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A Literature Review on Implementing Virtual Reality in a Hospitality Education

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Abstract

This paper provides a systematic view of the published research topics relevant to an understanding of using Virtual Reality (VR) within Hospitality Education. The structure of the literature review is based on the PRISMA reporting guidance and reviews two main elements: status of VR embedded in Hospitality Education and the learning frameworks best fitting VR in education. Using the Google Scholar, Science Direct, and EBSCO databases, the present review found relevant articles. The included papers were classified concerning the following dimensions: year of publication, hospitality industry domain, and search keywords. A total of fifty-one articles were deemed relevant and reviewed. The reviewed articles focused on different aspects of the Hospitality Education, including Virtual Reality Technologies (VRTs) applied, learning frameworks, design, and evaluation of VR.

The results highlight among others that VRT can be integrated in (design-based) teaching and is seen as a valuable addition. Also, VR has a great effect on student learning, especially the impact of technology itself and classroom design. Fundamentally, a social constructivist learning framework fosters a good basis for including VRT in education. These results provide potential directions for hospitality educators, researchers, and practitioners in future research efforts to enhance the correct use of the virtual learning environment in education and training of the practical aspects in the hospitality industry.

Key implications of this study include the call for determining the appropriate level of VRT most suitable for the development of Virtual Learning Environments (VLE), the online learning programs and how to motivate the students the most.

Keywords
Hospitality, Education, Learning Framework, VR Training, Social Constructivist Education.

1. Introduction

While introducing VR as an educational tool in a practical training surrounding at an undergraduate hospitality management education, the need surfaced for research into the requirements to be met to successfully embed VR in education. Inspired by Radianti et al. (2020) this realization led to the review of two main elements: status of VR embedded in Hospitality Education, and the learning frameworks best fitting VR in Hospitality Education.

Development (online) technologies within Education

VR has been described as a 21st-century learning tool (Radianti et al., 2020). Furthermore, VR is defined as the entirety of hardware and software systems that attempt to generate an all-encompassing, sensory illusion of being there in another location (Biocca & Delaney, 1995). In their study, Lei and So (2021) discuss the viewpoints on online learning in tourism and hospitality education, as well as lecturers' acceptance of technological changes. This is demonstrated by the acceptance of online learning as a supplement to classroom learning, which has been accelerated through Covid-19. From the standpoint of the student, the increase in online learning allows them to improve their computer skills. In general, society will be confronted with an increasing impact of technology in daily life and therefore the use of technology needs to be embedded in Hospitality Education as well. As shared by Suh and Prophet (2018), the four domains using the most immersive technologies are education, entertainment, healthcare, and marketing, which have been researched in two main streams. One of these topics is looking at how immersive technology might increase user performance and the efficacy of learning and teaching. The theoretical basis of immersive technology has been researched and integrated in current studies (Suh and Prophet, 2018).

Virtual Reality in Learning Frameworks

Leung, Chen, Chang, and Mhlanga (2022) share from their research that knowledge construction through the existence of VR is seen as an advantage where the overall acceptance of technology is still the largest obstacle. Radianti et al. (2020) state that the learning theories used as theoretical foundation, are missing in the research of Suh and Prophet (2018). Therefore, Radianti et al. (2020) constructed a learning framework where learning theory, the way of learning, and learning content, what is learned, are described. Both Leung et al. (2022) and Radianti et al. (2020) discuss learning theories such as constructivist learning theory and cognitive-affective theory of learning and agree upon the constructivist learning design being most applicable for VR-based learning. Another learning environment, described by Geitz and De Geus (2019), called Design Based Education (DBE), is a further development (i.e., redesign) of the existing concepts of problem-based learning and competence-based education based on the principles of sustainable education. “Social constructivism is an important foundation for the DBE learning environment” (Geitz & De Geus, 2019, p. 7). Representation of reality and learning constructed due to internal representation for own version of knowledge, are the common thread in the three articles.

The literature review was based on the research questions presented by Radianti et al. (2020). The protocol for recommended reporting items for systematic reviews and meta-analyses (PRISMA) was used for this review. The current study is organized as follows: the setup of the research questions and inclusion and exclusion criteria are shared in the methodology. The results paragraph explains which results were found per research question, which are coming back in the discussion. The review ends with the conclusions and suggestions for further research.

2. Methodology

The setup of the literature review is based on the reporting guidance called Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) constructed by Liberati et al. (2009). The reporting guidance has been preceded by the following research questions divided over four main topics which are based on Radianti et al. (2020). These four main topics are Hospitality Education & VR, Hospitality Education & Learning Frameworks, Design & VR, and Evaluation.

RQ1. How can VR be implemented in the Hospitality Education?
RQ2. In what way are immersive VR technologies embedded into Hospitality Education?
RQ3. Which learning frameworks support the use of VR in Hospitality Education?
RQ4. What are the effects of VR on the learning process within Hospitality Education?
RQ5. Which VR design elements are relevant for the learning content in the Hospitality Education?
RQ6. Which VR design elements are relevant for the use of VR in Hospitality Education?
RQ7. How is the use of VR evaluated within Hospitality Education?

Based on the research objectives described above, keywords for the search string were defined in a peer review environment as part of the search strategy. The search string shown below has been applied to the EBSCO (Hospitality and Tourism database) on 18 December 2022.

Table 1 Search string used in EBSCO.

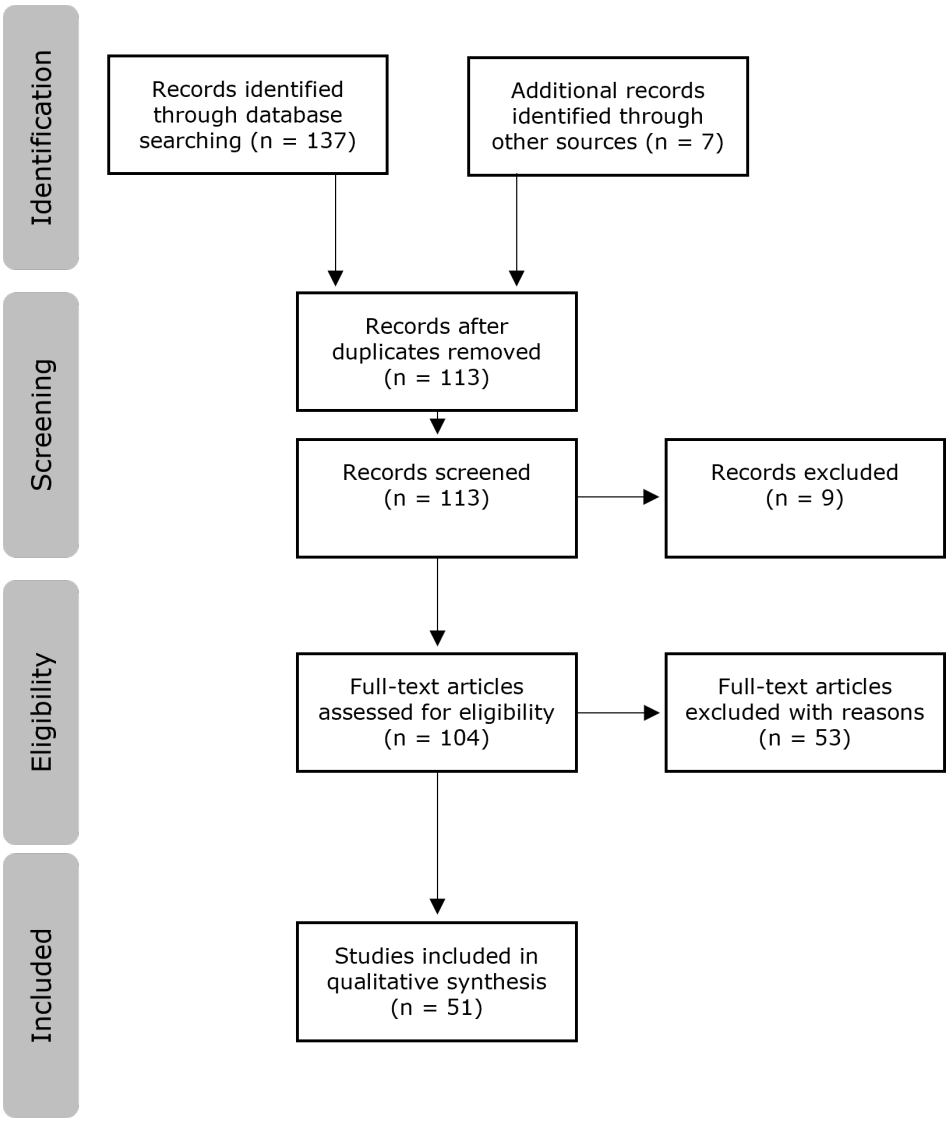
Keywords	Conjunction
["Virtual reality" or "VR" or "virtual environment" or "VE"]	AND
["Hospitality Education" or "higher Hospitality Education" or "professional Hospitality Education"]	AND
["augmented reality"]	NOT
["educat*" OR "learn*" OR "train*" OR "teach*" OR "learning framework"]	AND
["rehabilitation" OR "therapy"]	NOT

In addition to the EBSCO database, on the same day also Google Scholar, Research Gate, and Science Direct were used. In addition, on 21 December 2022, the EBSCO database was used as a search engine. Different setups of search strings are applicable for each of the separate databases though all the same keywords have been applied as indicated in table 1. The results of Research Gate did not match either of the criteria and were therefore entirely excluded from the process.

During the identification stage in December 2022 the search string as shown in table 2 served as a guidance. In January 2023, the screening of the documents included the process of determining the accessibility of the documents which resulted in nine excluded articles. This process was followed in February 2023 by a manual screening of the records done in a peer review setting and based on the following key words: Hospitality Education + VR, Hospitality Education + VR + learning framework, Hospitality Education + VR + learning framework + criterium design VR, Hospitality Education + VR + learning framework + criterium design VR + evaluation learning effects VR usage. Selection bias was a concern for the researchers and therefore the articles had first been screened on the title and abstract of the article. Secondly, bias might occur with the inaccurate inclusion/exclusion criteria used in the eligibility stage, so again the authors separately read the articles in full, resulting in the exclusion of another fifty-three articles.

The illustration of the selection strategy based on PRISMA guidelines is shown in figure 1.

Figure 1 Article selection strategy based on PRISMA guidelines.



Fifty-one articles remained in the selection and were added to Atlas.ti to derive the relating quotes from articles and link to the specific research question.

3. Results

General process

The selected fifty-one articles were read manually by the authors. For the processing and qualitative analysis of the selected fifty-one articles the tool Atlas.ti was used. Within Atlas.ti the articles were imported, a text search was done within the articles with the codewords resulting in relevant quotations, and the research questions were defined with the corresponding codewords. Also, smart codes were created with the corresponding codewords. These smart codes generated 'co-occurrence' quotations relevant per research question. Finally, the quotations of the smart codes were exported to Excel and segmented per research question. These exports were the basis of the results.

Result per research question

Research question 1: How can VR be implemented in the Hospitality Education?

In total 20 quotes appeared, based on the co-occurrence of the codes "implementation virtual reality" and "VR in hospitality education". However, after critical examination, only four quotes appeared relevant. From other articles 6 quotes appeared of which there were three new quotes.

As indicated by Patiar et al. (2021) limited research has been done on the effect of virtual experiences on a student's learning, and specifically about the impact of the technology itself and the design of the lesson. Furthermore, Lei and So (2021) emphasize the importance of the lecturer's performance and, more specifically, the shift to a different teaching style, which appears to be the strongest predictor in online learning. The importance of the lecturer's behaviour is indicated by Lei and So (2021) by stating that when lecturers do not believe in the effectiveness of transferring knowledge in an online world, although these are strongly related to practice, a decrease in satisfaction regarding teaching online will occur. Barron and Henderson (2002) already indicated that successful VLE require an appropriate level of VRT. Added to this is the need for deciding upon the educational program which best fits being taught via VR. Leung et al. (2022) compared in-person hospitality employee training with a VR setup and the only difference was the background used. Two decades ago, Barron and Henderson (2002), already stated seen from the pedagogical perspective, the use of virtual hospitality learning environment to educate hands-on experience in a VRT surrounding, would be a valuable learning environment. Bilsland, Nagy, and Smith (2020) continue research in this same area when discussing the possibilities of virtual internship experiences in which a case-based instruction is used to simulate the real-world setting by using immersive virtual environment.

Research question 2: In what way are immersive VR technologies embedded into Hospitality Education?
In total 12 quotes appeared, based on the co-occurrence of the codes "immersive VR" and "VR in hospitality education". However, after critical examination, only two quotes appeared relevant. From other articles 1 quote appeared which was the same quote as found with the original Research Question.

In their exploratory research, Barron, and Henderson (2002) already found that VRT can be integrated in teaching and is seen as a valuable addition. Their main question was still on the 'how' and which type to use. Almost two decades later, Bilsland, Nagy, and Smith (2020) share from their research that in the meanwhile the hotel industry has embraced the visualization technology of for example VR in guest and marketing strategies, however, in training the adoption is much less.

Research question 3: Which learning frameworks support the use of VR in Hospitality Education?
Based on the co-occurrence of the codes "immersive VR" and "VR in hospitality education", 34 quotes were found. However, after critical examination, only two quotes appeared relevant. However, after critical examination, only two quotes appeared relevant. From other articles 5 quotes appeared of which there were two new quotes.

Price-Howard and Lewis (2022) state that it is worthwhile for hospitality programs to integrate Virtual Learning Environments like Second Life in their programs. Applying virtual settings operationalized through digital platforms and offering scalable simulations are ideal in a situation when face-to-face delivery of classroom sessions is not possible, something which was discussed by Wang, Munoz, and Tham (2022). Their research related to blending design thinking concepts in tourism and hospitality with traditional education and how this type of education, including the use of digital platforms, prepares the student for the ever-changing industry. Leung et al. (2022) refer to the use of the constructivist learning theory, to which self-directed interactive learning is related. This type of learning might lead to a higher trainee performance and satisfaction to which VR game training contributes as it allows self-directed learning. In addition, they state that a more positive

attitude towards learning is shown when video-based instructions are included, and effective knowledge retention is established (Leung et al., 2022).

Research question 4: What are the effects of VR on the learning process within the Hospitality Education?
Based on the co-occurrence of the codes "learning process virtual reality" and "VR in hospitality education" five quotes were found, and after critical examination, all five quotes appeared relevant. From other articles 12 quotes appeared of which there were four new relevant quotes for this research question.

Patiar et al. (2021) have shown that virtual hospitality environments provide a technology-enhanced solution to practice-based knowledge and employability skill acquisition. This is successful in supporting assessment tasks and enhancing learning outcomes, as well as improving knowledge about the functioning of hotels and their ability to operationalize food and beverage systems. The virtual hospitality environment must consist of three elements: context, people, and content to facilitate knowledge acquisition and skills development. It can also stimulate the use of authentic assessment tasks, challenge student assumptions, reflection, and provides an opportunity for one-to-one learning encounters (Fitzsimons & Farren, 2016). Although the virtual hospitality experience cannot replicate the real world (Stokes-Thompson et al., 2012), students can experience a full perspective with well-designed VR environment (Jacobson et al., 2009; Leydon & Turner, 2013).

Leung et al. (2022) concluded that VR training was a more effective method of training for hospitality learners. The constructivist learning theory, following the Kirkpatrick Model (Kirkpatrick, 2006), was used to measure knowledge retention and self-directed interactive learning. When using the con structivist learning theory, self-directed interactive learning could lead to better training outcomes such as higher trainee satisfaction and trainee performance (Leung et al., 2022). Research on the training effectiveness of VR training applied in the service industry is limited, specifically around forming employee attitudes, and improving knowledge recall.

Finally, the use of VR has a positive effect on the motivation of students to explore creative ideas and to learn speaking skills in a virtual learning environment (Price-Howard & Lewis, 2022). In addition, students showed a positive attitude towards adopting VR as an educational tool and as well a willingness to use them as a training tool for communicational and interpersonal skills (Shen et al., 2022).

Research question 5: Which VR design elements are relevant for the learning content in the Hospitality Education?
The co-occurrence of the codes "design elements of VR" and "learning content hospitality education" resulted in four quotes. However, after critical examination, only three quotes appeared relevant. From other articles eight quotes appeared of which there was one new quote.

Studies like the one of Sagnier, Loup-Escande, Lourdeaux, Thouvenin & Valléry (2020) investigated the relevant criteria of the Technology Acceptance Model (Silva, 2015) on the acceptance and use of virtual reality. The criteria 1) perceived usefulness, 2) playfulness, 3) attitude, and 4) behavioural intention boosted the use of virtual environments and related to the willingness of learners to view VR as a learning platform. Deale (2019) found that being able to work and learn together as a group provided interesting opportunities for virtual learning in the online Hospitality Education. Communicational and interpersonal skills were received positively by these students to be trained in the virtual learning environment (Hsu, 2012). For the hospitality industry, it is important to include the elements of the service mindset (Bilsland et al., 2020). Patiar et al. (2021) showed that virtual learning had a positive influence on hospitality students when the subject matter was supported by the management processes and practices used in the hospitality businesses.

According to Lei and So (2021) not only are hardware and software important factors for the use of virtual learning environment, but also the lecturer's performance is one of the most important criteria for students' online learning satisfaction. Online courses in VR should be redesigned in a totally different way than the traditional 'content delivery' so that students can experience the full potential of virtual learning. Sufficient training and support for lecturers from the university policy makers within the Hospitality Education is critical. Perceived benefits of online courses significantly affect both lecturers' and students' satisfaction. Hospitality Education policymakers should provide resources to both lecturers and students to ensure that they are both convinced that virtual learning is appropriate for Hospitality Education (Lei & So, 2021).

Research question 6: Which VR design elements are relevant for the use of VR in the Hospitality Education?
The co-occurrence of the codes "design elements of VR" and "VR in hospitality education" resulted in total 19 quotes. After critical examination, only eight quotes appeared relevant. From other articles 12 quotes appeared of which there were three new quotes.

Wang et al. (2022) state that it is important to integrate design thinking concepts into the virtual learning courses. The hospitality educators should facilitate the students in this with discussion and reflection on an individual or a group level. Wang et al. (2022) also describe the facilitation of a virtual learning environment where face-to-face delivery is not possible (e.g., COVID-19). In these virtual learning environments Wang et al. (2022) state that having guests from the industry to share experiences as well as immersive experiences such as field trips can complement and reinforce the concepts taught in class. These scenarios (through digital platforms and simulations) combined with design thinking principles can offer learning and assessment outcomes that are authentic and scalable (Burdick & Willis, 2011; Vallis & Redmond, 2021).

To achieve satisfaction in online virtual teaching from the lecturer's perspective, perceived benefits is an important factor to implement (Lei & So, 2021). The satisfaction and belief of lecturers in virtual training potential is crucial for tourism and hospitality students in deciding if a virtual environment may be beneficial in providing practical tourism and hospitality courses (Lominé, 2002).

Hospitality academics in general agree with the potential and benefits of online learning. Especially food and beverage courses are transitioning to the virtual learning environment through a combination of video and simulation (Flaherty, 2020). Practical subjects can benefit the most from the use of virtual reality even though these are often the most expensive subjects to deliver in a traditional mode (Barron & Henderson, 2002). Leung et al. (2022) indicate that the amount of arousal by means of adding tension or stimulation to the VR surrounding, shows a negative effect on training effectiveness. However, the use of a rich immersive visualization in tourism education led to a better understanding and engagement in tourism and Hospitality Education (Schaffer, 2017).

Research question 7: How is the use of VR evaluated within the Hospitality Education?
In total 24 quotes arose out of the co-occurrence of the codes "evaluation virtual reality" and "VR in hospitality education". However, after critical examination, only four quotes appeared relevant. From other articles no quotes appeared.

To evaluate the use of VR as a training tool, Leung et al. (2022) show the possibilities of surveys with intrinsic motivation-related questions to help better understand intrinsic motivation. Another good practice is to schedule regular one-on-one sessions. Data for evaluation can be collected via an attitudinal questionnaire and a semi-structured interview (Price-Howard & Lewis, 2022), or, pre- (expectations) and post- (perception of actual acquisition of knowledge) open-ended questionnaires (Patiar, Kensbock, Benckendorff, Robinson, Richardson, Wang & Lee, 2021).

4. Discussion

Virtual Reality in Hospitality Education

Education is one of the four domains where immersive technology is embedded according to Suh and Prophet (2018). When reading the fifty-one articles, the focus lies on using VR for training staff in hospitality industry instead of training students in Hospitality Education. This is also reflected by the low number of quotes returning with RQ1 and after examination, the two relevant quotes returning from our research displayed a recognition of the possibilities of embedding VR in education which is already two decades ago (Barron & Henderson, 2002) but more recently supported by Patiar et al. (2021) indicating that little further research has been done on this matter. With RQ2 the possibilities of how to embed VR in Hospitality Education gives more information and addresses the importance of the lecturer's performance and willingness to change their teaching style (Lei & So, 2021). Furthermore, Barron and Henderson (2002) state that it is critical to have an acceptable degree of Virtual Reality Technology present as well as a competent teaching program. The design element needed in the VR surrounding is described as a rich immersive environment (Deale, 2019) where perceived usefulness, attitude toward, and behavioural intention are relevant for students to see the VR surrounding as a useful learning platform (Sagnier et al., 2020). The element of touch added to the VR surrounding is most researched (Jung, Wood, Hoermann, Abhayawardhana, & Lindeman, 2020), though Leung et al. (2022) suggest minimizing the effect of arousal to maximise positive training effectiveness. According to Lei and So (2021), the most essential factor is the lecturer's performance, to which they add the importance of policymakers who must provide enough equipment for both lecturers and students.

Learning framework

The introduction to this article already sheds light on the constructivist learning environment that may occur in a Design Based Education where social constructivism is a basis (Radianti et al., 2020; Leung et al., 2022; Geitz & De Geus, 2019). Leung et al. (2022) are indicating the relevance of self-directed interactive learning which is part of constructivist learning theory. Patiar et al. (2021) share that context, people, and content to facilitate knowledge are the prerequisites which need to be present to facilitate the virtual learning environment. As indicated by Stokes-Thompson et al. (2012), the virtual hospitality environment surrounding cannot replace the real world, but this virtual surrounding can already challenge the student's assumptions related to tasks and jobs. Self-directed learning is encouraged by using VR games for training (Upadhyay & Khandelwal, 2022). Learning, and more specifically knowledge retention, is stimulated in a training setting when set up according to the constructivist learning theory (Leung et al., 2022). Students showed their interest in using VR tools like Virtual Learning Environment to train for communication and interpersonal skills (Shen et al., 2022). Virtual Learning Environments like 'Second Life' are good instances of this (Price-Howard & Lewis, 2022). When designing the VR surrounding, it is important to include design thinking principles in this (Burdick and Willis, 2011; Vallis and Redmond, 2021).

5. Conclusion

Summary

This paper supplies a systematic view of the published research topics relevant to the understanding of using VR within Hospitality Education. The setup of the literature review is based on the PRISMA reporting guidance. In the end, fifty-one publications were found to be relevant to the literature evaluation. The research topics comprised of a combination of the following topics: Hospitality Education, VR, learning framework, design, and evaluation.

The results highlight among others that VRT can be integrated in design-based teaching and is seen as a valuable addition to it. Also, VR influences student learning, especially the impact of technology itself, and classroom design. These results provide potential directions for hospitality educators, researchers, and practitioners in future research efforts to enhance the correct use of the virtual learning environment in education and training of the practical aspects in the hospitality industry.

Limitations

Conducting systematic literature reviews has some limitations. The first limitation is the identification and analysis of published articles in a specific period. The second limitation is the inability to discover relevant individual articles from a limited number of keywords. The third limitation is the use of a limited number of searchable databases to discover articles. Although the authors have defined some search and tracking keywords according to PRISMA guidelines, it is possible that some articles that met the inclusion criteria were not considered in this review. A review of recent papers on the emerging technology of VR published after 2016 reveals that there are few articles from which to gather knowledge. VR is still a very new technology, especially in Hospitality Education. Furthermore, focusing on the search terms Hospitality Education may limit the number of articles found. Most of the articles mention search terms like Hospitality Industry, not Hospitality Education. These articles may therefore not give a clear picture of whether the learner is an employee or a student.

Future research

As the subject of VR in training is relatively new, future research is recommended. First, additional research to determine an appropriate level and type of Virtual Reality Technologies most suitable for the development of Virtual Learning Environments to teach hospitality management is required. Second, research is required that identifies the most suitable educational programs to be taught via VR. Third, despite the debates and uncertainties, tourism and hospitality scholars generally agree that online learning would be an important future trend. Understanding users' perceptions of online learning and how experiences can be better shaped will remain one of the most important topics in future research (Hsu et al., 2012). Fourth, researching whether being a student or an employee within the hospitality industry makes any difference when using VR training to maximize learning impact. Finally, research into how incorporating VR as a training tool in education might increase student motivation, reduce drop-out rates, student completion and impact learning styles for both lecturers and students.

References

Barron, P., & Henderson, D. (2002). Achieving deep learning in higher education programs: hospitality and leisure management students' perceptions of the potential use of virtual reality technology. *International Journal of Hospitality Information Technology*, *2*(2), 63-76.

Bilsland, C., Nagy, H., & Smith, P. (2020). Virtual Internships and Work-Integrated Learning in Hospitality and Tourism in a Post-COVID-19 World. *International Journal of Work-Integrated Learning*, *21*(4), 425-437.

Biocca, F., & Delaney, B. (1995). Immersive virtual reality technology. *Communication in the age of virtual reality*, *15*(32), 10-55.

Burdick, A., & Willis, H. (2011). Digital learning, digital scholarship and design thinking. *Design Studies*, *32*(6), 546-556.

Deale, C. S. (2019). Learning Preferences Instead of Learning Styles: A Case Study of Hospitality Management Students' Perceptions of How They Learn Best and Implications for Teaching and Learning. *International Journal for the Scholarship of Teaching and Learning*, *13*(2), Article 11.

Fitzsimons, S., & Farren, M. (2016). A brave new world: Considering the pedagogic potential of Virtual World Field Trips (VWFTs) in initial teacher education. *International Journal for Transformative Research*, *3*(1), 9-15.

Flaherty, C. (2020). Massive increases in LMS and synchronous video usage. *Inside Higher Ed*.

Geitz, G., & de Geus, J. (2019). Design-based education, sustainable teaching, and learning. *Cogent Education*, *6*(1), 1647919.

Hsu, L. (2012). Web 3D simulation-based application in tourism education: A case study with Second Life. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *11*(2), 113-124.

Jacobson, A. R., Militello, R., & Baveye, P. C. (2009). Development of computer-assisted virtual field trips to support multidisciplinary learning. *Computers & Education*, *52*(3), 571-580.

Jung, S., Wood, A. L., Hoermann, S., Abhayawardhana, P. L., & Lindeman, R. W. (2020, March). The impact of multi-sensory stimuli on confidence levels for perceptual-cognitive tasks in vr. In *2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)* (pp. 463-472). IEEE.

Kirkpatrick, D., & Kirkpatrick, J. (2006). Evaluating training programs: The four levels. *Berrett-Koehler Publishers.*

Lei, S. I., & So, A. S. I. (2021). Online teaching and learning experiences during the COVID-19 pandemic–A comparison of teacher and student perceptions. *Journal of Hospitality & Tourism Education*, *33*(3), 148-162.

Leung, X. Y., Chen, H., Chang, W., & Mhlanga, L. (2022). Is VR game training more effective for hospitality employees? A longitudinal experiment. *Tourism Management Perspectives*, *44*, 101020.

Leydon, J., & Turner, S. (2013). The challenges and rewards of introducing field trips into a large introductory geography class. *Journal of Geography*, *112*(6), 248-261.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., ... & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Annals of internal medicine*, *151*(4), W-65.

Lominé, L. L. (2002). Online learning and teaching in hospitality, leisure, sport and tourism: Myths, opportunities and challenges. *Journal of Hospitality, Leisure, Sport and Tourism Education*, *1*(1), 43-49.

Patiar, A., Kensbock, S., Benckendorff, P., Robinson, R., Richardson, S., Wang, Y., & Lee, A. (2021). Hospitality students' acquisition of knowledge and skills through a virtual field trip experience. *Journal of Hospitality & Tourism Education*, *33*(1), 14-28.

Price-Howard, L. K., & Lewis, H. (2022). Perceived usefulness of simulation learning in Hospitality Education. *International Hospitality Review*, (ahead-of-print). https://doi.org/10.1108/IHR-05-2022-0028.

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education*, *147*, 103778.

Sagnier, C., Loup-Escande, E., Lourdeaux, D., Thouvenin, I., & Valléry, G. (2020). User acceptance of virtual reality: an extended technology acceptance model. *International Journal of Human–Computer Interaction*, *36*(11), 993-1007.

Schaffer, V. (2017). Enhancing learning to diverse cohorts via immersive visualization. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *21*, 46-54.

Shen, S., Xu, K., Sotiriadis, M., & Wang, Y. (2022). Exploring the factors influencing the adoption and usage of Augmented Reality and Virtual Reality applications in tourism education within the context of COVID-19 pandemic. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *30*, 100373.

Silva, P. (2015). Davis' technology acceptance model (TAM)(1989). *Information seeking behavior and technology adoption: Theories and trends*, 205-219.

Stokes-Thompson, F., Wood, D., Scutter, S., & Dobinson, T. (2012, November). Researching the potential of the 3D virtual learning environment to complement work integrated learning in higher education. In *2012 Australian Collaborative Education Network National Conference* (p. 276).

Suh, A., & Prophet, J. (2018). The state of immersive technology research: A literature analysis. *Computers in Human Behavior*, *86*, 77-90.

Upadhyay, A. K., & Khandelwal, K. (2022). Metaverse: the future of immersive training. *Strategic HR Review*, *21*(3), 83-86.

Vallis, C., & Redmond, P. (2021). Introducing Design Thinking Online to Large Business Education Courses for Twenty-First Century Learning. *Journal of University Teaching and Learning Practice*, *18*(6), 213-232.

Wang, M. J. S., Munoz, K. E., & Tham, A. (2022). Enhancing industry-ready competence and skills through design thinking integration: evidence from a CLIL-based hospitality course. *Consumer Behavior in Tourism and Hospitality, 17*(3), 326-337. https://doi.org/10.1108/CBTH-09-2021-0211.