OBSERVARE
Universidade Autónoma de Lisboa
e-ISSN: 1647-7251
VOL. 16, Nº. 1, TD1
Thematic Dossier – Internationalization of Higher Education: Experiences and Challenges
June 2025

JANUS.NET
e-journal of International Relations

DIGITAL TOOLS IN SECOND LANGUAGE LEARNING IN HIGHER EDUCATION: A SYSTEMATIC REVIEW OF RECENT RESEARCH

SEÇKIN ESEN
seckinesen@hacettepe.edu.tr
Seçkin Esen received his Ph.D. in Educational Sciences from Hacettepe University in 2023 (Turkey). His research interests focus on educational management, second language acquisition, school health, and educational technologies. He has contributed to various academic projects and publications in educational sciences. Currently, he is involved in developing innovative content and mobile applications to enhance language learning for diverse learner profiles.

Abstract

The use of digital tools has recently gained prominence in the field of second language teaching due to the promising potential of technology use in education, which innovates teaching methods and enhances the effectiveness of learning. This systematic review focuses on recent research on the impacts of digital tool usage in second language teaching in higher education. The review covers findings from recently published studies and highlights challenges and best practices related to the implementation of digital technologies. The findings of the studies show that technologies such as blended learning, online learning platforms, mobile learning applications, digital games, and virtual and augmented reality offer opportunities for language acquisition. Moreover, artificial intelligence presents opportunities and challenges for not only language teachers but also learners. The conclusion section of the study covers the gap in existing research and recommendations for future research on the use of digital tools, which will make second language education in higher education more effective.

Keywords

Digital Tools, Second Language Learning, Higher Education, Technology-Enhanced Language Learning, Systematic Review.

Resumo

Nos últimos anos, a utilização de ferramentas digitais tem vindo a assumir um papel de destaque no domínio do ensino de línguas estrangeiras, impulsionada pelo potencial transformador da tecnologia na educação. Este fenómeno tem promovido a inovação nos métodos pedagógicos e contribuído para o aumento da eficácia dos processos de aprendizagem. A presente revisão sistemática incide sobre investigações recentes que analisam os impactos da integração de ferramentas digitais no ensino de línguas estrangeiras no ensino superior. A análise contempla os resultados de estudos publicados nos últimos anos e sublinha os principais desafios, bem como as boas práticas identificadas no que respeita à implementação de tecnologias digitais no contexto educativo. Os dados analisados evidenciam que tecnologias como o ensino híbrido (blended learning), plataformas de aprendizagem online, aplicações móveis de apoio à aprendizagem, jogos digitais, e ambientes de realidade virtual e aumentada proporcionam oportunidades significativas para a aquisição de

competências linguísticas. Paralelamente, a inteligência artificial revela-se uma ferramenta promissora, embora também apresente desafios, não apenas para os docentes, mas igualmente para os próprios estudantes. A secção final deste estudo identifica lacunas relevantes na literatura existente e propõe direções para futuras investigações. As recomendações formuladas visam contribuir para uma utilização mais eficaz e sustentada das ferramentas digitais no ensino de línguas estrangeiras no ensino superior, promovendo, assim, ambientes de aprendizagem mais inovadores e inclusivos.

Palavras-chave

Ferramentas Digitais, Aprendizagem de Segunda Língua, Ensino Superior, Aprendizagem de Línguas Assistida por Tecnologia, Revisão Sistemática.

How to cite this article

Esen, Seçkin (2025). Digital Tools in Second Language Learning in Higher Education: a Systematic Review of Recent Research. *Janus.net, e-journal of international relations.* Thematic Dossier - *Internationalization of Higher Education: Experiences and Challenges*. VOL. 16, Nº. 1, TD1. June 2025, pp. 52-63. DOI https://doi.org/10.26619/1647-7251.DT0325.4.

Article submitted on 11th April 2025 and accepted for publication on 8 may 2025.

JANUS.NET, e-journal of International Relations
e-ISSN: 1647-7251
VOL. 16, Nº. 1, TD1
Thematic Dossier
Internationalization of Higher Education: Experiences and Challenges
June 2025, pp. 52-63
Digital Tools in Second Language Learning in Higher Education: a Systematic Review of Recent Research
Seçkin Esen

DIGITAL TOOLS IN SECOND LANGUAGE LEARNING IN HIGHER EDUCATION: A SYSTEMATIC REVIEW OF RECENT RESEARCH

SEÇKIN ESEN

1. Introduction

The role of communication in education is undeniable, especially in the field of second language acquisition, as it promotes global interaction, cultural immersion, and a variety of career opportunities. Today's communication is mostly based on digital technologies that not only alter the education environments but also transform pedagogical practices and learning outcomes. Digital tools used in second language learning in higher education consist of various innovative tools and methods. These new learning environments include blended learning that combines online and face-to-face instruction and artificial intelligence platforms that provide personalized learning experiences. The widespread use of rapidly evolving technologies in education makes it necessary to review the recent research, which may help researchers investigate and understand the existing systems, identify trends, and find gaps in the field. This review aims to examine the studies on the use of digital tools in second language education in higher education and to provide a comprehensive perspective for researchers, educators, and policymakers.

2. Literature Review: Existing Systematic Reviews and Meta-Analyses

Technology-enhanced language learning (TELL) has been a popular subject among scholars; therefore, numerous studies have been conducted on the integration of digital tools in language education. Several systematic reviews, such as blended learning in higher education for second language acquisition, have examined specific approaches. "A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024" analyzed studies published between 2014 and 2023. The study indicates that various studies were conducted on undergraduate English learners, and there were significant enhancements in language acquisition and student engagement due to the integration of social, cognitive, and teaching presence. Other reviews, covering studies from 2013 to 2024, have focused on English as a Foreign Language (EFL) teaching that is based on online collaboration, emphasizing the potential of online environments to improve writing skills through interactive learning and feedback. (Al-Rahmi et al., 2024). The use of newly

developed technologies in English teaching at universities has also been systematically reviewed, and it was revealed that the number of empirical studies on the latest tools like chatbots and virtual reality is inadequate (Bakhsh & Abid, 2023). Research trends in TELL in the period between 2020 and 2022 were analyzed, pointing to the prevalence of quantitative studies in higher education (Albashiry & Khan, 2023). Furthermore, technology-enhanced self-regulated language learning has been systematically reviewed in the studies published between 2011 and 2020 (Yang et al., 2023).

Meta-analyses have been applied in order to determine the effectiveness of digital tools. In one meta-analysis, 34 studies on technology-enhanced vocabulary learning were investigated. It was found that technology had a moderately positive effect on vocabulary learning, and incidental instruction is more effective than intentional instruction (Lin & Yu, 2022). The effects of interactive technologies on language learning were investigated in another meta-analysis, finding that they have a significant positive effect on language skills, learning attitudes, and self-efficacy (Li & Peng, 2024). Digital game-based language learning (DGBLL) has been examined through meta-analysis, indicating a small to medium positive effect of digital games on second language development (Dixon et al., 2022). In addition, the effect of TELL on ESL/EFL writing skills has also been examined in some studies. Accordingly, it was found that technology has a clearly significant positive effect on writing skills (Xie and Wang, 2023). A meta-analysis on augmented reality (AR) in language learning examined studies from 2010 to 2023 and found that AR has a significant positive effect on both language and emotional outcomes (Wu et al., 2024). A meta-analysis was also conducted on blended language education, and as a result of the study, it was concluded that this method can be as successful as traditional face-to-face education (Baralt et al., 2021). Several of these studies (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024; Bakhsh & Abid, 2023; Chen et al., 2025; González-Calatayud et al., 2023; Huang & Li, 2024; Wu et al., 2024) clearly demonstrate the methodological rigor employed in the field through the PRISMA guidelines for conducting systematic reviews.

According to the findings of literature reviews and meta-analyses, there is a well-established research area within TELL. However, due to the continuous development of new digital tools and the dynamic nature of educational practices, systematic reviews are needed to capture current trends and findings. There is a significant amount of research examining English as a foreign language, particularly at the undergraduate level (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024; Al-Rahmi et al., 2024). However, due to the paucity of such research on other languages, more research is needed in additional target languages and at various levels of higher education, including postgraduate studies.

3. Digital Tools and Second Language Skills: Impact and Effectiveness

This section of the study examines the impact and effectiveness of specific categories of digital tools in supporting second foreign language learning in higher education.

3.1. Blended Learning

Blended learning is defined as a hybrid model in which learners participate in both physical classroom environments and online platforms. Blended learning is a multifaceted concept that includes various definitions, models, and frameworks, incorporating all educational formats that combine online and face-to-face learning activities (Hrastinski, 2019). Another definition is that it is a "pedagogically balanced, adaptive combination" of various learning methods, consisting of both formal and informal dimensions as well as the integration of real and virtual educational experiences (Mintii, 2023).

Emphasizing the interaction of social, cognitive, and instructional presence, the Community of Inquiry (CoI) framework has significantly improved language acquisition skills such as speaking, listening, writing, and general proficiency, as well as psychological outcomes such as student engagement, perception, confidence, and self-efficacy (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024). There have been many significant cognitive improvements in behavioral outcomes, including academic performance, in blended learning environments (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024). However, blended learning has its drawbacks, one of which is related to increasing reliance on technology. This situation may create barriers for students and educators. Technical difficulties such as poor internet connectivity, issues with Learning Management Systems (LMS), and limited access to digital resources can hinder the learning process. Students in areas with unreliable or inadequate internet connectivity may face difficulties during blended learning, which can lead to frustration (Suriaman et al., 2023). Furthermore, Romli et al. emphasize the essential necessity of adequate technology infrastructure. If technology infrastructure is inadequate, technical difficulties can prevent students from learning (Romli et al., 2023).

The idea of integrating online and face-to-face teaching is a valuable approach for second language acquisition in higher education since it can help the educators and learners to achieve positive outcomes by promoting social and cognitive presence. However, technical issues need to be prevented in order to make this approach effective for both students and educators.

3.2. Online Collaborative Learning

Online collaborative learning (OCL) is defined as a method of structured learning in which people participate in group projects using web resources. It usually results in the creation of shared products for evaluation. This approach is described as activities needing combined intellectual efforts between students or between students and teachers (Kawtar et al. 2024). This cooperative approach allows students, who might be geographically apart, to work either asynchronously or synchronously. Therefore, it strengthens the learners' sense of community and shared goal.

Online collaborative settings have been applied in teaching ESL and EFL in higher education. They focus on the digital platforms and the specific language skills targeted

(Al-Rahmi et al., 2024). Systematic reviews clearly show that collaborative online settings improve learners' language proficiency through interactive learning, feedback techniques, and personalized learning opportunities (Al-Rahmi et al., 2024). These environments not only help students improve their writing skills but also their oral and speaking skills because the nature of online collaboration allows for this (Al-Rahmi et al., 2024). However, collaborative online settings have disadvantages that need to be addressed. These drawbacks include distraction of the learners, issues with internet connection, lack of sources, and technical skills of learners (Al-Rahmi et al., 2024).

This learning approach encourages interaction among students. It offers significant opportunities, especially in the development of writing and speaking skills. In order for this approach to be effective, it is of great importance to prevent technical problems. In addition, sufficient support should be provided to both educators and students to ensure active participation of students and to increase educational efficiency.

3.3. Mobile Learning (MALL)

Mobile Learning (MALL) allows users to access learning materials and activities independently of time and space by incorporating mobile devices into education (Indriani, 2020). This approach also encourages participatory and independent learning.

Recently, mobile learning has been widely used in second language education in higher education. The use of mobile applications has become one of the best practices in blended learning environments for language acquisition because it offers flexible and accessible tools for language acquisition (Systematic Review of Blended Learning in Higher Education: Second Language Acquisition with a Community of Inquiry Framework, 2024).

Research findings indicate that mobile applications of foreign language education generally focus on the development of vocabulary skills (Bakhsh & Abid, 2023). Besides, meta-analytic data show that mobile-assisted vocabulary learning is more successful than traditional computer-assisted learning approaches due to the instant learning and adaptability provided by mobile devices (Li and Peng, 2024).

3.4. Digital Game-Based Language Learning (DGBLL)

Digital game-based learning (DGBL) can be defined as supporting and facilitating learning processes using video and digital games. Prensky coined the term, and according to Prensky, DGBL encompasses learning activities that include digital games, ranging from educational simulations to role-playing games (RPGs) (Byun & Joung 2018).

DGBL's potential in second language education has been a popular subject among researchers and educators. Meta-analyses have provided valuable insights into the effects of digital games on language education (Dixon et al., 2022), while systematic reviews have investigated how digital games could be utilized in teaching vocabulary skills (Bakhsh & Abid, 2023). These meta-analyses suggest a small to medium positive effect of DGBL on language learning outcomes (Dixon et al., 2022). Recent research has proposed that games designed for only entertainment purposes can particularly be more

effective for second language acquisition when compared with the games designed for only educational purposes (Dixon et al., 2022). In addition to the result of the studies. It is indicated that playing digital games might help learners' vocabulary acquisition and change the perspective of language acquisition in a favorable way (Franco, 2024).

Digital game-based language learning proposes a promotive way for second language acquisition based on the indications of studies that demonstrate beneficial effects on a variety of language skills, such as vocabulary skills. The realization of how games with an entertainment focus can be adapted to the process of second language learning highlights the importance of motivation and engagement in the language learning process. What is also inferable from the discoveries is the superiority of these elements compared to unique instructional designs.

3.5. Virtual Reality (VR) and Augmented Reality (AR)

Virtual reality (VR) and augmented reality (AR) have recently started to be used in second language education. These technologies support second language education with immersive and personalized learning experiences. While virtual reality offers simulated contexts that learners participate in authentic language use, augmented reality enhances the educational experience by providing visual components in the real world, encouraging vocabulary learning in context (Wu et al., 2024).

VR and AR-based digital tools maximize student participation in education and provide immersive learning experiences. At the same time, these technologies facilitate the understanding of complex topics through visualization and interaction. Vesisenaho et al. state that through these technologies, students can experience the real world in simulated environments and increase their competence (Vesisenaho et al., 2019). In addition, VR has the feature of minimizing risks. Thanks to VR technologies integrated into various medical education programs, students can practice procedures in a safe environment without the risks associated with real-life applications (Lie et al., 2022). This also applies to language learning. If these digital tools are used in higher education, students learning a second language can develop their language skills by experiencing real life.

4. Impact on Affective and Cognitive Factors

Digital tools used in second language teaching have a significant impact on students' emotional and cognitive states. Educational experience, student motivation, and engagement are affected by these technological tools. They allow for varied learning modalities that can increase students' willingness to actively participate in their education and create a more dynamic learning environment (Pikhart et al., 2023).

The use of various digital resources can improve communication skills as it enables students to participate in language learning (Lee & Dressman, 2017). The inclusion of multimedia elements in education has a positive effect on students, making the learning

environment more interactive and making students more willing to communicate, which is a very important factor in language acquisition.

Technology-enhanced language learning environments (TELLEs) promote learners' willingness to communicate (WTC), which is a crucial element in second language acquisition. TELLEs increase the amount of engagement with content, peers, and educators as well as expand affective components including self-confidence and enjoyment. These environments help learners to develop linguistic skills and to reduce cognitive load; therefore, they increase the prospect of verbal communication (Huang & Li, 2024).

Gamified and interactive digital technology can contribute to learning by encouraging students to communicate. As a result, technology has a positive impact on communication, with the effect of improving interaction, emotional well-being, and language development. However, more research is needed to understand how digital technologies can benefit students at different stages of the learning process.

5. The Role of Artificial Intelligence (AI) in Second Language Education

The emergence of artificial intelligence (AI) has transformed second and foreign language learning, as in many other fields. Researchers have begun to investigate the effects of AI on higher education curricula and have found that AI presents both opportunities and challenges (Chen et al., 2025). The effects of AI-based chatbots on language learning have recently become one of the popular topics of research (Bakhsh & Abid, 2023; Bimpong, 2025). We can classify these chatbots as virtual tutoring assistants because they provide personalized learning experiences as well as real-time feedback (Bimpong, 2025; Bali & Sharma, 2024). Generative AI and large language models (LLMs) such as ChatGPT have recently gained great importance in language education and offer smart tutoring opportunities (Voss, 2024; McKenzie, 2024; Bommarito, 2023). If we need to list the benefits of artificial intelligence in terms of language learning, we can say personalized learning, instant feedback, and the creation of adaptable learning environments (Chen et al., 2025; Language Learning Trends for 2025: What's New and What's Next, 2024; Reeve-Parker, 2024).

Research shows that students increasingly perceive the use of artificial intelligence tools as beneficial for their learning and future careers (Almusharraf et al., 2024; Reeve-Parker, 2024).

On the other hand, the use of AI in education raises concerns about the effective and ethical use of these tools, such as academic honesty and the potential for bias in AI-generated content (Chen et al., 2025; Voss, 2024; Compilatio, 2025).

Today, the need to use AI-supported digital tools, including chatbots and large language models, in second language teaching is an undeniable reality. However, their effective and responsible integration into the field of education, ethical implications, and pedagogical strategies must be carefully considered.

6. Challenges and Best Practices in Implementing Digital Tools

Using digital tools in second language education in higher education can pose challenges such as the need for reliable internet access and technical support, which can prevent learners from using digital resources effectively (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024; Al-Rahmi et al., 2024). Additionally, ensuring adequate student engagement in online learning environments can be difficult, which is especially true in blended or fully online courses. It should also be noted that there are differences in language proficiency levels among students. This situation requires the use of tools and strategies to meet different needs (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024). Another challenge to introducing equitable practices in language teaching is the inequality of access to technology and digital literacy (The Role of Digital Technologies in Personalizing ESL Instruction: Challenges and Innovations, n.d.). These challenges that need to be overcome necessitate the identification of best practices. Based on the findings from the research, some of these practices can be providing comprehensive training and ongoing support to teachers as well as enabling them to effectively integrate technology into their teaching practices (Purwanto et al., 2023; Chai & Jung, 2024). The way to ensure that technology enhances students rather than hinders them is to align digital tools with pedagogical and learning goals (Al-Rahmi et al., 2024). Encouraging online communities and increasing opportunities for interaction and collaboration are essential to maximizing student engagement and creating a supportive learning environment (A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework, 2024; Al-Rahmi et al., 2024). Another factor to consider when determining digital tools is the need to consider the needs of all learners to ensure equal access to opportunities (The Role of Digital Technologies in Personalizing ESL Instruction: Challenges and Innovations, n.d.; Dahlstrom & Bichsel, 2025).

Developing a proactive approach to successfully integrating digital tools into second language education can help students overcome challenges related to participation, technology, and equity. Some of the practices that can be applied include training teachers, aligning technology with pedagogy, and developing online communities. This can help maximize the benefits of digital tools used in education.

7. Conclusion and Future Directions

This systematic review attempts to synthesize research on the use of digital tools in second language education in higher education and to identify the effects of various technologies on language learning. The analysis reveals that digital tools have a positive effect on language learning outcomes, student motivation, and student engagement.

With the emergence of artificial intelligence and its use in education, chatbots in particular have begun to play a major role in language teaching. Thanks to these tools, the potential for personalization and development of language learning experiences has increased.

Important insights have been gained from existing research; however, it is also known that this area needs to be further investigated. Most of the research conducted focuses on English as the target language, which indicates that more studies should be conducted on the effectiveness of digital tools in learning other languages. In addition, the long-term effects of these tools on language learning should be investigated. Another important issue is the need to examine the extent to which digital technologies affect students at different language levels. Further research is needed to ensure the pedagogical effects of the use of AI and LLM in language acquisition as well as their ethical and effective integration. Future research should also aim to refine the role of digital tools in developing reading, speaking, listening, and writing skills. Addressing these gaps can continue to advance the topic of supporting second language education with digital tools in higher education.

References

A Systematic Review of Blended Learning in Higher Education: Second Language Acquisition through the Community of Inquiry Framework. (2024). *International Journal of Learning Teaching and Educational Research*, 23(10), 226–251.

Al-Rahmi, W. M., Yahya, N., Aldraiweesh, A. A., Khan, S., & Aljeraiwi, A. A. (2024). The Digital Classroom: Systematic Review of Use of English as a Foreign Language (EFL) in Teaching in Collaborative Online Settings. *International Journal of Learning, Teaching and Educational Research*, 23(3), 1–24.

Albashiry, N. M., & Khan, A. (2023). Technology Enhanced Language Learning Research Trends and Practices: A Systematic Review (2020–2022). *Electronic Journal of e-Learning*, 21(1), 1–15.

Bakhsh, S., & Abid, G. (2023). A Systematic Review on the Use of Emerging Technologies in Teaching English as an Applied Language at the University Level. *Applied Sciences*, 13(1), 42.

Bond, M., Bedenlier, S., Marín, V. I., & Zawacki-Richter, O. (2023). Digital transformation in higher education: A systematic review of systematic reviews*. Australasian Journal of Educational Technology*, 39(3), 135–154.

Byun, J., & Joung, S. (2018). Digital game-based learning for K–12 mathematics education: A meta-analysis. *School Science and Mathematics*, 118(1-2), 3-13. doi:10.1111/ssm.12271

Chen, L., Xiao, Y., & Bian, D. (2025). A systematic review of the early impact of artificial intelligence on higher education curriculum, instruction, and assessment. *Frontiers in Education*, 10, 1522841.

Golonka, E. M., Bowles, A. R., Frank, V. M., Richardson, D. L., & Freynik, S. (2020). Review of Studies on Technology-Enhanced Language Learning and Teaching. *Sustainability*, 12(2), 524.

González-Calatayud, V., Prendes-Espinosa, M. P., & Castañeda-Quintero, M. (2023). Digital competencies in higher education: A systematic review of instruments based on DigCompEdu. *Education Sciences*, 14(11), 1181.

Hrastinski, S. (2019). What do we mean by blended learning? *TechTrends*, 63(5), 564–569. https://doi.org/10.1007/s11528-019-00375-5

Huang, H., & Li, M. (2024). The impact of technology-enhanced language learning environments on second language learners' willingness to communicate: A systematic review of empirical studies from 2012 to 2023. *Language Learning & Technology*, 28(1), 1–22.

Indriani, L. (2020). *EFL learners' attitudes toward MALL*. https://doi.org/10.4108/eai.12-10-2019.2292211

Kawtar, Z., Khaldi, M., & Erradi, M. (2024). Design and modeling of educational scenarios for collaborative online learning activities. *International Journal of Religion*, 5(9), 525-537. https://doi.org/10.61707/70c04n50

Lee, J. S. and Dressman, M. (2017). When idle hands make an English workshop: informal digital learning of English and language proficiency. *TESOL Quarterly*, 52(2), 435-445. https://doi.org/10.1002/tesq.422

Lie, S., Helle, N., Sletteland, N., Vikman, M., & Bonsaksen, T. (2022). Implementation of virtual reality in health professional higher education: protocol for a scoping review. *Jmir Research Protocols*, 11(7), e37222. https://doi.org/10.2196/37222

Mintii, I. (2023). Blended learning: Definition, concept, and relevance. *Освітній Вимір*, 8, 85–111. https://doi.org/10.31812/ed.539

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-6. doi:10.1108/10748120110424816

Romli, N., Mohamed, S., Darami, A. I., Haris, S., & Isa, M. A. M. (2023). The effect of student performance towards the adoption of blended learning: a case study of investment students. International *Journal of Academic Research in Progressive Education and Development*, 12(3). https://doi.org/10.6007/ijarped/v12-i3/18614

Suriaman, A., Manurung, K., Mukrim, M., Apridayani, A., & Agussatriana, A. (2023). Effective or impractical? discussing students' perceptions toward learning management systems in English language learning. *International Journal of Language Education*, 7(2). https://doi.org/10.26858/ijole.v7i2.43495

The Role of Digital Technologies in Personalizing ESL Instruction: Challenges and Innovations. (n.d.). *ResearchGate*. Retrieved from https://www.researchgate.net/post/The_Role_of_Digital_Technologies_in_Personalizing_ESL_Instruction_Challenges_and_Innovations

Vesisenaho, M., Juntunen, M., Häkkinen, P., Pöysä-Tarhonen, J., Fagerlund, J., Miakush, I., … & Parviainen, T. (2019). Virtual reality in education: focus on the role of emotions and physiological reactivity. *Journal for Virtual Worlds Research*, 12(1). https://doi.org/10.4101/jvwr.v12i1.7329

Yang, Y., Wen, Y., & Song, Y. (2023). A Systematic Review of Technology-Enhanced Self-Regulated Language Learning. *Educational Technology & Society*, 26(1), 31–44.

Zhang, S., Zhao, J., & Zhou, L. (2023). Online learning effectiveness during the pandemic: A systematic review and meta-analysis. *Frontiers in Education*, 8, 1334153.

Zhang, Y., & Zou, B. (2024). Technology-enhanced language learning: A bibliometric analysis and future directions. *Education and Information Technologies*, 29(1), 1–27.