



OPEN ACCESS

EDITED BY

Bruno Peixoto,
University of Trás-os-Montes and Alto
Douro, Portugal

REVIEWED BY

Sohaib Ahmed,
Bahria University, Karachi, Pakistan
Narmin Mohammed,
Tishk International University (TIU), Iraq

*CORRESPONDENCE

Orathai Piayura
✉ orapan@kku.ac.th

RECEIVED 09 September 2024

ACCEPTED 08 January 2025

PUBLISHED 12 February 2025

CITATION

Piayura O, Boonmas T, Wongphongkham N,
Sae-joo P, Narongchai W,
Wongphongkham H, Promphakping B and
Rahman MA (2025) Overcoming language
barriers in film production: the role of
VR-based learning in English proficiency.
Front. Educ. 10:1493442.
doi: 10.3389/feduc.2025.1493442

COPYRIGHT

© 2025 Piayura, Boonmas, Wongphongkham,
Sae-joo, Narongchai, Wongphongkham,
Promphakping and Rahman. This is an
open-access article distributed under the
terms of the [Creative Commons Attribution
License \(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Overcoming language barriers in film production: the role of VR-based learning in English proficiency

Orathai Piayura^{1*}, Thidarat Boonmas²,
Niyom Wongphongkham³, Phongthanat Sae-joo⁴,
Wanichcha Narongchai¹, Hava Wongphongkham³,
Buapun Promphakping⁵ and Md Ahbabur Rahman⁶

¹Faculty of Humanities and Social Sciences, Khon Kaen University, Khon Kaen, Thailand, ²Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand, ³Faculty of Fine and Applied Arts, Khon Kaen University, Khon Kaen, Thailand, ⁴Faculty of Education, Khon Kaen University, Khon Kaen, Thailand, ⁵Department of Social Development, Faculty of Humanities and Social Sciences, Khon Kaen University, Khon Kaen, Thailand, ⁶International College, Thaksin University, Songkhla, Thailand

Virtual Reality (VR) has promptly transformed educational practices, presenting immersive environments that boost learning experiences. However, it must be noted that even though earlier research highlights the possible role of VR in language learning as a viable medium, it still stands as a largely unexplored area due to lack of understanding of its potential and limitations. This research is fueled by the shift toward using digital educational resources during the time of the corona virus pandemic and it focuses on the contribution of VR toward the improvement of English skills within the context of the film industry in Thailand. The study created a VR App called “EngLab for Film” that has 10 interactive units related to film making. Using structured questionnaires, quantitative data were collected and analyzed with SPSS to assess engagement, motivation, and independent learning outcomes. Findings reveal that VR-based learning fosters motivation and enhances vocabulary acquisition, offering a dynamic alternative to traditional methods. However, technical limitations, such as video clarity, require further refinement. This study underscores VR’s transformative potential in language education, providing actionable insights for its integration into specialized professional contexts. The findings indicate that VR can significantly enhance language skills and motivation, though technical and content-related improvements are needed.

KEYWORDS

E-Learning, metaverse, virtual reality, language acquisition, E-Learning success

1 Introduction

The Internet has become the principal tool in this digital era that leads people to swap reality with its legislatures. It has become the keystone of communication in today’s advancing digital panorama, profoundly reforming how individuals experience and engage with the world. Over the years, the most transformative has been the invention of the metaverse and its three-dimensional virtual world, which can be view as an alternate universe. Making its way through various apparent technological barriers, the evolution of the metaverse has emerged as interesting to some because of its broad applications, notably in the field of education (Park and Kim, 2022).

In the contemporary world, there has been a lot of emphasis on the use of technology in education, especially with the introduction of VR headsets. With these headsets, students are able to engage with virtual content in a way that cannot be experienced in real life. However, despite the hype surrounding educational VR, evidence of its effectiveness remains scarce. Additionally, the adoption of VR in classrooms has other problems, for example, the need to consider its pros and cons.

Likewise, in the case of Thailand, the use of VLEs is another step forward in accomplishing the vision of 20 years National Strategy and goals of Thailand 4.0. These initiatives are intended to change the course content for the learners, so that they would be able to study it anytime and anywhere they want to [Maryati et al. \(2024\)](#). Additionally, VLEs enhances collaborative learning by providing social environments and virtual 3D spaces which increase the learners' attention and desire to study ([Park and Kim, 2022](#); [Zhang et al., 2022](#); [Sapliyan et al., 2023](#)). This synergetic approach highlights the revolutionary role that VLEs can play in the future of education.

Building on these advancements, the metaverse introduces a broader and more comprehensive digital framework for education. While there is considerable excitement about its potential, a transparent and thorough understanding of its elements and applications in education remains elusive. Studies have explored the history and applications of the metaverse to clarify its current state. However, its components cannot be precisely specified, and its structure remains ambiguous. Additionally, the existing E-Learning systems based on the metaverse are often inadequately described or only partially implemented. The metaverse integrates VR with web, internet, and extended reality (XR) technologies, creating a multifaceted digital environment ([Lee et al., 2021](#)). Its roadmap encompasses four key components: augmented reality, life logging, mirror worlds, and virtual worlds ([Zhang et al., 2022](#)). These components are further categorized into four dimensions: external, augmentation, intimate, and simulation, providing a framework for understanding its potential applications.

The goal of this study is to address this gap by investigating the use of VR technologies as a means of improving English language skills, interpreted from the perspective of the Thai film industry. Moreover, this study canvasses the opportunities that immersive technologies offer for the enhancement of student engagement and motivation as well as the students' independent learning in context of the VR-based educational process. The study is aimed at the creation of "EngLab for Film" application in which language acquisition is enhanced through the application of virtual reality, thus, piloting language comprehension for better communication during film production and suggest some directions for further studies and practice in this new area of research.

2 Literature review

VR or Virtual Reality initiates computer-generated environments that are either parallel to real-life situations or completely dramatized and fictionalized worlds ([Harley, 2024](#)). It presents an exceptional potential and perspective for immersive acquiring and engagement unlike anything ever underwent

in history. VR allows learners to take part in simulations and encounters that would be unrealistic or difficult to duplicate physically ([Asad et al., 2021](#)).

For example, virtual reality (VR) has revealed immense potential in transforming educational experiences by plunging students into distant planets, historical events, or complex scientific phenomena. These interactive experiences enhance perception, recall, and retention of studied material. For instance, [Chatwattana \(2023\)](#) features how virtual classrooms can enable learners to manipulate digital objects and settings as if they were in a physical room. This unique blend of immersion and encounter serves to diverse learning styles, significantly enhancing the overall learning process.

Moreover, VR has proven exceptionally effective in industries requiring hands-on skill development, such as medicine, engineering, and the arts. In medical training, students can practice plastic surgery procedures, while engineering students can experiment with physical models in controlled environments. Likewise, art students can explore creative processes using digital technology, all within a safe, simulated setting. One of the standout advantages of VR is its ability to transcend geographic and physical barriers, as noted by [Alawad et al. \(2015\)](#). This feature has enabled students from remote or underserved regions to access educational opportunities that were previously unavailable.

Building on the capabilities of VR, the concept of Metaverse represents an evolution into a more comprehensive digital universe. Unlike VR, the Metaverse integrates technologies such as augmented reality (AR), blockchain, and advanced networking to create an inclusive space for socializing, learning, and commerce ([Lee et al., 2021](#)). This convergence enables immersive educational experiences that either replicate real-world scenarios or craft entirely novel learning environments. Within a virtual campus, students can attend classes, collaborate on projects, and participate in extracurricular activities.

The Metaverse's ability to foster engagement and social interaction is a cornerstone of its educational impact. For example, [Chen et al. \(2022\)](#) emphasizes its role in promoting collaborative learning through group discussions, projects, and problem-solving activities. These elements not only enrich the learning experience but also align with the principles of effective pedagogy. By creating immersive and interactive environments, Metaverse facilitates deeper connections among learners while providing innovative tools to meet diverse educational needs.

With Metaverse, students can communicate and interact with one another in real-time, as they would in a physical classroom that has various channels of digital communication. [Sapliyan et al. \(2023\)](#) assert the importance of collaborative skills that can be bettered by the interactive capabilities found on the Metaverse. Metaverse allows learners to build personalized learning experiences custom-made to suit individual needs and preferences ([Tinmaz and Dhillon, 2024](#)). Additionally, adaptive learning systems embedded in the Metaverse can analyze learner behavior and performance, thereby adjusting content and teaching strategies. By so doing, this customization ensures learners get targeted support and resources that match their unique styles of learning. This improves overall educational outcomes. In virtual

space, educational resources are available through the metaverse at any place or anytime it is needed thus democratizing access to them (Alam and Mohanty, 2022). Students can virtually question textbooks, experience simulated environments, go through expert lectures or even have an opportunity to use global research materials among other things irrespective resource availability or their location physically. Accessibility is critical for promoting a more inclusive and fairer educational environment.

Integrating VR and Metaverse into learning facilitates there is need to develop specific proficiencies that are crucial for effective learning in such environments (Lee and Hwang, 2022). One of these skills is effectively navigating and using VR and metaverse platforms, a good command of digital technology is required. Digital literacy means being able to create, understand, and use digital content through different tools including media literacy, information literacy, technology literacy, communication literacy as well as social literacy (Sapliyan et al., 2023). In the ever-changing dynamic world of VR and metaverse; it is critical to have an ability to generate new ideas and solutions. Creativity allows for innovation which allows learners to explore new virtual environment possibilities leading improvements advancing in various fields. An effective interaction with others within virtual spaces needs expertise in collaboration as well as communication. The metaverse enables group work and collective problem-solving approaches where learners must make positive contributions toward one another's ideas to reach common objectives (Damaševičius and Sidekierskiene, 2024). On this aspect of self-directedness as well as adaptability learners will have to overcome new technologies and learning experiences in cyberspace (Veiga Simão et al., 2021).

The incorporation and merger of VR in educational contexts has acquired increasing attention in recent years. The literature review in this study ultimately emphasizes on three critical variables: student engagement, independent learning, and motivation to contextualize the role of VR-based learning in improving English proficiency, particularly in the milieu of the Thai film industry.

Engagement of learners is a vital element of effective learning conditions. According to a study, engagement contains emotional, behavioral, and cognitive dimensions which are vital for improving academic accomplishment and performance (Reyes et al., 2012). Virtual Reality (VR) technology has been revealed to adoptive intensified engagement by postulating immersive experiences that traditional instructional systems cannot approach (Chuah, 2018; Moreira et al., 2022). A study found that VR environments initiate a sense of spirit and existence which can drastically increase students' interest in engagement and knowledge activities (Papanastasiou et al., 2019). This is intensely significant in the perspective of language learning where engagement can be a critical interpreter of success. The shared nature of VR allows learners to participate in virtual real-world scenarios, accelerating a deeper linking to the material (Bailenson et al., 2008). In the film industry context, this engagement can transform into enhanced language skills as learners actively contribute to filmmaking consequences that require language usage in a practical framework.

Independent learning is another vital attribute of language acquisition, as it enables learners to take injunctions of their educational voyages (Howell, 2021). VR technology can boost independent learning by presenting personalized learning routes

and allowing students to discover content at their own sphere (Xie et al., 2019). Virtual Reality can support independent decision-making, which is critical for learners who often need to practice beyond the traditional classroom setting (Berg and Vance, 2017).

Motivation plays a crucial role in language learning (Gilakjani et al., 2012; Thohir, 2017; Seven, 2020). Motivation influences both the urge to learn and the effort employed in the process (Pranawengtias, 2022). Virtual Reality has been demonstrated to enhance motivation by initiating involving and relevant learning experiences that accommodate to students' interests. A study found that immersive environments can fuel learners' underlying motivation by delivering contexts that are directly aligned with their personal and professional ambitions (Mills et al., 2019). In Thai film industry sector, English proficiency is progressively important for cooperation, collaboration and creativity. The use of VR can align with students' career goals, thereby fostering greater motivation to engage with the language.

To brief, the literature supports the argument that VR-based learning environments can extensively boost student engagement, persist independent learning, and increase motivation among language learners. The integration of Virtual Reality has the prospective into educational systems to transform learning by presenting engaging experiences that strengthen accessibility and further engagement. This study aims to explore how VR technologies present diverse prospects to improve access to education, enhance learning procedures, and foster digital literacy skills crucial for thriving in these advanced virtual environments. Future research should persist in exploring the longitudinal effects of VR to transform educational systems across various settings.

3 Materials and methods

This study uses a quantitative research method with the goal of evaluating the effectiveness of a VR Metaverse project with regard to English language skills of students and workers in the Thai film industry. Specifically, there was a project called "EngLab for Film" whose target was to improve English language skills by simulating real life experiences in entertaining and engaging ways. The application consists of 10 comprehensive units addressing various aspects of film production. Each unit incorporates vocabulary exercises, quizzes, and final assessments aimed at evaluating the users' knowledge and performance.

The application is available on PC and mobile devices and uses VR technologies and features that are helpful for the learning process. Similarly, the application contains feedback mechanisms to monitor any errors that it aims to rectify. The development of "EngLab for Film" was done based on a software engineering paradigm which included requirements gathering, technical writing, VR implementation, evaluation and development. For VR development, the product Unity3D was used and for the analysis of data, SPSS was applied.

To measure the application's effectiveness, primary data was collected using a structured questionnaire. The questionnaire was carefully designed and adapted from validated instruments used in prior studies, ensuring its relevance and reliability. It consisted of both closed-ended and open-ended questions. Closed-ended questions included items measured on a Likert scale,

evaluating dimensions such as motivation, engagement, perceived independence in learning, and user satisfaction with the VR experience. Open-ended questions allowed participants to provide qualitative feedback on their experiences and challenges.

The study targeted students and personnel from the Thai film production industry who were seeking to improve their English language skills. A purposive sampling approach was adopted to select participants who met these criteria. A total of 100 participants were recruited, ensuring diversity in demographics and professional backgrounds. The questionnaires were personally distributed to each participant by the researcher to ensure a high response rate and to provide clarifications where necessary.

The first step in the data collection was the presentation of the objectives of the study, and later the participants were further guided on how they were supposed to use the VR interface. VR devices were handed to the users, and they were exposed to a stimulus film that was intended to replicate real life film making situations but this time in English. Their answers as well as their actions during the VR performance were noted and filmed.

The questionnaires were coded, and information was input into the SPSS program and was put through statistical analysis. Simple statistics were used to explain demographic features and general patterns. Secondary statistics, including regression analysis, were also employed to determine the link between general motivation and productivity, and the use of self-directed learning in vocabulary performance. A reliability analysis was undertaken, with a calculated Cronbach's Alpha of 0.88 (representing high internal consistency). There were also calculated variance inflation factors (VIF) for the predictor variables with all values being <5 indicating that the variables had no multicollinearity problems. These are analyses which strengthened the argument of the study and the findings.

4 Results

This study initiated by presenting activities and task themes, clarifying the objectives and approaches for the participants. Students were subsequently provided with comprehensive instructions and asked to wear a VR headset. Then the video stimulus was commenced allowing students to engage with a VR scenario where an instructor provided directions.

Each student's responses to the VR experience were monitored and noted their engagement within the VR content. Students were presented with an identical set of picture cards and questioned to name them in English again to allow for an assessment with their initial responses. After then, students were requested to complete a survey questionnaire to rate their perceptions of the VR experience using a range from Excellent to Poor. Once the survey was completed, students were urged to share their thoughts about VR in learning language. The survey was persistent on students' responses to the VR experience, with the goal of assessing their levels of motivation, engagement, and perceived independence in learning.

As per regression analysis (as shown in Table 1), motivation and independent learning are strong predictors of Vocabulary Performance, meaning that as these increase, so do the post-test scores, where Engagement does not have a significant impact in

TABLE 1 Regression analysis results.

Variable	Coefficient (β)	Standard error	t-value	p-value
Motivation	0.85	0.10	8.50	0.000**
Engagement	0.15	0.12	1.25	0.210
Independent learning	0.70	0.11	6.36	0.000**

R-squared: 0.78. The "***" typically denotes a significance level of 0.01 (1%), meaning that the result is highly significant and the probability of the result occurring by chance is less than 1%.

TABLE 2 Multicollinearity test.

Variable	VIF
Motivation	2.60
Engagement	2.20
Independent learning	3.80

this particular model. This supports a reliable basis for concluding that concentrating on progressing motivation and independent learning could lead to better vocabulary outcomes. A Cronbach's Alpha of 0.80 suggests that the scale is reliable and has good internal consistency.

The VIF values for all three variables are below 5 which reveals that there is no severe multicollinearity in the model (as shown in Table 2). This means that each predictor variable influences unique information to the model and does not overly inflate the variance of the regression coefficients.

The use of virtual reality in the process of learning languages can foster students' motivation and vocabulary, which agrees with numerous studies on the importance of technology in education. However, effective integration calls for appropriate technology selection. It has been noted that well-selected VR tools can improve student's participation and relevance of their learning experiences. Early findings indicate a strong correlation between motivation and independent learning where self-organization is seen to be an essential condition for language acquisition. The study is formative, but it confirms what has already been established that autonomous learning leads to better results because it helps learners to recognize their errors and develop their skills further.

5 Discussion

There is a significant demand to improve English language learning skills in a fun and engaged way. Despite global recognition, challenges persist in the Thai film production industry, particularly the limited English language skills of personnel. We developed an application named "EngLab for Film" to address this gap by developing a modern learning model in a virtual space. The platform covers all aspects of the production process (Pre-production, Production, and Post-Production), utilizing technology like Metaverse for consistency and educational quality.

The application is developed for use on both PC and Mobile via Spatial, either through Web or Application. If using via web

browser, it is recommended to use Microsoft Edge browser. On the Mobile side, it can also be played. For optimal performance, it is recommended to use the Spatial app. The application consists of 10 units and in each unit, users can interact with vocabulary, content, and quizzes to enrich their learning journey, aiming to overcome language barriers through VR. After starting the screen, the users can use their hands or pinch fingers together to grasp the desired object and utilize index finger to tap on the buttons and press down to activate them. To open the menu, position the left hand near the player's face, ensuring the player's gaze sees the hand in front to initiate the opening of the menu window. For objects zooming, grasp the object with both hands, spread them apart to enlarge the object, and bring them together to reduce its size. The inclusion of 3D components will enhance visual experience for users. Users can press the vocabulary buttons on the table to hear pronunciation from the narrator and read additional descriptive text about each term.

Users get acquainted with the use of the cameras, and the roles of the crew, create the storyboards, choose locations, casting, design costumes and perform post processing. Each unit incorporates vocabulary activities that have pronunciation aspects. Upon the completion of the course, users take a final exam covering all aspects of the course for certification. Respondents were also able to note however that VR increased motivation and retention of words in target language, only minor technical complaints were made. The research as a whole demonstrates the efficacy of the immersive VR as a tool in the process of acquiring a new language.

The sequence of visual, auditory, and kinesthetic inputs enriched the learning experience and demonstrated practical English application. It is cardinal to address the technical challenges that some users faced to improve virtual reality language learning tools for concentrating on better adaptation protocols and technological modifications.

The findings of this study exhibit a strong connection to the reviewed sources, emphasizing once again the importance of Virtual Reality (VR) as a medium that allows significant changes in the process of language learning and teaching, especially in the context of the Thai's film industry. Our investigation of VR's contribution on students' engagement, self-study and determination depicts the interrelationships among these core factors in English language learning.

To start with, the study validates that learner participation is an essential aspect to consider for any teaching and learning environment, as shown by [Bailenson et al. \(2008\)](#), [Reyes et al. \(2012\)](#), and [Papanastasiou et al. \(2019\)](#). Through the incorporation of virtual environments in the processing of language tasks, students are able to not only capture attention but also encourage for more emotional, cognitive and behavioral involvement. As [Moreira et al. \(2022\)](#) confirm, this type of participation can be particularly useful in language learning where learners encounter the challenges of contextual and situated understanding of vocabulary and grammar dimensions. The findings show that students who experienced VR-related motion picture activities had significantly high levels of engagement and motivation since they believed that learning was practical and applicable within familiar environments.

In addition, with regard to independent learning, our results are consistent with the findings of [Howell \(2021\)](#) and [Xie et al.](#)

(2019) in learning autonomy interacts with language acquisition in broad sense. VR creates for learners' opportunities for self-directed study as it allows them to navigate through the content at a time of their choice, which is beneficial. This type of independence is particularly important in the case of the Thai film students who need to be flexible to changing language needs quickly. By encouraging students to engage with the material independently, VR allows the students to be active participants in the learning process, which increases their language competence and confidence when using it in practice.

As far as motivation is concerned, our findings support earlier findings ([Gilakjani et al., 2012](#); [Mills et al., 2019](#); [Lowry et al., 2013](#)), showing that it's the most important factor for language learning outcomes. Our results are consistent with literature which finds that the students are better motivated when they feel the work is immersive and geared toward their interests and career aspirations. Not only does this motivation encourage learners to work harder on the tasks, but it also assists in the pursuit of English language skill development. The results imply that when students see the language in the context of their work, such as the film making industry, they will be more willing to learn it.

Briefly, the findings in this study lend credence to the proposition that language teaching in virtual reality environments supports active engagement of the students, learner autonomy, and increased motivation in language learning. Language learning through the lens of the Thai film industry provides a practical framework for the application of VR and offers students effective learning opportunities. The outcomes of this research have important implications suggesting that language education should utilize technological approaches and in this case VR devices. Further research is needed to include longitudinal research in order to investigate long term impact of VR on language skill acquisition and strengthen the argument that such teaching practices should always keep up with technology.

5 Conclusions

This study has explored the incorporation of Virtual Reality (VR) in language teaching system as it applies to Thai film industry. The aim of this research is to fill gaps in language proficiency that are affecting this sector, through developing "EngLab for Film" application using VR technology which will boost English speaking skills. Our findings indicate that VR-based learning environments offer a dynamic and engaging alternative to traditional methods, potentially improving both language acquisition and learner engagement. The use of "EngLab for Film" demonstrates how virtual reality can be employed effectively as part of educational experiences. By giving learners an interactive feel with practical examples on filmmaking, vocabulary building process and contexts, application enhances understanding of what they can view and talk about so far overcoming any linguistic hurdle. Moreover, the study demonstrates the significance of adapting technology tools to match learners' interests and their professional settings. Even though VR has been praised in numerous instances, whereas it works well when carefully implemented and aligned with educational objectives.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

OP: Conceptualization, Methodology, Validation, Writing – review & editing. TB: Data curation, Investigation, Validation, Writing – review & editing. NW: Methodology, Writing – original draft. PS-j: Data curation, Formal analysis, Software, Writing – review & editing. WN: Resources, Writing – original draft. HW: Data curation, Validation, Writing – original draft. MR: Conceptualization, Formal analysis, Project administration, Writing – review & editing. BP: Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article. This

References

- Alam, A., and Mohanty, A. (2022). “Metaverse and Posthuman animated avatars for teaching-learning process: interperception in virtual universe for educational transformation,” in *International Conference on Innovations in Intelligent Computing and Communications* (Cham: Springer), 47–61. doi: 10.1007/978-3-031-23233-6_4
- Alawad, A., Aljoufie, M., Tiwari, A., and Daghestani, L. (2015). Beyond geographical and cultural barriers: the concept of a virtual gallery for arts, design & architecture schools in Saudi Arabia. *Art Design Rev.* 3:87. doi: 10.4236/adr.2015.34012
- Asad, M. M., Naz, A., Churi, P., and Tahanzadeh, M. M. (2021). Virtual reality as pedagogical tool to enhance experiential learning: a systematic literature review. *Educ. Res. Int.* 2021:7061623. doi: 10.1155/2021/7061623
- Bailenson, J. N., Yee, N., Blascovich, J., Beall, A. C., Lundblad, N., and Jin, M. (2008). The use of immersive virtual reality in the learning sciences: digital transformations of teachers, students, and social context. *J. Learn. Sci.* 17, 102–141. doi: 10.1080/10580400701793141
- Berg, L. P., and Vance, J. M. (2017). An industry case study: investigating early design decision making in virtual reality. *J. Comput. Inf. Sci. Eng.* 17:011001. doi: 10.1115/1.4034267
- Chatwattana, P. (2023). The virtual technology towards future learning and digital transformation. *J. Educ. Innov.* 25, 331–350.
- Chen, Y., Lin, W., Zheng, Y., Xue, T., Chen, C., and Chen, G. (2022). Application of active learning strategies in metaverse to improve student engagement: an immersive blended pedagogy bridging patient care and scientific inquiry in pandemic. *SSRN J.* 4098179. doi: 10.2139/ssrn.4098179
- Chuah, S. H. W. (2018). Why and who will adopt extended reality technology? Literature review, synthesis, and future research agenda. *SSRN J.* doi: 10.2139/ssrn.3300469
- Damaševičius, R., and Sidekierskiene, T. (2024). Virtual worlds for learning in metaverse: a narrative review. *Sustainability* 16:2032. doi: 10.3390/su16052032
- Gilakjani, A. P., Lai-Mei, L., and Sabouri, N. B. (2012). A study on the role of motivation in foreign language learning and teaching. *Int. J. Modern Educ. Comput. Sci.* 4:9. doi: 10.5815/ijmecs.2012.07.02
- Harley, D. (2024). “This would be sweet in VR”: on the discursive newness of virtual reality. *New Media Soc.* 26, 2151–2167. doi: 10.1177/14614448221084655
- Howell, R. A. (2021). Engaging students in education for sustainable development: the benefits of active learning, reflective practices and flipped classroom pedagogies. *J. Clean. Prod.* 325:129318. doi: 10.1016/j.jclepro.2021.129318
- Lee, H., and Hwang, Y. (2022). Technology-enhanced education through VR-making and metaverse-linking to foster teacher readiness and sustainable learning. *Sustainability* 14:4786. doi: 10.3390/su14084786
- Lee, L. H., Lin, Z., Hu, R., Gong, Z., Kumar, A., Li, T., et al. (2021). When creators meet the metaverse: A survey on computational arts. *arXiv [Preprint]* arXiv:2111.13486.
- Lowry, P. B., Gaskin, J. E., Twyman, N. W., Hammer, B., and Roberts, T. L. (2013). Taking “fun and games” seriously: Proposing the hedonic-motivation system adoption model (HMSAM). *J. Assoc. Inf. Syst.* 14, 617–671. doi: 10.17705/1jais.00347
- Maryati, I., Fisher, D., Yatim, S. A. M., and Mauladaniyati, R. (2024). Statistical literacy ability of students through virtual learning environment based on moodle-learning management system. *Int. J. Inf. Educ. Technol.* 14, 99–106. doi: 10.18178/ijiet.2024.14.1.2029
- Mills, K., Jass Ketelhut, D., and Gong, X. (2019). Change of teacher beliefs, but not practices, following integration of immersive virtual environment in the classroom. *J. Educ. Comput. Res.* 57, 1786–1811. doi: 10.1177/0735633119854034

research and development project, titled “Development of English Skills for Manpower in Thai Film Industry on Metaverse,” was made possible through funding from PMU-B (P5) under the program to promote Social and Humanity frontier research and basic research that Thailand has potential (P5). We express our sincere appreciation for their invaluable support, which has contributed significantly to the advancement of this study.

Acknowledgments

We gratefully acknowledge the support provided by the Program Management Unit for Human Resources & Institutional Development, Research, and Innovation (PMU-B) under the Human Quality and Capability Enhancement in the 21st Century with Humanities, Social Sciences and Arts.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher’s note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

- Moreira, G. J., Luna-Nevarez, C., and McGovern, E. (2022). It's about enjoying the virtual experience: the role of enjoyment and engagement in the adoption of virtual reality in marketing education. *Market. Educ. Rev.* 32, 224–239. doi: 10.1080/10528008.2021.1965486
- Papanastasiou, G., Drigas, A., Skianis, C., Lytras, M., and Papanastasiou, E. (2019). Virtual and augmented reality effects on K-12, higher and tertiary education students' twenty-first century skills. *Virtual Real.* 23, 425–436. doi: 10.1007/s10055-018-0363-2
- Park, S. M., and Kim, Y. G. (2022). A metaverse: taxonomy, components, applications, and open challenges. *IEEE Access* 10, 4209–4251. doi: 10.1109/ACCESS.2021.3140175
- Pranawengtias, W. (2022). Undergraduate students' motivation on English language learning at Universitas Teknokrat Indonesia. *J. Engl. Lang. Teach. Learn.* 3, 27–32. doi: 10.33365/jeltl.v3i2.1956
- Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., and Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *J. Educ. Psychol.* 104:700. doi: 10.1037/a0027268
- Sapliyan, S., Chatwattana, P., and Nilsook, P. (2023). A constructionist, imagineering learning system with the metaverse: a study of learning outcomes at secondary schools in Thailand. *Glob. J. Eng. Educ.* 25, 90–98.
- Seven, M. A. (2020). Motivation in language learning and teaching. *Afr. Educ. Res. J.* 8, 62–71.
- Thohir, L. (2017). Motivation in a foreign language teaching and learning. *Vision J. Lang. Foreign Lang. Learn.* 6, 20–29. doi: 10.21580/vjv6i11580
- Tinmaz, H., and Dhillon, P. K. S. (2024). User-centric avatar design: a cognitive walkthrough approach for metaverse in virtual education. *Data Sci. Manage.* 7, 267–282. doi: 10.1016/j.dsm.2024.05.001
- Veiga Simão, A. M., Costa Ferreira, P., Pereira, N., Oliveira, S., Paulino, P., Rosa, H., et al. (2021). Prosociality in cyberspace: developing emotion and behavioral regulation to decrease aggressive communication. *Cogn. Comput.* 13, 736–750. doi: 10.1007/s12559-021-09852-7
- Xie, H., Chu, H. C., Hwang, G. J., and Wang, C. C. (2019). Trends and development in technology-enhanced adaptive/personalized learning: a systematic review of journal publications from 2007 to 2017. *Comput. Educ.* 140:103599. doi: 10.1016/j.compedu.2019.103599
- Zhang, X., Chen, Y., Hu, L., and Wang, Y. (2022). The metaverse in education: definition, framework, features, potential applications, challenges, and future research topics. *Front. Psychol.* 13:1016300. doi: 10.3389/fpsyg.2022.1016300