buckley, C., & Perez, N. (2019). Best practices in the use of augmented and virtual reality technologies for SLA: Design, implementation, and feedback. In M. L. Carrió-Pastor (Ed.), *Teaching language and teaching literature in virtual environments* (pp. 55–72). Springer Singapore. https://doi.org/10.1007/978-981-13-1358-5_4

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*, *35*(4), 1–26. https://doi.org/10.1080/09588221.2020.1752735

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. https://www.jstor.org/stable/26915405

York, J., Shibata, K., Tokutake, H., & Nakayama, H. (2020). Effect of SCMC on foreign language anxiety and learning experience: A comparison of voice, video, and VR-based oral interaction. *ReCALL*, *33*(1), 49–70. https://doi.org/10.1017/S0958344020000154

Vygotsky, L. S. (1986). *Thought and language*. The MIT Press.