

D.R. Akhmetova, T.V. Pitirimova*, S.A. Beiskhanova, N.E. Nessipbaeva

NJSC "Karaganda Technical University named after Abylkas Saginov", Karaganda, Kazakhstan
(*Corresponding author email: 26061984@mail.ru)

¹ORCID 0000-0003-2149-3353

²ORCID 0009-0008-1296-3740

³ORCID 0000-0003-2281-8914

⁴ORCID 0000-0002-7042-5122

Virtual reality as a pedagogical tool to increase the effectiveness of ESP teaching

In modern education, the relevance of the search for new teaching methods is emphasized by the growing interest in effective approaches. Virtual reality (VR) is gaining attention as a potential tool for providing immersive learning environments. The purpose of the study is to explore the possibilities of using VR in teaching English for Specific Purposes. An analysis of existing ESP VR courses was carried out and new ones were developed, taking into account professional characteristics. The influence of VR on students' motivation and performance was studied. The results confirm the effectiveness of VR in teaching ESP, allowing students to immerse themselves in a professional environment, practice skills in a safe environment and increase motivation to learn the language. The study makes a valuable contribution to the exploration of VR capabilities in ESP and may be useful for the development of educational programs. Research methods include literature analysis, questionnaires and testing, and a pedagogical experiment comparing the effectiveness of teaching using VR and traditional methods. The practical significance of the work is expressed in the development of specific tools — VR courses and exercises that help increase the efficiency of ESP learning and a deep understanding of the material by students.

Keywords: innovations in education, new teaching methods, immersive environment, virtual reality (VR), VR ESP courses, VR exercises, educational programs, students' motivation.

Introduction

In recent years, virtual reality has become widely used in education as it provides new learning opportunities and improves teaching effectiveness. VR, a cutting-edge computer technology, facilitates users' immersion and interaction within virtual environments in real time, as elucidated by Calvert [1; 159]. The burgeoning body of research, exemplified by the works of Chang [2; 256], underscores the profound impact of VR utilization in teaching English for Specific Purposes (ESP), wherein discernible enhancements in learning efficacy are observed.

VR engenders experiential learning by enabling students to engage in simulated scenarios reflective of real-life contexts, thereby affording them immersive opportunities to hone their communicative competencies through practical application. Such pedagogical innovation not only fosters active participation but also cultivates a dynamic learning environment conducive to comprehensive skill development.

Amid the burgeoning interest in integrating Virtual Reality (VR) into educational environments, there is a conspicuous scarcity of research regarding its implementation in the domain of English for Specific Purposes (ESP) pedagogy. The selection of this research topic is underpinned by multifaceted considerations. Firstly, the paramount significance of this study is underscored by the conspicuous absence of scholarly inquiry in this domain. Secondly, insights gleaned from the works of predecessors, such as Makransky [3; 232], elucidate the inherent limitations of extant developments, which predominantly concentrate on generic language acquisition, neglecting the nuanced vocational dimensions inherent to English language learning. Such lacunae starkly delineate the imperative for robust investigation in this specialized area of inquiry.

The third rationale revolves around both the theoretical and practical significance inherent in the chosen topic. Establishing a robust theoretical framework for the integration of VR in ESP instruction emerges as an urgent imperative, particularly in light of the rapid advancements witnessed in technological realms. Conversely, the pragmatic importance lies in the formulation of methodological guidelines and VR-based course materials that can be readily deployed within educational settings. These dual imperative underscores the exigency of scholarly inquiry aimed at bridging theoretical constructs with actionable pedagogical strategies, thereby facilitating the seamless integration of VR technologies into ESP instruction.

Within the contemporary educational landscape, an escalating demand surfaces for efficacious methodologies in the instruction of language tailored for specific purposes. Virtual Reality (VR) emerges as a potent avenue, offering a conduit to fabricate immersive learning environments that intricately mirror real-world contexts and scenarios germane to distinct domains of expertise. Consequently, the incorporation of VR technology into the pedagogy of English for Specific Purposes (ESP) bears profound theoretical underpinnings and tangible practical ramifications. It stands poised to furnish students with the requisite linguistic proficiencies indispensable for navigating and excelling within their respective professional milieus.

The focal point of inquiry delves into the utilization of virtual reality within the realm of English instruction tailored for specific purposes. The crux of the investigation revolves around gauging the efficacy of integrating VR technologies into the educational framework of ESP. The overarching aim of this study is to substantiate the assertion positing that the integration of virtual reality in the ESP pedagogical milieu augments learning efficiency whilst fostering the development of students' linguistic proficiencies. Moreover, the study endeavors to formulate methodological guidelines aimed at optimizing the utilization of VR to enhance the effectiveness of ESP instruction. To this end, a multifaceted approach is adopted, delineating several delineated tasks: conducting an exhaustive analysis of extant research within the spheres of VR in education and ESP; discerning the nuanced characteristics underpinning the integration of VR within ESP contexts; crafting VR-centric courses and exercises tailored to the exigencies of ESP; orchestrating a pedagogical experiment to gauge the impact of VR on the efficacy of ESP instruction; and culminating in the formulation of comprehensive methodological recommendations aimed at optimizing the integration of VR technologies within the ESP educational paradigm.

The research methodology adopted encompasses a comprehensive framework, incorporating literature analysis, development of VR-infused courses and exercises, execution of a pedagogical experiment, and subsequent analysis of garnered results. The authors propose that the integration of VR into ESP instruction heralds an era of heightened student motivation, bolstered learning outcomes, and the fostering of adept language proficiencies.

This study employs a judicious fusion of competency-based and activity-oriented approaches, facilitating a nuanced and exhaustive exploration of the intricacies surrounding the incorporation of VR technologies in ESP pedagogy. The significance of this research lies in its offering of customized guidance for ESP educators and the simultaneous development of pioneering methodological frameworks aimed at leveraging modern technologies in the educational landscape.

Materials and methods

For the execution of this study, specialized VR equipment was requisitioned, comprising a virtual reality headset, controllers, and a computer outfitted with requisite software. The VR headset serves as the conduit through which users are seamlessly immersed within a virtual realm, as explicated by Miranda [4; 85], wherein interaction is facilitated through the utilization of controllers. Notably, bespoke software was employed in the creation of the virtual environment, affording the creation of interactive scenarios and tasks tailored to the unique requirements of students.

Central to the investigative endeavor was the overarching research inquiry: "In what manner can the integration of virtual reality augment the efficacy of ESP instruction?"

The research unfolded across distinct phases, delineated as follows:

1. Preparatory phase: a comprehensive review study delved into the thematic landscape, scrutinizing extant methodologies governing the pedagogy of ESP. Fundamental tenets to inform the subsequent investigation were delineated through this preliminary exploration.
2. Development of learning materials: building upon the insights garnered, bespoke learning materials were meticulously crafted for deployment within the VR milieu. These materials encompassed a diverse array of activities, games, and scenarios meticulously tailored to furnish students with immersive opportunities for honing their English language proficiencies within a lifelike virtual realm.
3. Instruction within a VR environment: the cohort of students was bifurcated into two distinct groups: one cohort partook in conventional classroom instruction, while the other engaged in immersive learning experiences facilitated within a VR setting. Sessions conducted within the VR environment encompassed a spectrum of tasks meticulously curated to foster the cultivation of reading, writing, speaking, and listening proficiencies. These sessions were meticulously structured to instigate proactive engagement amongst students, as elucidated by Rodriguez [5], with a pronounced emphasis on fostering interaction within the virtual milieu.

4. Data collection and analysis: data acquisition ensued throughout the instructional sessions, comprising student grades, test results, and feedback garnered via questionnaires. Subsequent to the collection, a meticulous analysis of these data ensued, employing statistical methodologies to discern the efficacy of VR integration within ESP pedagogy.

The study was underpinned by the following methodological approaches:

1. Comparative methodology: the investigation was structured as an experimental endeavor, wherein one cohort of students underwent instruction in a traditional classroom setting, while another cohort engaged in immersive learning within a VR environment. This methodological design facilitated a comparative analysis, elucidating the relative effectiveness of the two instructional modalities.

2. Methods of data collection encompassing:

A) Survey methodology: students were administered questionnaires to ascertain various facets such as their motivational levels, comprehension, retention of material, and overall satisfaction with the instructional sessions conducted within the VR environment.

B) Testing procedures: students underwent comprehensive assessments aimed at gauging their proficiency in English language knowledge and skills subsequent to participating in classes within both traditional and VR settings. The outcomes of these assessments served as pivotal indicators in evaluating the efficacy of each instructional modality.

C) Scholarly findings attest to the transformative impact of integrating virtual reality within ESP pedagogy, underscoring marked enhancements in learning efficacy. Notably, students immersed within the VR milieu exhibited heightened motivation levels, augmented comprehension and retention of material, and attained superior test scores compared to their counterpart's undergoing instruction through traditional means.

The integration of virtual reality (VR) into the English for Specific Purposes (ESP) classroom emerges as a potent pedagogical instrument, heralding transformative implications. VR technology affords the creation of immersive, true-to-life scenarios and tasks that not only serve to engender student motivation but also facilitate enhanced comprehension and retention of instructional material. The findings gleaned from the study resoundingly affirm the efficacy of VR utilization within the ESP educational milieu, delineating a discernible augmentation in learning efficiency and resultant improvements in student outcomes.

Results and discussions

This section of the research manuscript presents the results and in-depth analysis of a study on the application of virtual reality (VR) in English for Special Purposes (ESP) pedagogy. The main results and their comprehensive discussion are presented here along with the conclusions drawn from the study.

The results clearly show that the use of virtual reality in ESP lessons significantly increases the effectiveness of the educational process. Virtual reality technology creates an immersive environment in which students can immerse themselves in real-world scenarios and contexts relevant to their respective fields of study. This immersion facilitates deep learning, promotes memorization, and catalyzes the development of practical skills.

An immersive environment is a space in which the user is completely immersed in a virtual world and has the feeling of being present in that space. This heightened state of immersion is facilitated by the use of advanced technologies such as virtual reality (VR) or augmented reality (AR), in which the user interacts with virtual elements and the environment using specialized devices such as VR or AR headsets.

In the context of a technical university, an immersive environment has many advantages for teaching English for Special Purposes (ESP). Let's look at some of these benefits, as shown in Table 1:

Table 1

Benefits of immersive ESP learning at a technical university

Use	Description	Examples
Practical experience without risk.	Students can practice safely in a virtual environment, improving their skills without fear of the consequences of making mistakes in real life.	Virtual operations , experiments with machines
Visualization of complex concepts	3D models of technical systems and production processes make abstract concepts more clear and understandable.	3D models , Visualization of complex concepts
Interactive simulators	Virtual experiments, tasks and assignments related to the future profession deepen the understanding and memorization of the material through interaction with the virtual environment.	Virtual experiments , interactive simulators

Use	Description	Examples
Adaptive learning scenarios	The virtual environment, which changes based on student actions, allows learning to be tailored to students' level of knowledge and needs.	Adaptive learning scenarios
Interdisciplinary education	Students from diverse technical backgrounds work together and solve complex problems to develop teamwork, communication and critical thinking.	Interdisciplinary learning

The integration of immersive learning environments in a technical university promises to significantly improve the teaching of English for Special Purposes (ESP) by providing students with in-depth knowledge and pragmatic skills in their respective fields of study.

As a culmination of the investigation, the following principal deductions have been formulated:

1. Proficiency in subject matter: individuals subjected to Virtual Reality (VR) training exhibited markedly superior levels of comprehension in contrast to their counterparts undergoing conventional pedagogical methodologies. Substantiation lies within the examination outcomes, where the VR-trained cohort evidenced substantially higher mean scores. Specifically, the average examination score among VR-trained participants soared to 85 %, contrasting starkly with the control group's 70 % — a discrepancy indicating a more profound assimilation of the curriculum by the VR-trained cohort. Notably, students immersed in VR simulations tailored to their specialized domains experienced heightened engagement. For instance, in the realm of mechanical engineering, they actively engaged in virtual enactments involving the design and assembly of machinery within simulated factory settings. Such immersive experiences facilitated a nuanced comprehension of terminologies and operational processes intrinsic to mechanical engineering and manufacturing.

2. A notable observation pertains to the heightened motivational quotient discerned among students immersed in Virtual Reality (VR) compared to their counterparts deprived of such technological integration. Evidently, the former cohort exhibited a more pronounced proclivity towards the educational process, marked by heightened engagement in discussions and practical exercises. This phenomenon finds elucidation in the immersive affordances facilitated by VR technologies, rendering learning a more captivating and enjoyable endeavor. Notably, in post-virtual reality sessions, students within the experimental group demonstrated protracted engagement, willingly delving into additional scenarios and undertaking supplementary exercises. Such actions underscored an elevated level of student commitment and enthusiasm.

3. The efficacy of educational delivery in the domain of employing Virtual Reality (VR) for teaching English for Specific Purposes (ESP) within a technical university setting is contingent upon myriad factors, delineated comprehensively in Table 2:

Table 2

The influence of VR on the quality of ESP teaching in a technical university

Item	Description	Impact on the quality of training
Depth of understanding of the material	Virtual reality (VR) technologies allow students to immerse themselves in a three-dimensional (3D) environment and interact with virtual objects.	Visualization of abstract concepts and learning material interactively for a deeper and more holistic understanding.
Remembering information	Immersive environments create vibrant and memorable experiences.	Emotional involvement promotes better retention of material.
Knowledge consolidation	Interaction with virtual objects and scripts.	Promotes more effective consolidation of knowledge through practical application.
Application of knowledge in practice	Practice VR in realistic scenarios.	Develops professional skills and prepares for work in real conditions.
Student motivation	An immersive environment that is more exciting and motivating.	Encourages active participation and increases motivation to study.
Achieving educational goals	Assessment is based on achievement of learning objectives and outcomes.	Allows you to evaluate success mastering the material and applying it in practice.

The effectiveness of training in the utilization of Virtual Reality (VR) for instructing English for Specific Purposes (ESP) within a technical university hinges upon various pivotal facets, including the thorough assimilation of the material, its retention, proficient practical application, student motivation, and the attain-

ment of educational objectives. A comparative analysis of our research outcomes vis-à-vis prior studies corroborates their substantive significance and innovative essence. Notably, investigations conducted by Lee and Low (2018) and Fox et al. (2020) echo the favorable repercussions of VR integration on language acquisition proficiency. Nevertheless, our study enriches these findings by introducing salient dimensions, such as tailored methodologies for evaluating learning outcomes and the formulation of specialized educational curricula tailored for VR-based training. For instance, students exposed to VR training exhibited heightened readiness to engage in English communication within professional contexts, facilitated by immersive simulations and role-playing exercises conducted within virtual environments.

Throughout the experimental investigation, a myriad of discernible outcomes surfaced:

1. The experimental cohort exhibited a markedly elevated proclivity towards English language acquisition compared to their counterparts in the control group, as delineated in Table 3.
2. Test outcomes unveiled that students within the experimental faction garnered superior scores relative to their peers in the control contingent, as delineated in Table 4.
3. The study of student reviews showed that English courses that use virtual reality are perceived predominantly positively, indicating their high value and effectiveness.

Table 3

Motivating students to learn English

Group	Average score
Experimental	4.8
Control	4.2

Table 4

Assessment students of ESP VR courses

Criterion	Average score
Interactivity	4.9
Visibility	4.8
Availability	4.7
Utilities	4.8

The depicted tables yield noteworthy insights:

Table 3 encapsulates the motivation levels of students in their pursuit of English language acquisition. Within the experimental cohort, an impressive average motivation rating of 4.8 emerged, denoting a robust enthusiasm towards mastering English through the immersive realm of VR technologies. Conversely, the control group exhibited a comparatively diminished average score of 4.2, hinting at a potentially subdued level of motivation amongst students relying on conventional pedagogical methodologies.

Table 4 provides an illuminating glimpse into students' perceptions regarding the ESP VR courses. Remarkably, the evaluation criteria of Interactivity, Visibility, Accessibility, and Usefulness garnered commendable ratings, with scores of 4.9, 4.8, 4.7, and 4.8 respectively. Such high appraisals unequivocally signify the students' contentment with the integration of VR technologies into ESP teaching, underscoring its efficacy and utility in enhancing the learning experience.

Table 4 delineates the criteria meticulously crafted through a synthesis of scholarly insights on virtual reality (VR) and ESP training, along with findings from prior research on VR technology in education [6]. These criteria were formulated with due consideration to students' perspectives gleaned from their participation in the study and VR courses. Their invaluable feedback, coupled with experiential insights, steered the development of these criteria, ensuring alignment with their practical experiences and expectations regarding the efficacy and quality of ESP VR courses. Furthermore, the criteria adhere to contemporary standards [7] and benchmarks for educational technologies, including virtual learning resources, to uphold stringent educational and quality norms. Drawing from a tapestry of scholarly discourse, expert viewpoints, student appraisals, and global quality standards, the evaluation criteria, meticulously expounded in Table 4, serve as a robust yardstick for assessing the effectiveness and quality of ESP courses leveraging VR technologies, resonating with both student sentiments and pedagogical innovation in educational realms.

Upon scrutinizing the amassed data, it is discernible that the integration of VR technologies into ESP pedagogy yields heightened student motivation and contentment with the learning trajectory. Evidenced by the commendable ratings across domains of interactivity, aesthetic allure, accessibility, and pragmatic utility, the efficacy of embedding VR technologies within the educational milieu is unequivocally affirmed.

The findings of the investigation substantiate the theoretical framework advocating for the advantageous ramifications of integrating VR technologies into ESP instruction. They evince that this approach engenders a heightened enthusiasm among students toward English acquisition, augments their proficiency levels in ESP, and fosters the cultivation of adeptness in professional language competencies.

In contrast to preceding inquiries, this study introduces the following novel contributions:

1. Development of methodologies and resources tailored for VR-based learning within the domain of engineering education. Bespoke educational modules have been meticulously crafted to enhance the acquisition of specialized language proficiencies pertinent to ESP in engineering (Table 5).

Table 5

VR learning techniques and tools for technical training

Name of techniques and tools	Description	Example
1. Virtual laboratories and simulations	Creation of VR simulations that simulate real technical processes.	VR simulators for assembling and testing electronic devices
2. VR exercises with technical tasks	Development of VR exercises aimed at solving problems in a specific field of technology.	VR tasks on calculations and modeling of structures
3. VR scenarios of professional communication	Development of VR simulations that simulate professional situations and communication tasks.	VR situations of interaction with colleagues and clients
4. VR conferences and presentations	Creation of VR simulators of conferences and presentations, allowing students to practice speaking and public speaking skills.	VR conferences with reports and discussions of technical issues
5. VR projects and assignments	Creation of VR projects and assignments focused on the practical application of knowledge in a specific technical area.	VR software development projects with English-speaking clients
6. VR teamwork training	Development of VR exercises aimed at developing teamwork and collaboration skills.	VR simulation of the design and development of complex technical systems
7. VR courses and trainings	A combination of theoretical and practical modules in VR courses, providing a comprehensive study of the discipline.	VR courses in electrical engineering with theory and practice
8. VR exams and assessments	Creation of VR exams and assessment tasks that allow you to objectively assess the knowledge and skills of students.	VR exams in mechanics with answers to questions and completion of tasks

The incorporation of virtual reality modules and exercises stands poised to greatly facilitate technical university students in effectively honing their English language proficiencies tailored to their professional spheres, thereby equipping them for prospective engagements in an international milieu. This targeted pedagogical approach meticulously aligns with the requisites and nuances inherent to their vocational pursuits.

Furthermore, the article furnishes recommendations delineating the deployment of VR technologies in ESP instruction. It delineates cardinal principles and prescriptive insights aimed at optimizing the efficacy of virtual reality (VR) tools in the realm of teaching English for Specific Purposes (ESP), as delineated in Table 6.

Table 6

Guidelines for the Implementation of Virtual Reality Technologies in English for Specific Purposes

Suggestion	Description	Examples
1. Integration of VR technologies	Systematic integration of VR technologies into the educational process in order to create a more interactive and exciting environment for ESP learning.	Development and use of VR simulations to develop professional skills in various areas of ESP. Creation of VR courses and modules integrated into existing ESP programs. Implementation of VR applications for teaching vocabulary, grammar and other aspects of the language.

Continuation of Table 6

Suggestion	Description	Examples
2. Adaptation of content	Careful adaptation of the ESP course content and materials to the virtual environment, taking into account the specifics of VR learning.	Creation of VR environments that maximally imitate real professional situations. Development of VR tasks based on authentic materials, relevant to ESP learners. Adaptation of texts, audio and video materials for the VR format, taking into account the peculiarities of information perception in the VR environment.
3. Interactivity and visibility	Active use of VR technologies to create interactive and visually attractive materials that promote deeper and more durable learning.	Providing the ability to interact with virtual objects and characters to practice communication skills. Visualize complex concepts and abstract concepts using VR tools. Using VR games and simulations to provide playful learning, making the process more fun.
4. Personalisation and adaptability	Development of VR training scenarios that take into account the individual characteristics and needs of each student.	Adjust the difficulty, speed of learning and exercises in the VR environment according to your skill level and learning style. Adaptation of VR content to the individual goals and objectives of each student. Creation of personal VR learning routes taking into account interests and abilities.
5. Rating and reviews	Using VR technologies to assess academic performance and provide feedback to students.	Development of VR tests and simulations to assess language skills and professional competencies. Creation of VR games and exercises with an automated assessment system. Providing students with personalized feedback based on the results of VR training.
6. Collaborative learning	Using VR technologies to organize collaborative learning and carry out joint tasks and projects.	Assigning virtual teams to perform VR tasks that require collaboration and teamwork. Ensuring communication and collaboration in virtual groups. Development of teamwork skills in a VR environment.
7. Multimedia capabilities	Using VR technologies to create attractive and memorable materials, enhancing the learning experience.	Use of virtual video, audio, graphics and other media elements. Creation of VR presentations and interactive lectures. Development of VR museums and virtual exhibitions.
8. Expanding boundaries	Using VR technologies to expand the boundaries of ESP learning and provide students with new opportunities.	Creation of VR trips to English-speaking countries for immersion in the linguistic and cultural environment. Development of VR excursions to enterprises
9. Interactive scenarios	VR technologies are used to create realistic and practical learning situations	Virtual simulations of professional tasks
10. Research and development	Continued research and development in the field of VR technologies for ESP	Optimization of teaching methods, development of new scenarios and materials

These recommendations draw upon the prevailing currents in educational paradigms, technological advancements, and scholarly inquiry pertaining to the integration of virtual reality (VR) technologies in the educational milieu [8]. Their overarching objective is to refine the landscape of English for Specific Purposes (ESP) pedagogy, fostering heightened student engagement and motivation.

The findings of this research not only affirm previously established conclusions regarding the favorable impact of VR technologies on the educational domain but also proffer concrete recommendations for their effective integration into ESP instruction. These findings resonate with parallel investigations into the utilization of VR technologies in education, exemplified by studies such as those conducted by [9] and [10]. VR holds the potential to refine students' articulation, particularly within technical domains where precise pronunciation holds paramount importance. Moreover, the immersive nature of virtual reality affords students the opportunity to navigate intricate 3D structures, thereby cultivating cognitive and behavioral proficiencies.

The utility of this technology becomes particularly pronounced for students whose opportunities for real-world practice are limited. Specifically, engineering students stand to gain considerable advantages from the utilization of virtual environments to hone and refine their skill sets. Within these immersive realms, students can engage in virtual experiments and simulations that encompass a spectrum of technical processes, spanning from intricate engineering calculations to the design, assembly, and testing of devices. Notably, these simulations unfold within a safe and meticulously controlled setting, affording students the freedom to

explore diverse scenarios without the specter of equipment damage or physical harm looming overhead. The discourse herein delves into the pivotal role that practical skill acquisition plays in augmenting students' professional development.

Incorporating virtual reality (VR) into English for specific purposes (ESP) instruction necessitates careful consideration of its inherent limitations [11]. Of primary concern in this regard is the significant financial outlay necessitated for the procurement of VR equipment, a factor that could pose a hindrance to the widespread adoption of this technology. It is pertinent to underscore that many educational institutions and students may encounter financial constraints that hinder their access to the requisite VR hardware. Furthermore, the utilization of VR demands specialized software and content development, a multifaceted and costly endeavor.

Moreover, ensuring the effective integration of virtual reality (VR) into education mandates thorough preparation of both educators and learners, necessitating a substantial allocation of time and resources for comprehensive training and education initiatives.

Despite the aforementioned limitations, the findings and discussions of these studies underscore the potential efficacy of virtual reality (VR) in ESP pedagogy. VR furnishes pioneering tools that enable students to immerse themselves in authentic scenarios and hone practical competencies. Nonetheless, further investigation and advancement are imperative to surmount impediments concerning equipment accessibility and cost, as well as to furnish requisite training for both educators and learners.

Research endeavors have delved into the paramountcy of scrutinizing students' responses towards the integration of virtual reality (VR) in English for Specific Purposes (ESP) instruction. The findings elucidate that avant-garde pedagogical approaches, exemplified by VR, harbor the capacity to augment students' engagement and enthusiasm within the instructional milieu. The active participation and vested interest of students engendered through the utilization of VR can engender a more efficacious assimilation of educational content.

Furthermore, the harnessing of VR technology holds promise in enhancing students' communicative prowess. Immersive environments that replicate real-world interactions serve as conduits for fostering proficiency in English communication, encompassing the comprehension and application of idiomatic expressions, specialized jargon, and situational adaptation.

Notwithstanding, it is paramount to recognize the conceivable limitations entailed in the incorporation of virtual reality (VR) within ESP pedagogy. It has been noted that certain students may encounter discomfort or encounter challenges when engaging with VR equipment, notably if they contend with issues pertaining to mobility or sensory perception. Additionally, technical glitches inherent in hardware or software may also serve as impediments to the seamless integration of virtual reality into the educational landscape. It should also be noted that potential technical issues with hardware or software could pose a challenge to the successful integration of virtual reality technology in educational settings.

Conclusions

The study examined the effectiveness of virtual reality (VR) as a pedagogical tool to improve the effectiveness of English for Special Purposes (ESP) teaching. A comprehensive analysis of research results was conducted to assess the impact of VR on learning outcomes, student motivation, and overall quality of education. Using a mixed methods design that includes a literature review, VR-ESP course design, and experimental evaluation, the study confirmed the hypothesis of a beneficial impact of VR technology on students' motivation, performance, and professional language skills. The experiment showed that students who received VR-assisted instruction showed higher motivation, better understanding and memorization of the content, and better practical application of the acquired knowledge compared to the control group. The evaluation of the ESP-VR courses showed that students were satisfied with the use of this technological model.

These findings have important implications for educational development. Integrating VR into educational practice holds significant potential to improve student learning and engagement. The proposed methods for research and development of subject curricula using VR for ESP teaching are promising for practical application and contribute to the effectiveness of the teaching and learning paradigm.

Future research in this area could include a more nuanced examination of the long-term effects of VR implementation on educational outcomes, as well as the development of new methods and resources to optimally integrate this technology into the learning environment. Additionally, individualized studies targeting different learning environments and individual learner needs could further shed light on the diverse benefits of VR in education.

References

- 1 Calvert, J., & Abadia, R. (2020). Impact of immersing university and high school students in educational linear narratives using virtual reality technology. *Computers & Education*, 159–168.
- 2 Chang, Y.S., Chou, C.H., Chuang, M.J., Li, W.H., & Tsai, I.F. (2020). Effects of virtual reality on creative design performance and creative experiential learning. *Interactive Learning Environments*, 37–41.
- 3 Makransky, G., & Petersen, G.B. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): A Theoretical research-based model of learning in immersive virtual reality. *Educational Psychology Review*, 98–112.
- 4 Miranda, M., et al. (2019). Virtual Reality in ESP Training: A Case Study in Technical English. *Computer Assisted Language Learning*, 33(5-6), 522–538.
- 5 Rodriguez, A., & Lopez, C. (2018). Using Virtual Reality for Business English Teaching: Opportunities and Challenges. *TESOL Quarterly*, 52(2), 315–330.
- 6 Kaplan, A.D., Cruik, J., Endsley, M., Beers, S.M., Sawyer, B.D., Hancock, P.A. (2021). The Effects of Virtual Reality, Augmented Reality, and Mixed Reality as Training Enhancement Methods: A Meta-Analysis. *Hum Factors*, 63(4), 706–726.
- 7 DeJoy, D.F., & Horn, M.S. (2022). VR/AR Learning Standards: A New Framework for the Future of Education, 256–267.
- 8 Cai, H., & Wang, S. (2020). A meta-analysis of the effects of virtual reality on learning outcomes. *Educational Research Review*, 150–163.
- 9 Chen, Y., & Jang, S.J. (2021). A study on the effects of a virtual reality English learning system on students' English learning motivation and achievement. *Educational Technology & Society*, 130–143.
- 10 Diegmann, P., & Schüller, A. (2017). Virtual reality and education: Potentials and challenges. In C.J. Dede, M.C. Levin, & Teuteberg (Eds.). *The impact of emerging technologies on education*, 211 p.
- 11 Li, L., & Low, R. (2018). The Application of Virtual Reality Technology in English Teaching. *International Journal of Emerging Technologies in Learning (IJET)*, 184–192.

Д.Р. Ахметова, Т.В. Питиримова, С.А. Бейсханова, Н.Е. Несипбаева

Виртуалдық шындық ESP оқытудың тиімділігін арттыру педагогикалық құрал ретінде

Заманауи білім беруде оқытудың жаңа әдістерін іздеудің өзектілігі тиімді әдіс-тәсілдерге деген қызығушылықтың артуы маңызды. Виртуалды шындық (VR) иммерсивті оқу ортасын қамтамасыз етудің әлеуетті құралы ретінде назар аударады. Зерттеудің мақсаты — нақты мақсаттарға арналған ағылшын тілін оқытуда VR пайдалану мүмкіндіктерін зерттеу. Қолданыстағы ESP VR курстарына талдау жүргізілді, яғни кәсіби сипаттамаларды ескере отырып, жаңалары әзірленді. Студенттердің ынтасы мен үлгеріміне VR әсері зерттелді. Нәтижелер ESP оқытудағы VR тиімділігін растайды, бұл студенттерге кәсіби ортаға енуге, қауіпсіз ортада дағдыларды және тілді үйренуге деген ынтасын арттыруға мүмкіндік береді. Зерттеу ESP жүйесіндегі VR мүмкіндіктерін зерттеуге құнды үлес қосады және білім беру бағдарламаларын дайындау үшін пайдалы болуы мүмкін. Зерттеу әдістеріне әдебиеттерді талдау, сауалнамалар мен тестілеу, VR және дәстүрлі әдістерді қолдану арқылы оқытудың тиімділігін салыстыратын педагогикалық эксперимент жатады. Жұмыстың практикалық маңыздылығы нақты құралдарды, яғни VR курстары мен жаттығуларды әзірлеуде көрінеді, олар ESP оқытудың тиімділігін арттыруға және студенттердің материалды терең түсінуіне көмектеседі.

Кілт сөздер: білім берудегі инновациялар, оқытудың жаңа әдістері, иммерсивті орта, виртуалды шындық (VR), VR ESP курстары, VR жаттығулары, білім беру бағдарламалары, студенттердің мотивациясы.

Д.Р. Ахметова, Т.В. Питиримова, С.А. Бейсханова, Н.Е. Несипбаева

Виртуальная реальность как педагогический инструмент для повышения эффективности преподавания ESP

В современном образовании актуальность поиска новых методов обучения подчеркивается растущим интересом к эффективным подходам. Виртуальная реальность (VR) привлекает внимание как потенциальный инструмент для создания иммерсивной среды обучения. Цель исследования — изучить возможности использования виртуальной реальности при обучении английскому языку для специальных целей. Проведен анализ существующих курсов ESP VR и разработаны новые с учетом профессиональных особенностей. Изучалось влияние VR на мотивацию и успеваемость студентов. Результаты подтверждают эффективность VR в обучении ESP, позволяя студентам погрузиться в профессию.

нальную среду, практиковать навыки в безопасной среде и повысить мотивацию к изучению языка. Исследование вносит ценный вклад в изучение возможностей виртуальной реальности в ESP и может быть полезно для разработки образовательных программ. Методы исследования включают анализ литературы, анкетирование и тестирование, а также педагогический эксперимент с использованием VR и традиционных методов, при этом сравнивается эффективность обучения. Практическая значимость работы выражается в разработке конкретных инструментов — VR-курсов и упражнений, которые помогают повысить эффективность обучения ESP и глубокое понимание материала студентами.

Ключевые слова: инновации в образовании, новые методы обучения, иммерсивная среда, виртуальная реальность, курсы VR ESP, VR-упражнения, образовательные программы, мотивация студентов.

Information about the authors

Akhmetova, D.R. — Master of pedagogical sciences, Senior lecturer, Karaganda Technical University named after Abylkas Saginov, Karaganda, Kazakhstan; e-mail: *akhmetovadinara11@gmail.com*, ORCID ID 0000-0003-2149-3353

Pitirimova, T.V. (contact person) — Master of philological sciences, Teacher, Karaganda Technical University named after Abylkas Saginov, Karaganda, Kazakhstan; e-mail: *26061984@mail.ru*, ORCID ID 0009-0008-1296-3740

Beiskhanova, S.A. — Master of philological sciences, Senior lecturer, Karaganda Technical University named after Abylkas Saginov, Karaganda, Kazakhstan; e-mail: *saltanat.beiskhanova@gmail.com*, ORCID ID 0000-0003-2281-8914

Nessipbaeva, N.E. — Senior lecturer, Karaganda Technical University named after Abylkas Saginov, Karaganda, Kazakhstan; e-mail: *neesipbaeva@mail.ru*, ORCID ID 0000-0002-7042-5122