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Systematic Review of Literature of the Use of Virtual Reality in Tourism Education

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ABSTRACT

The present study reviewed primary studies that report the use of virtual reality in tourism education to identify the impact that the use of virtual reality has generated in the classroom. The applied methodology was the systematic literature review proposed by Kitchenham, which includes planning, review and reporting of results. As a result, 365 scientific articles were obtained, of which, after reviewing, we selected 52 papers. In these articles, it is evident that virtual reality is a tool that has positively impacted education, establishing through constructivism an adequate relationship of students with the knowledge, does not discriminate gender or age, which allows having a range of action at all educational levels, in terms of tourism facilitates approaching the area where the activity takes place from every context.

Keywords: Virtual reality, Tourism education, Experiential education, Systematic literature review

INTRODUCTION

In recent years, tourism has experienced different evolutionary curves, discovering that the flow of visitors to the main destinations in the world has increased. This fact was altered due to the COVID-19 pandemic, reducing the number of people travelling to almost zero. All these variations have caused various analyses, new ways of managing tourism and how the academy approaches it (Yung, Khoo-Lattimore and Potter, 2021).

The evolution of technology has taken leaps and bounds, allowing technology to become more accessible to the consumer. Many theorists have analysed the use of different technological tools in education, allowing the development of new systems, virtual learning environments, and educational techniques with a different approaches. In the case of tourism, it has not been the exception; the use of technology to approach a destination, a historical fact, a somehow unattainable space, and the academic interest in optimising technological resources guide the present study (Schott and Marshall, 2018).

The present work presents an alternative in which Virtual Reality (VR) contributes to learning without discriminating academic groups. However, the study is focused on tourism education. Since despite being a rapidly growing industry, its relationship with technological systems has been limited to

reservation systems concentrated on the hotel industry and tourism. Leaving aside other elements which can improve the ability to learn and the same academic development of tourism professionals.

Despite a large amount of existing literature, very little has focused on studying or researching the use of virtual reality in tourism. Therefore, the objective of this paper is to carry out a systematic review of primary studies that report the use of virtual reality in tourism education. To identify the impact that the use of virtual reality generated in the classroom. The reported characteristics of their inclusion in the academic tourism field, the academic group about age, gender and level of study where better results have been achieved.

This document is divided into the following sections: initially, it presents the theoretical support and previous related research, followed by applying the methodology proposed by (Kitchenham and Charters, 2007) for the systematic review of literature, including the phases of planning, carrying out and reporting results; Finally, it presents the conclusions.

Related Work

Virtual reality, known by its acronym in English VR, made its first appearance in 1938 with the stereoscope, or stereopsis, that generates a depth effect through two images; later, in 1929, the first simulator for combat pilots was created, which would be the prototype for current VR, through the years evolving until what we have today (Garcia Garcia, Vivar Zurita and Universidad Complutense de Madrid, 2005).

To define virtual reality, it is essential to consider that VR must generate a three-dimensional environment. The author describes VR as a series of interactive data generated through an operating system, which stimulates the senses, is visualisable, and can be manipulated in "real-time", allowing the user to be part of the virtual world (Levis, 2012).

Virtual reality is efficient for learning, contributing to the critical analysis and reflection of the students. Thanks to the technological advances in recent years and the lower costs of VR, these trips can now be made from the classroom without having to leave it (Schott, 2017). It is also important to consider as a constructivist tool since learning is built through individuals and their interaction with the environment through VR (Chen, 2009).

Tourism and technology are two industries that have been growing together over the years; the evolution and interest in them have increased thanks to globalisation that every day covers more areas. Tourism somehow depends on technology to promote itself and reach more consumers (tourists) (Rodriguez, 2015).

Competition in tourism year after year has become more radical, which has led to some destinations including technologies such as VR and AR so that tourists can access other types of experiences in the same destinations from smartphones or any device that enhances the visit (Katkuri, Mantri and Anireddy, 2019).

VR encourages the student to feel in place, generating an immersive experience that allows knowledge to be developed—having these tools at our disposal in the academic field. It is proposed to contribute to the tourism career. (Schott and Marshall, 2021). According to (Xerach Pérez, 2014), it is essential to pay attention to technological evolution since, over the years, its link to all industries has been gaining ground, and the tourism industry has been one of the least able to adapt and use these resources.

METHOD

The present study takes as a basis for its development the proposal presented by (Kitchenham and Charters, 2007) for systematic literature reviews. It includes the phases of planning, carrying out and reporting the SLR.

Research Questions

The research questions are presented in Table 1.

Search Process

The applied search strategy includes identifying the terms or keywords for the search, assembling the search string and executing the search string in the selected digital libraries.

Search String. The main terms are established as: "Virtual Reality", "Education", and "Tourism"; the alternative term is: "VR", and connectors in the English language are established for the search string: "OR" and "AND".

Online Databases. The search string is applied to the title, abstract, and keyword metadata. Automatic searches were done in the digital libraries: IEEE Xplore, Scopus, ACM, Springer, Emerald, and SAGE. Also, from manual searches in Google scholar, the 4th International Conference of the Virtual and Augmented Reality in Education, the 7th International Conference on Arts IT 2018 and the 3rd EAI International Conference on Design, Learning and Innovation.

Study Selection

The selection process of studies is based on reading the title and abstract by each reviewer and according to the established inclusion and exclusion criteria (see Table 2).

Table 1. Research questions.

N.	Research Question
RQ1	What impact has generated the use of virtual reality in the classroom?
RQ2	What characteristics were found in applying virtual reality in the academic field of tourism?
RQ3	In which academic group, considering age, gender, and study level, have achieved the best results with virtual reality?
RQ4	How has virtual reality influenced the academic development of students?

Table 2. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
IC1: Articles that address the use of virtual reality in education. IC2: Articles that mention virtual reality in tourism. IC3: Articles that analyse the use of virtual reality in tourism education. IC4: Complete articles. IC5: Articles in English, Spanish, and Portuguese	EC1: Editorials, prologues, opinions, discussions, interviews, news, publicity, summaries of articles, panels, or posters. EC2: Articles for which the complete document is not available. EC3: Duplicate articles in other bibliographic bases. EC4: Articles that still need to be validated. EC5: Articles that are written in languages other than those mentioned.

Once the search string is applied in the libraries, 319 articles are obtained, distributed as follows: ACM 11 articles, Emerald 119 articles, IEEE 19 articles, Sage Journals 2 articles, Scopus 128 articles and Springer 43 articles. In the first review, 34 duplicate papers were eliminated, followed by the title and abstract being reviewed in each study. The inclusion and exclusion criteria were applied, leaving 53 articles evaluated.

Quality Assessment

The quality of each selected article is evaluated according to the criteria previously established; the score for each closed question will be the arithmetic mean of all the individual scores of each reviewer. The whole of the scores of the three closed questions of each study provides a final score (an integer between -4 and 4). These scores shown in Table 3 were not used to exclude articles from the study but were used to detect representative research studies.

Strategy for Data Extraction

The data extraction strategy defines the possible answers to each question that can be identified in the reviewed studies, as represented in Table 4.

Table 3. Quality evaluation.

Question	Criteria	Score
Have five or more authors cited the article?	Three or more	1
	2 or 3	0
	Two or less	-1
Has the article been published in a relevant journal or conference?	Q1, Q2	1
	Q3, Q4	0
	Others	-1
Does the study draw a conclusion where VR is linked to tourism education?	Yes	1
	It's mentioned	0
	No	-1
Does the study link data collection, data interpretation and conclusions correctly?	Yes	1
	Average	0
	No	-1

Table 4. Research question.

N.	Description
RQ1	Learning process, better attitude, accessibility, improved learning, mitigate risks, Teaching process, Helps understand student problems, Fosters innovation., Education system, Educational, content, Experiential education, Active participation, Health conditions, Pedagogical benefit, Increased school, engagement, Skill enhancement, Research tool, Constructivism
RQ2	Immersive interface, Animation routines, Interactive capability, Virtual environments, Critical thinking, Motion, Tourism education, Sensory stimulation
RQ3	New generations, All ages, Digital natives, All genders
RQ4	Complete experience, reduces science phobia, improves skills, Professional development, Accessibility and inclusion, Cultural context, Health condition (disadvantage), Improves learning process, promotes collaborative learning, Experiential learning, Better attitude, Committed students.

RESULTS

Once the information extraction is complete, the following results are evidenced for each research question posed.

RQ1. What Impact Has Generated the Use of Virtual Reality in the Classroom?

Studies have shown that adopting virtual reality (VR) technology can enhance the educational process by allowing students to interact in controlled and risk-free environments without limitations of time and space. Additionally, the immersive experience of VR can generate positive feelings in participants (Stavroulia et al., 2019).

When discussing the educational system and its relationship with VR, it is argued that the government must intervene through policies that allow development, innovation, and entrepreneurship. This also generates new employment sources (Rath, Satpathy and Patnaik, 2019).

Studies have shown that virtual reality technology can improve the educational process. This technology helps students interact in a risk-free environment where they can face controlled situations without time and space limitations. VR can create positive feelings in the participants and improve their concentration, making it easier for them to understand abstract concepts. Virtual environments simulate reality, allowing students to understand situations more vividly. This can change students' attitudes towards learning and generate new skills and experiences. VR also contributes to constructivism by enabling students to interact and experiment with virtual objects, building their own knowledge. Additionally, VR is seen as a way to approach blended learning, allowing both virtual and in-person activities. For students and educators, VR contributes to research, allowing them to test and evaluate theories without affecting natural objects or environments (Guttentag, 2010; Perez-Valle and Sagasti, 2012; Stavroulia *et al.*, 2019; An, Ko and Kang, 2020; Baxter and Hainey, 2020a; McGovern, Moreira and Luna-Nevarez, 2020).

The impact classification and articles mentioned it is represented in Table 5.

Table 5. Impact on the use of virtual reality in the classroom.

Description	N.	Description	N.
Learning process	8	Educational content	1
Better attitude	3	Experiential education	1
Accessibility	2	Active participation	1
Improve learning	1	Improve concentration	1
Improve skills	2	Health conditions	1
Mitigate risks	1	Pedagogical benefit	1
Teaching process	3	Increased school engagement	1
Helps understand student problems	1	Skill enhancement	1
Fosters innovation	1	Research tool	1
Education system	1	Constructivism	1

Q2. What Characteristics Were Found in Applying Virtual Reality in the Academic Field of Tourism?

The academic curricula related to hospitality worldwide aim to develop professionals who can adapt to the changing world of work. v

VR in tourism can improve the education process by providing new and engaging learning experiences through virtual environments (Gupta, Hassanien and Khanna, 2020). VR can reduce the need for physical trips, increase efficiency and optimise learning times while still delivering holistic knowledge (Shen et al., 2022). The perception of VR is positive and contributes to student motivation, interpersonal communication skills, and critical thinking. VR also allows for a better understanding of sensitive environments and the impact of tourism (Lee *et al.*, 2017; Schott and Marshall, 2021b).

As you can see in Figure 1, most of the features related with the different papers talk about virtual environments, immersive experience and interactive capabilities.

Q3. In Which Academic Group, Considering Age, Gender, and Study Level, Have Achieved the Best Results With Virtual Reality?

Once all the articles selected for this study have been reviewed, it is determined that there is no age limit for virtual reality since it is adaptable to different contexts and realities. The same happens with gender and educational level as shown in Figure 2.

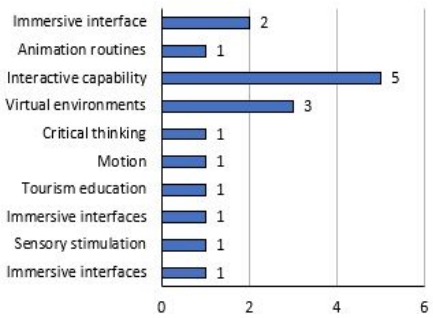

Figure 1: Features of virtual reality applications.

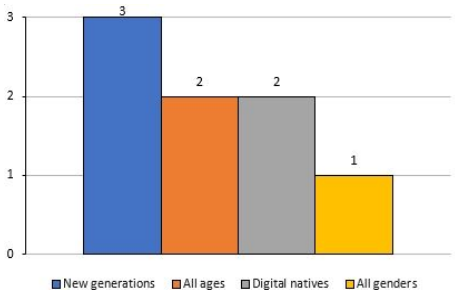

Figure 2: Age group and gender.

VR can be easily adapted to different age, social, and cultural groups; it is even proposed to be accessible for people with disabilities, allowing them greater reach and commitment (Chiao, Chen and Huang, 2018). It should be noted that for the new generations, it is more accessible, and they are more enthusiastic when adapting to new technologies (McGovern, Moreira and Luna-Nevarez, 2020). By being more involved in using mobile devices, they have greater familiarity; therefore, the learning process is much more familiar (De Paolis and Bourdot, 2019).

Efforts have been made to develop technological advances in the educational field, especially in higher education. According to (Hsu, 2018), for millennials, who have a very short-term level of attention, proposing interactive, collaborative activities through new technologies will allow them to adapt and learn better. However, this can challenge educators since they must redefine their strategies. Since the stakeholders who have a particular characteristic, being digital natives, it is straightforward to adapt them to new technologies such as virtual reality (Loureiro, Bilro and Angelino, 2021).

When talking about age, it should be mentioned that virtual reality can affect younger users since it can cause long-term problems of photosensitivity and seizures. All this is due to the high visual and auditory stimulus generated by VR, which is why it is essential to consider these effects to mitigate them (An, Ko and Kang, 2020). Regarding gender, (Baxter and Hainey, 2020b) mention that men tend to be more enthusiastic when proposing study methods through virtual reality, which can be translated into better assimilation of the knowledge delivered through this technology.

Q4. How Has Virtual Reality Influenced the Academic Development of Students?

The use of virtual reality (VR) in education presents benefits for students, teachers, and professionals (Perez-Valle and Sagasti, 2012). VR can help improve students' science phobia and learning through guided activities (Sakamoto et al., 2018). It provides safe and controlled environments for solving problems and helps teachers guide students in learning (Stavroulia et al., 2019). Additionally, VR generates new skills in students compared to traditional presentations and can evidence knowledge differently (McGovern, Moreira and Luna-Nevarez, 2020).

The use of virtual reality positively influences being able to adapt to people with disabilities through solutions such as generating assisted locomotion; that is, through external tools, people with reduced mobility problems or some learning disabilities can be assisted by the use and operation of the controls. It encourages greater activity participation (Torres Mas et al., 2022). In the field of autism, it contributes since it is not limited to texts or illustrations, which allows the concept to be visualised and experience how things work (Nalluri, L and Munavalli, 2021).

Virtual reality is increasingly being used in education and has several benefits, including providing safe and controlled learning environments and allowing for immersive experiences. The technology is also being used to mitigate adverse effects, and companies are using AI and 5G to improve it (Nalluri, L and Munavalli, 2021). Despite limited options for educational games, VR has the potential to enhance students' learning experiences by making them more practical and engaging (An, Ko and Kang, 2020). VR offers a first-person experience, allowing students to understand cultural processes, surroundings, and environmental context. In tourism, VR generates greater engagement and learning through simulations of the natural world (Chen, Warden and Lin, 2017; Martín-Gutiérrez *et al.*, 2017; Gupta, Hassanien and Khanna, 2020; Loureiro, Bilro and Angelino, 2021). The constructivist approach to VR in education allows students to be the leading interpreters in their learning experiences. The use of VR in education improves student learning and critical thinking skills, with a focus on the student (Chiao, Chen and Huang, 2018; Bilotta *et al.*, 2021).

As represented in Table 6, there are different influences related to students' academic development.

Table 6. Influence of VR on students' academic development.

Description	N.	Description	N.
Full experience	1	Improve learning process	3
Reduces science phobia	1	Promotes collaborative learning	1
Improve skills	1	Experiential learning	1
Professional development	1	Improve concentration	1
Accessibility and inclusion	1	Better attitude	1
Cultural context	2	Committed students.	1
Health condition (disadvantage)	1		

CONCLUSION

The study found the importance of technology in education and the need to optimise its use in the academic field. The benefits of virtual reality in the classroom have been noted, including its contribution to the academic world, gamification, and inclusivity for people with disabilities (Memos et al., 2020).

The use of virtual reality in education has been found to improve the state of mind of students. Therefore the educational system should invest in developing new technologies to lower costs and improve the quality of education.

The use of virtual reality in tourism education is limited and mainly focused on language learning or as a guiding tool. The technology available in the tourism academic field is limited to reservation systems. The curriculum must adequately prepare professionals to utilize technology for new ways of communicating tourism with consumers.

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