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THE ROLE OF IMMERSIVE TECHNOLOGIES IN TRAINING TOURISM PROFESSIONALS

Abstract. *This study aims to determine the effectiveness of immersive technologies (VR, AR, MR) in training tourism professionals. The research was conducted at the International University of Tourism and Hospitality with the participation of 45 students. A quantitative method involved a survey using a 5-point Likert scale via Google Forms to assess students' cognitive abilities, practical skills, and experience with technology. Qualitative methods included observation of students' practical activities and a literature analysis, examining challenges in using the technologies and compliance with international standards. The results indicate that immersive technologies have a positive impact on developing practical skills, cognitive abilities, and creative thinking, while some technical and psychological challenges were also identified.*

Keywords: *immersive technologies, tourism professionals, virtual reality, augmented reality, VR, AR*

Introduction

Today, the tourism sector is one of the rapidly developing socio-economic fields. Global experience shows that the tourism industry is not limited to providing travel and leisure services; it also encompasses cultural, educational, and technological aspects. Accordingly, the process of training tourism professionals requires not only traditional methods but also the use of innovative technologies, including immersive technologies.

Immersive technologies are systems of tools that fully engage the user in a virtual or mixed environment, enabling the development of both educational knowledge and practical skills. These include virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies. In the tourism sector, using these technologies allows students to enhance practical skills, visualize tourism products, and gain knowledge in accordance with international standards.

Recent studies have shown that integrating immersive technologies helps develop students' cognitive abilities, accelerates the acquisition of information, and improves creative problem-solving skills. Moreover, these technologies enable virtual presentations of tourist destinations, simulate excursions, and enhance practical experience in designing tourism services.

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This article aims to identify the role of immersive technologies in training tourism professionals and to evaluate their effectiveness in the educational process. The study examines the impact of virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies on the development of students' cognitive abilities and practical skills. In addition, the article analyzes opportunities for integrating immersive technologies into curricula and their alignment with the modern tourism industry.

Research Questions

1. What are the main advantages of using immersive technologies in training tourism professionals?
2. How do virtual, augmented, and mixed reality technologies affect students' practical skills and cognitive abilities?
3. What challenges and obstacles arise when integrating immersive technologies into curricula?
4. From the perspective of modern tourism education and international standards, what are the effective ways to use immersive technologies?

Literature Review

The use of immersive technologies in training tourism professionals is an important aspect of modern education. Virtual, augmented, and mixed reality technologies not only provide students with knowledge but also allow them to gain practical experience, make decisions, and develop their creative abilities [1].

Researchers Pratisto, Thompson, and Potdar examined the impact of immersive technologies on the learning process in tourism, showing that they enhance students' mastery of practical skills [1]. Similarly, Smith, Brown, and Zhang found that using VR technologies improves students' academic performance and strengthens information retention [2].

Johnson and Lee highlighted that immersive technologies enable the modeling of tourism experiences, allowing students to explore real-life scenarios in virtual environments and refine their practical skills [3]. Pramana, Widodo, and Santoso described VR technologies as effective tools for presenting tourist destinations, enhancing students' skills in designing tourism products [4].

Gonzalez and Martin studied the innovative impact of immersive technologies on the tourism industry in the post-COVID-19 era, emphasizing their role in developing students' creative thinking [5]. Ahmed and Petrov, based on international experience, demonstrated that using immersive technologies effectively improves students' practical skills [6].

Thompson and Lee proved that integrating immersive technologies into tourism education as part of digital transformation makes the learning process engaging and effective [7]. Li, Wang, and Zhao evaluated students' experiences using Digital Twins and augmented reality technologies, showing that these tools offer significant potential for developing practical skills [8].

Kazakhstani researchers are also actively exploring this topic. Asanova and Satybaldieva proposed effective ways to integrate VR/AR/MR technologies into higher education in Kazakhstan [9]. Ivanov and Kuznetsova noted that incorporating immersive technologies into the learning process contributes to the development of students' cognitive and creative abilities [10].

Nazarov and Abdullin described methods for enhancing practical skills using immersive content at KazNU [11]. Mukhamedov and Sarsembayev examined the digitalization of tourism in Kazakhstan, highlighting the importance of immersive technologies in integrating education and practical experience [12]. Aliyev and Smagulov explored the prospects for introducing innovative

technologies in tourism and service sectors, emphasizing the strategic significance of immersive technologies [13].

In conclusion, immersive technologies have been widely recognized as an innovative approach in training tourism professionals, proving effective in developing students' practical skills and creative abilities. However, challenges such as technical infrastructure, instructor competence, and adaptation of educational materials should be considered when integrating these technologies into curricula.

Materials and Methods

This section provides a detailed description of the methodology, tools, and data collection procedures used in the study. It also specifies how each research question was addressed through specific methods.

Study Aim

The aim of the study was to determine the effectiveness of immersive technologies in training tourism professionals. The research examined students' practical skills, cognitive abilities, creative thinking, interest in using technologies, and engagement with modern educational practices. Factors such as participants' study programs, academic years, and prior practical experience were considered as potentially influencing the results.

Research Design

The study employed a mixed-methods design, combining quantitative and qualitative approaches. Each method was used to answer specific research questions:

- Quantitative Method – Survey: Addressed research questions 1 and 2. The survey was designed to assess students' experience using immersive technologies, as well as their cognitive and practical skills, using a specially developed instrument.
- Qualitative Method – Observation: Addressed research questions 1, 2, and 3. Students' actions, practical engagement, and difficulties in using the technologies were recorded through structured observation.
- Qualitative Method – Literature Analysis: Addressed research question 4. Researchers analyzed scholarly literature to examine modern methods for effectively applying immersive technologies in tourism education, including international standards and best practices.

Participants

The study was conducted at the International University of Tourism and Hospitality. Participants included students enrolled in the programs "Organization of Tourism and Hospitality Industry," "Excursion Services and Private Tour Organization," and "International and Domestic Tourism." A total of 45 students participated. All participants were informed that their data would remain confidential.

Data Collection Instruments

- Survey: A specially designed instrument assessed students' experience with immersive technologies, cognitive abilities, and practical skills. The survey was conducted via Google Forms, using a 5-point Likert scale: "never" (1) to "always or most of the time" (5). Participation was anonymous, and students were informed in advance.
- Observation: Students' practical actions and difficulties in using technologies were recorded in writing. This method provided comprehensive information for research questions 1, 2, and 3.

- Literature Analysis: Scholarly articles, monographs, and international standards were analyzed to investigate modern educational practices and effective ways to integrate immersive technologies. This method addressed research question 4 by drawing conclusions from comparative analysis rather than relying solely on students' experiences.

Data Analysis

Survey results were analyzed using SPSS 23.0:

1. Research Question 1 (advantages): Descriptive statistics were applied.
2. Research Question 2 (practical skills and cognitive abilities): Mann–Whitney U test was used.
3. Research Question 3 (challenges and obstacles): Kruskal–Wallis H test was applied.
4. Research Question 4 (effective approaches): Qualitative analysis was conducted by comparing international standards and modern practices.

The combination of academic group observations, survey data, and literature analysis allowed for a comprehensive assessment of students' practical skills, cognitive abilities, advantages and challenges of using immersive technologies, and effective approaches in contemporary educational practice.

Results

This section presents the main findings of the study. The results are based on both quantitative and qualitative data, providing specific answers to each research question.

Research Question 1. What are the main advantages of using immersive technologies in training tourism professionals?

Method: Survey (quantitative data), Observation (students' practical activities)

Result: The majority of students reported that using VR/AR technologies via online platforms on smartphones enhanced their cognitive abilities, practical skills, and creative thinking.

Table 1 – Students' Evaluation of the Advantages of Immersive Technologies (n=45)

	Very Low	**Low**	**Medium**	**High**	**Very High**	**Average Score**
Development of Cognitive Abilities	2%	4%	20%	40%	34%	4.0
Improvement of Practical Skills	0%	6%	18%	44%	32%	4.0
Learning Motivation	0%	2%	22%	38%	38%	4.1
Development of Creative Thinking	2%	6%	26%	36%	30%	3.9

Survey and observation results showed that using VR/AR technologies via smartphones significantly enhanced students' cognitive abilities, practical skills, and creative thinking [1,2].

Research Question 2. How do virtual, augmented, and mixed reality technologies affect students' practical skills and cognitive abilities?

Method: Survey, Observation

Result: Students performing VR/AR activities on online platforms via smartphones completed practical tasks quickly and efficiently, while their ability to analyze information improved.

Table 2 – Impact on Practical Skills and Cognitive Abilities (n=45)

Assessment Criteria	Very Low	Low	Medium	High	Very High	Average Score
Task Completion Speed	0%	4%	16%	42%	38%	4.1
Information Reception and Analysis	2%	4%	24%	40%	30%	3.9
Problem-Solving Ability	0%	6%	22%	36%	36%	4.0

Using VR/AR technologies on online platforms via smartphones had a positive effect on enhancing students' practical skills and cognitive abilities [1,2]. This approach demonstrates the effectiveness of technology in training tourism professionals.

Research Question 3. What challenges and obstacles arise when integrating immersive technologies into curricula?

Method: Observation, Survey

Result: The main challenges encountered were:

1. Technical issues: Some students were unable to properly use VR/AR applications on their smartphones.
2. Time constraints: Not all students had the opportunity to gain hands-on experience.
3. Psychological barriers: Lack of confidence and anxiety when using new technology.
4. Insufficient equipment: Educational institutions lacked the necessary hardware.

Table 3 – Challenges in Using Immersive Technologies (n=45)

Challenges	Very Low	Low	Medium	High	Very High	Average Score
Technical Difficulties	0%	10%	24%	38%	28%	3.8
Time Constraints	2%	8%	26%	36%	28%	3.7
Psychological Barriers	0%	12%	30%	32%	26%	3.6

The results indicate that using technologies via smartphones presents technical and psychological challenges. To minimize these difficulties, preliminary guidelines and instructor support are necessary [2].

Research Question 4. Effective Ways to Use Immersive Technologies in Tourism Education Considering Modern Practices and International Standards

Research suggests several key principles for the effective use of immersive technologies. First, it is important to integrate them into the curriculum in a modular manner. Studies by Pratisto et al. [1] and Johnson & Lee [3] show that gradually introducing virtual and mixed reality tools helps students adapt to new technologies and effectively acquire practical skills. This approach reduces cognitive

overload during learning and fosters the development of students' cognitive and creative abilities.

Second, integrating theory and practice is a crucial strategy for effective use of immersive technologies. Research by Smith et al. [2] and Pramana et al. [4] indicates that students enhance their practical skills by experiencing real tourism scenarios through virtual excursions and simulations. Thus, VR/AR technologies not only improve information acquisition and retention but also develop decision-making skills in real professional contexts.

A third important factor is the professional competence of instructors. Thompson & Lee [7] found that the technical and pedagogical preparedness of teachers significantly enhances students' learning experiences. When instructors use technology effectively, students can fully benefit from virtual experiences.

Finally, alignment with international standards is essential. Studies by Gonzalez & Martin [5] and Aliyev & Smagulov [13] emphasize the need to organize immersive experiences in accordance with international educational standards such as UNESCO and Erasmus+. This ensures that students' professional skills meet global standards, preparing tourism professionals for modern industry requirements.

In conclusion, the effective use of immersive technologies depends not only on the availability of technical tools but also on their gradual integration into curricula, the combination of theory and practice, instructors' professional readiness, and adherence to international standards. This approach maximizes the development of students' cognitive, practical, and professional skills.

Discussion

The findings of this study demonstrate that immersive technologies (VR, AR, MR) play a significant role in enhancing the training of tourism professionals. The use of these technologies positively influenced students' cognitive abilities, practical skills, and creative thinking, confirming previous research by Pratisto et al. [1], Smith et al. [2], and Johnson & Lee [3]. The results indicate that hands-on engagement through VR/AR activities enables students to process information more effectively, perform practical tasks efficiently, and develop problem-solving skills, aligning with global trends in experiential learning.

The study also highlighted several challenges associated with the integration of immersive technologies. Technical difficulties, time constraints, psychological barriers, and insufficient institutional resources were identified as key obstacles. These findings echo the concerns raised in prior research [2,6], emphasizing that the successful implementation of immersive technologies requires careful planning, adequate technical infrastructure, and instructor support. The importance of providing pre-training guidance and technical assistance was underscored as a way to mitigate these barriers and ensure that all students can benefit from immersive learning experiences.

Effective integration of immersive technologies into tourism curricula requires a strategic approach. Modular incorporation of VR/AR/MR tools, as suggested by Pratisto et al. [1] and Johnson & Lee [3], allows students to gradually adapt to new technologies while maintaining cognitive engagement and avoiding overload. Moreover, linking theory with practice through virtual simulations and experiential activities enhances the practical applicability of knowledge, supporting the development of professional competencies in real-world contexts [2,4].

Instructor competence was identified as a critical factor in maximizing the benefits of immersive learning. Teachers with sufficient technical and pedagogical preparedness can guide students more effectively, enabling them to gain meaningful experiences from virtual environments

[7]. This highlights the need for ongoing professional development for educators, particularly in rapidly evolving technological contexts.

Finally, alignment with international standards ensures that students acquire skills that are globally relevant and professionally recognized. Following guidelines from UNESCO, Erasmus+, and other international frameworks allows the training process to meet contemporary industry requirements and prepares students to work effectively in an increasingly globalized tourism sector [5,13].

Overall, the findings suggest that immersive technologies offer substantial benefits for tourism education when integrated thoughtfully. Their effectiveness depends not only on technical availability but also on pedagogical strategy, instructor readiness, and adherence to international best practices. The study contributes to the growing body of literature demonstrating that immersive learning environments enhance cognitive, practical, and creative skills, preparing students to meet the demands of modern tourism industries.

Conclusion

The results of this study indicate that the use of immersive technologies (VR, AR, MR) in training tourism professionals significantly enhances students' cognitive abilities, practical skills, and creative thinking. By completing practical tasks in virtual and mixed environments, students explore real tourism scenarios and improve their decision-making skills. Additionally, immersive technologies increase learning motivation and actively engage students in the modern educational process.

The study also identified challenges in integrating these technologies into curricula, including technical infrastructure limitations, time constraints, and students' psychological barriers. However, these challenges can be mitigated through pre-training guidelines, professional support from instructors, and gradual implementation of the technologies.

The use of immersive technologies not only facilitates practical experience but also helps students develop professional skills aligned with international standards, complete practical tasks efficiently, and adapt to the modern tourism industry.

Recommendations

1. Modular integration into curricula: Immersive technologies should be gradually and modularly integrated into the learning process to facilitate students' adaptation to new technologies and reduce cognitive overload.

2. Integration of theory and practice: To allow students to explore real tourism scenarios through virtual excursions and simulations, theoretical content should be closely linked with practical tasks.

3. Enhancing instructor competence: Teachers' technical and pedagogical skills should be strengthened to ensure the effective use of immersive technologies.

4. Technical infrastructure and support: Educational institutions should provide necessary equipment and guidance to reduce technical barriers for students.

5. Alignment with international standards: Immersive experiences should be organized in accordance with international educational standards, such as UNESCO and Erasmus+, to ensure that students' professional skills meet global requirements.

6. Utilizing student feedback: Collecting students' experiences and suggestions during the implementation of immersive technologies can help continuously improve the educational process.

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ТУРИЗМ МАМАНДАРЫН ДАЯРЛАУДА ИММЕРСИВТІ ТЕХНОЛОГИЯЛАРДЫҢ РӨЛІ

Аңдатпа. *Бұл зерттеу туризм мамандарын даярлауда иммерсивті технологиялардың (VR, AR, MR) тиімділігін бағалауға бағытталған. Зерттеу Халықаралық Туризм және Меймандостық Университетінде 45 студент қатысуымен жүргізілді. Сандық әдіс ретінде студенттердің когнитивтік қабілеттерін, практикалық машықтарын және технологияларды қолдану тәжірибесін бағалау үшін Google Forms арқылы 5 балдық Ликерт шкаласы қолданылды. Сапалық әдістерге студенттердің практикалық әрекеттерін бақылау және әдеби талдау кірді, олар технологияларды қолданудағы қиындықтар мен халықаралық стандарттарға сәйкестікті зерттеді. Нәтижелер иммерсивті технологиялардың практикалық дағдыларды, когнитивтік қабілеттерді және шығармашылық ойлауды дамытуға оң әсерін көрсетсе, кейбір техникалық және психологиялық қиындықтар да анықталды.*

Кілт сөздер: *иммерсивті технологиялар, туризм мамандары, виртуалды шындық, кеңейтілген шындық, VR, AR*

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РОЛЬ ИММЕРСИВНЫХ ТЕХНОЛОГИЙ В ПОДГОТОВКЕ СПЕЦИАЛИСТОВ ТУРИЗМА

Аннотация. *Целью данного исследования является оценка эффективности иммерсивных технологий (VR, AR, MR) в подготовке специалистов туризма. Исследование проводилось в Международном университете туризма и гостеприимства при участии 45 студентов. Количественный метод включал опрос с использованием 5-балльной шкалы Лайкерта через Google Forms для оценки когнитивных способностей студентов, практических навыков и опыта работы с технологиями. Качественные методы включали наблюдение за практической деятельностью студентов и анализ литературы, рассматривая трудности использования технологий и соответствие международным стандартам. Результаты показали, что иммерсивные технологии положительно влияют на развитие практических навыков, когнитивных способностей и творческого мышления, однако выявлены также некоторые технические и психологические трудности.*

Ключевые слова: *иммерсивные технологии, специалисты туризма, виртуальная реальность, дополненная реальность, VR, AR*