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An overview of research on augmented reality in education

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Abstract. To understand the role of introducing and improving the quality of education in higher education institutions using augmented reality (AR), the authors of the article tried to identify the following questions: What contribution can these technologies make to education? What are the results of research in the field of augmented reality? How do augmented reality technologies affect learning processes? In this article, we search the Scopus, Science Direct, and Web of Science databases for articles describing the use of augmented reality technologies in higher education and their impact on learning outcomes. We identified 150 articles, of which, after several stages of verification and selection, 29 articles were left at the extraction stage, from which 16 reviews and 13 empirical research articles containing a full review and presentation were extracted. The results of the research showed that 80% of the reviewed studies provide positive results in the field of STEM and physics, as there is a more improved visualization and representation of complex processes. Nevertheless, the effect of AR is poorly understood. The conducted research shows the potential for improving the quality of education through AR technology and presents opportunities for integrating them into the educational process.



Keywords: augmented reality, education, informatization process, research, review.



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Introduction

Having conducted research in advanced technologies used in education, at the moment the field of AR is one of the arouses interest to generation Z. They actively use “digital devices” in everyday life, are interested in science and technology. Often, thanks to them, the field of information technologies is developing rapidly, because they are actively using them in education. Undoubtedly, no one is surprised by the fact of using AR technology in the classroom, but how effective are they and is it really possible to improve the quality of education through them.

In this regard, there is a need to study this problem, the purpose of which is to analyze the results of scientific research and to identify whether the use of AR technology has a positive impact to the field of educational technology.

AR is a kind of combination of the physical and virtual world, objects in the form of computer graphics, texts, sounds, feedback. All this reveals the boundaries of our real understanding, helps us to better understand the processes taking place, being inside them, as it were.

The modern education of young people is brought up on the principles of mobile learning, because it is not new for them to perceive information through digital devices. In addition, most students are visual, that is, they perceive information only visually. Based on these principles, modern learning technology is promising and relevant, but whether this is actually the case to determine this hypothesis is the main task of our study. The use of AR in educational fields is on the rise as the technology can be useful in education, such

as teaching which is difficult for students to comprehend in writing or conducting experiments that have risk factors or high costs. As a result, the teaching method using AR technology is gradually expanding with the advantage of increasing immersion in learning and direct interaction with students. This technology aroused a very strong interest in South Korea [1]. Perception of some augmented reality applications used in the course of social education and the joint course of social work and social education at Pablo de Olavide. Seville (Spain) is that the use of this technology in psychosocial treatment can help social professionals hone their competencies and, at the same time, increase support and improve treatment of some of the aspects identified in these risk groups [2]. Interest in learning, as well as the effectiveness of application in physics lessons, was caused by a mobile application used at Kharkov National Education, in the development and formation of student's basic ideas about electric meters [3]. A pilot survey on student perceptions of augmented reality showed positive feedback on the augmented reality app in terms of increasing awareness, learning, understanding and engagement when learning chemistry. Education organizations, such as in South Africa, have educational programs that require students to have significant experience as part of their academic component [4]. A survey and analysis of the results of Hong Kong educational organization showed a generally positive assessment and satisfactory results when using AR software. As described in this article, the results of the study showed that students began to understand the subject more deeply and prepare better for classes. Augmented reality technology was used in various learning formats: blended, online and traditional forms of learning [5] (Fig.1).

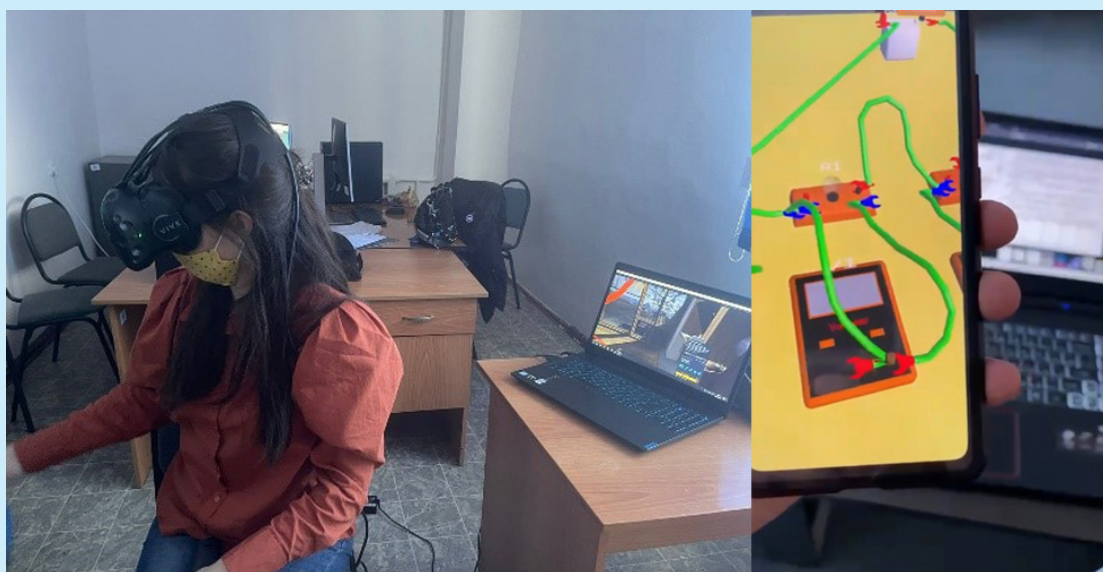


Figure 1. Application of AR technology in the educational process at Kazakhstan educational organizations

When the relevant literature is examined, the active use of augmented and virtual reality technologies in the education process is examined in many countries of the world and the governments of the countries are making efforts to expand the reach of these high quality and promising technologies.

Materials and Methods

We identified and reviewed articles that were included in the Scopus, Science Direct and WoS databases and included keywords like “virtual and augmented reality”, “education”, “educational institutions”, “their impact and learning outcomes”.

Screening

29 articles were checked by reading their titles and annotations after the duplicates were removed. The selection criteria were:

- only articles using AR technology are included;
- articles concerning educational institutions are included;

- results by year of publication are not older than 10 years.

It was also noted that the largest increase in publications on the use of AR technology falls in 2020, which is 9 articles out of 26. Perhaps the increased interest in studying begins during this period.

During the selection process, 3 articles were rejected, leaving 26 articles at the acceptance stage. Of these 3 excluded articles, 2 articles were incomplete and did not reflect the research process, 1 article did not concern higher education.

Acceptability

At the selection stage, the articles were randomly distributed among the authors for full-text analysis. The eligibility criteria were as follows:

1. The full text of the article is available in English;
2. Article on educational institutions;
3. Article about AR technology.

At this stage, 1 article was excluded as unacceptable, and 28 articles were deemed suitable for inclusion and data extraction. Of these 1 excluded articles, 1 did not concern education.

In this study, content analysis method, one of the qualitative analysis methods, was used in order to reach the concepts and relations necessary to explain the obtained data. In content analysis, studies on a specific subject are handled and the trends and results of these studies are evaluated in a descriptive and systematic way [6].

Content analysis method within the scope of this study; It was preferred to classify and compare the data and to reach conceptual conclusions based on this [7].

Data extraction was standardized across authors and selection bias was minimized by cross-referencing multiple sources to ensure methodological transparency.

Results

AR Technology Research Growth Model
The analysis's results in table 1 showed that researchers have been interested in the introduction of AR technology in the educational process since 2013-2015. At that time, a review of the development of this technology in general education was conducted, and one solution proposed was to provide sustainable support for teachers in adapting augmented reality technology, creating individual training events, and monitoring academic performance [11, 22]. The peak of AR study and implementation came in 2020. This is the lockdown period, when the educational process was intensively digitalized and adapted AR courses were developed, which could have a significant impact on the availability of knowledge [12]. The trend of studying and implementing technologies increased with the following year, as well as the key factors of learning changed as in the work [13]. Considering the total number of publications made in the period from 2013 to 2022, we can say that research in the field of education using AR technology is increasing and changing key factors, including also processes.

Table 1. Dissemination of education research based on AR/VR technology by year

Year	Number of publications	Year	Number of publications
2022	5	2018	1
2021	7	2017	1
2020	12	2013	2
2019	3		

Classification of publications by fields of education according to the Scopus, ScienceDirect and WoS databases

The field of implementation of AR technology in education is very diverse (Table 2): chemistry [14], engineering [15], STEM [16], interdisciplinary [17], geometry [18], biology [19], mathematics [20] and health basics [21]. 24 articles out of 30 where AR technology

have been introduced have the effect of growth and improvement in the educational process. The field of specific research and implementation of augmented reality technology has 19 articles out of 29, the rest are of an overview nature.

The largest percentage of published articles is in the field of education in general, that is, there is a general analysis and review of the

application of AR technology. The education system based on the introduction of this technology has not yet settled down and is gradually being introduced into all subjects of study, striving to improve and improve them.

For example, AR technology in physics lessons had a positive effect and improved the learning abilities of students [22]. As stated in many studies, the use of AR provides an excellent way to involve students in the orientation process in the laboratory and students perceive the learning process very positively [23]. Most of the conducted re-

search points to the fact that the use of AR is an attractive motivation for students [24-27], will be more active, effective, attractive, expands the educational process towards visibility, has advantages over the traditional form of education [28].

The articles also reflect the fact that if educational programs on artifacts are well developed, AR is useful for teaching, for example, the results of implementation can be used in the field of computer science education and improving the academic performance of students at all levels [29].

Table 2. Distribution of research in the field of education based on AR technology in the Scopus, ScienceDirect and WoS databases

Classification of publications by field of education	Number of publications	Percentage ratio
General education	11	37%
Computer science education	3	10%
Chemistry education	3	10%
Health basics	2	6%
Physical education	2	6%
Geometry, Mathematics	2	6%
Engineering Education	2	6%
STEM	1	3%
Science education	1	3%

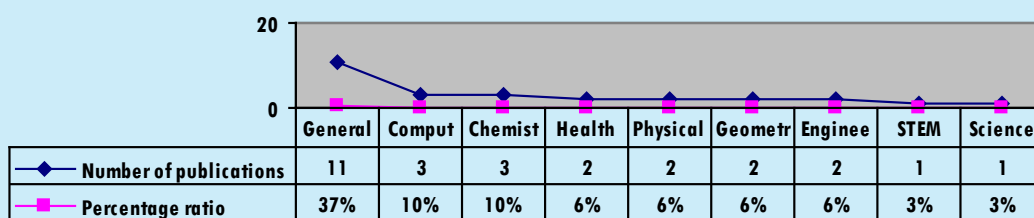


Figure 2. Research Trends in AR-Based Education Across Scopus, ScienceDirect, and WoS Databases

Classification of articles according to their influence

80% of studies prove the effectiveness of

the introduction of AR technology into the educational process and also reveal an interest in learning. Furthermore, 54% of the articles analyzed by the methodological processing tool of the study used surveys and

questionnaires to identify the results of the impact of technology. 22 articles described the introduction of augmented reality, while virtual reality technologies were considered in 4 articles out of 31. The rest of the articles were of a mixed format, the use of joint AR tools, mixed reality, attempts to introduce artificial intelligence into augmented reality [30], although this caused some problems in processing a huge amount of information

for Artificial intelligent (AI).

The analysis of articles with identified interventions, the impact of student learning based on engagement, motivation and performance indicators, methodology and effect of the introduction and application of AR technology can be seen in the results of Table 3.

Table 3. Classification of articles by their impact

Application area	Methodology	Impact (numbers in percent)
General education	One solution may be providing substantial support for teachers to tailor AR technologies, to create customized learning activities, and to monitor students' learning progress in AR.	70% increase
Computer science education	The results can be used to utilize Computer science for education and enhance the performance of all levels of the learners.	80% increase
Chemistry education	Use AR has advantages in contrast to the traditional form of education	80% increase
Health basics	Use as a trend towards greater realism and user satisfaction (external validity)	90% increase
Physical education	Use of AR has a positive effect on improving training and learning abilities	100% increase
Geometry, Mathematics	Use AR improves the learning process	90% increase
	Use of virtual and augmented reality technologies in teaching mathematics proves the effectiveness and it is an attractive motivation for students.	
Engineering Education	Use VR motivates students	90% increase
STEM	positive result using mobile application based on AR	100% increase
Science education	Use AR improves students' motivation for learning	90% increase
Biology education	Usefulness, hedonic motivation/playfulness and price value were found to be the determining factors for Chinese students behavioral intentions to use AR applications for learning purposes.	90% increase
Multidisciplinary Study	The findings suggest that AR can enhance a students' experience in the classroom. not only were students impressed with the technology, they also found relevance to their future careers outside of the classroom.	80% increase

Percentages were derived from surveys that assessed student engagement,

conceptual understanding, and academic achievement. These values represent

averages of comparative test scores and experimental assessments reported in the reviewed literature. Baseline scores were determined using pre- and post-intervention assessments from controlled studies.

The conducted studies confirm that simulation-based learning based on augmented reality can improve moral imagination compared to the absence of simulation (without training) [26], it is also noted that AR technologies require teacher training, they are not available to everyone [31]. The reasons for unavailability are mainly the high cost of AR software and hardware.

Discussion

Despite the relevance, augmented reality have attracted a lot of attention from researchers in different years, different researchers have attached different meanings to the term AR, and conducted research in different fields. Nevertheless, the field of education remains relevant, since it is here that all processes can be clearly and practically explained. For instance, back in 2013, the Hsin-Kai Wu author teams [8] and others presented a solution that could provide significant support to teachers in adapting AR technologies, creating individual learning activities and monitoring the progress of students with AR. The authors [9] see the use of augmented reality technology as one of the ways to increase the effectiveness of the mobile learning environment, which allows integrating real and augmented learning tools using mobile Internet devices.

This study has a positive outcome, and the conducted experiment can claim an increase in the effectiveness of the quality of education after the introduction of AR into the educational environment. While the work of Yassine et al.[10] states that AR is useful for teaching only if the educational programs on artifacts are well developed.

The conducted analysis showed the involvement and understanding of the educational material by students due to the implementation of AR, especially

in STEM classes. However, it is worth highlighting a number of issues regarding technical limitations, namely, there are incompatibilities of software with AR. The qualifications of many teachers reduce the effectiveness of integrating this technology into the educational process, and the application of augmented reality requires adaptation to various educational environments. Further research should be focused on long-term effects, interdisciplinarity, and optimization of augmented reality technology for various educational needs.

Conclusion

The article provides an overview of the relevance of the use of augmented reality technology, and discusses the possibilities of using this technology in the educational process. Attempts were identified to determine the possibility of application in modern education, to determine the results of research in this direction. It is revealed that augmented reality technologies stimulate the educational process and make it possible to realize knowledge in various fields of study, which is an effective and visual, safe way to conduct laboratory work. This technology expands and motivates the student to further study the material. Visual education is the best that can be offered to students in order to contribute to the development of scientific and technological progress.

The introduction of modern teaching tools into the system is the most important condition for strengthening the educational process, identifying new approaches in teaching, the ability to apply in various formats of distance, traditional and mixed, as well as jointly and with various artificial intelligence tools.

It is worth noting that the learning technology based on augmented reality is a tool of the future, which has fundamentally new visualization capabilities and will be useful for teaching.

Thus, the introduction of augmented reality

technology makes it possible to improve the quality of education by motivating students to work independently, increasing the interest of the audience in the educational material.

Future research should examine the broader application of AR and its long-term effectiveness, namely, student retention in the learning process, the potential for using AR technology outside of STEM, humanities and social sciences, and the potential to remove technical and financial barriers.

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References:

1. Mi-Young, An, Han-Seul, Kim, Ji-Won, Kang. Trends and Effects of Learning through AR-Based Education in S-Korea // *International Journal of Information and Education Technology*. 2020. Vol. 10, No. 9. DOI: 10.18178/ijiet.2020.10.9.1439.
2. Esteban, Vázquez-Cano, Verónica, Marín-Díaz, Wellington Remigio, Villota Oyarvide, Eloy, López-Meneses. Use of Augmented Reality to Improve Specific and Transversal Competencies in Students // *International Journal of Learning, Teaching and Educational Research*. 2020. Vol. 19, No. 8. P. 393-408. DOI: 10.26803/ijlter.19.8.21.
3. Gurevych, R., Silveistr, A., Mokliuk, M., Shaposhnikova, I., Gordichuk, G., Saiapina, S. Using Augmented Reality Technology in Higher Education Institutions // *Postmodern Openings*. 2020. Vol. 12, No. 2. P. 109-132. DOI: 10.18662/po/12.2/299.
4. Jantjies, M., Maart, R., Moodley, T. Experiential learning through virtual and augmented reality in higher education // *ICETM*. 2018. DOI: 10.1145/3300942.3300956.
5. Lu, A., Won, C.S.K., Cheung, R.Y.H., Im, T.S.W. Supporting Flipped and Gamified Learning with Augmented Reality in Higher Education // *Frontiers Education*. 2021. DOI: 10.3389/educ.2021.623745.
6. Lin, T.C., Lin, T.J., Tsai, C.C. Research trends in science education from 2008 to 2012: A systematic content analysis of publications in selected journals // *International Journal of Science Education*. 2014. Vol. 36, No. 8. P. 1346-1372.
7. Cohen, L., Manion, L., Morrison, K. Research methods in education. Canada: Routledge, 2007.
8. Wu, H.K., Lee S.W.Y., Chang, H.Y., Liang, J.C. Current status, opportunities and challenges of augmented reality in education // *Computers & Education*. 2013. P. 41-49. DOI: 10.1016/j.compedu.2012.10.024.
9. Nakhoul, G., Taliencio, J.J., Mehdi, A., Daou, R., Sedor, J., Nally, V.J., O'Toole, J., Bierer, S.B., Green, M.W. Virtual reality and education - A framework to guide development and integration // *Kidney International Reports*. 2020. Vol. 5.
10. Gómez-Galán, J., Vázquez-Cano, E., Luque de la Rosa, A., López-Meneses, E. Socio-Educational Impact of Augmented Reality (AR) in Sustainable Learning Ecologies: A Semantic Modeling Approach // *Sustainability*. 2020. Vol. 12. DOI: 10.3390/su12219116.
11. Srimadhaven, T., Chris Junni, A.V., Naga Harshith, Ebenezer, J., Girish, S., Priyaadharshini, M. Learning Analytics: Virtual Reality for Programming Course in Higher Education // *Procedia Computer Science*. 2020. Vol. 172. P. 433-437. DOI: 10.1016/j.procs.2020.05.095.
12. Nesenbergs, K., Abolins, V., Ormanis, J., Mednis, A. Use of Augmented and Virtual Reality in Remote Higher Education: A Systematic Umbrella Review // *Education Science*. 2021. Vol. 11, No. 8. DOI: 10.3390/educs11010008.
13. Yoon, S., Oh, J. A theory-based approach to the usability of augmented reality technology: A cost-benefit perspective // *Technology in Society*. 2022. P. 1-9. DOI: 10.1016/j.techsoc.2022.101860.
14. Aw, J.K., Boellaard, K.C., Tan, T.K., Yap, J., Loh, Y.P., Colasson, B., Blanc, E., Lam, Y., Fung, F.M. Interacting with Three-Dimensional Molecular Structures Using an Augmented Reality Mobile App // *Journal of Chemical Education*. 2020. P. 3877-3881. DOI: 10.1021/acs.jchemed.0c00387.
15. Häfner P., Häfner V., Ovtcharova, J. Teaching Methodology for Virtual Reality Practical Course in Engineering Education // *Procedia Computer Science*. 2013. P. 251-260. DOI: 10.1016/j.procs.2013.11.031.
16. Nordin N.A.A., Majid N.A.A., Zainal N.F.A. Mobile augmented reality using 3D ruler in a robotic educational module to promote STEM learning // *Bulletin of Electrical Engineering and Informatics*. 2020. Vol. 9. P. 2499-2506. DOI: 10.11591/eei.v9i6.2235.
17. Delello, J.A., McWhorter, R.R., M.K. Integrating Augmented Reality in Higher Education: A Multidisciplinary Study of Student Perceptions // *Journal of Educational Multimedia and Hypermedia*. 2015. P. 209-233.
18. Gargish, S., Mantri, A., Kaur, D.P. Augmented Reality-Based Learning Environment to Enhance Teaching-Learning Experience in Geometry Education // *Procedia Computer Science*. 2020. Vol. 172. P. 1039-1046. DOI: 10.1016/j.procs.2020.05.152.
19. Shen, S., Xu, K., Sotiriadis, M., Wang, Y. 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. 2022. Vol. 30. DOI: 10.1016/j.jhlste.2022.100373.
20. Vakaliuk, T.A., Shevchuk, L.D., Shevchuk, B.V. Possibilities of Using AR and VR Technologies in Teaching Mathematics to High School Students // Universal Journal of Educational Research. 2020. Vol. 8, No. 11B. P. 6280-6288. DOI: 10.13189/ujer.2020.082267.
 21. Kovoov, J.G., Gupta, A.K., Gladman, M.A. Surgery. 2021. Vol. 170. P. 88-98. DOI: 10.1016/j.surg.2021.01.05.
 22. Liu, Y., Sathishkumar, V.E., Manickam, A. Augmented Reality Technology Based on School Physical Education Training // Computers and Electrical Engineering. 2022. DOI: 10.1016/j.compeleceng.2022.107807.
 23. Nadeem, M., Chandra, A., Livirya, A., Beryozkina, S. AR-LabOr: Design and Assessment of an Augmented Reality Application for Lab Orientation // Education Science. 2020. Vol. 10. DOI: 10.3390/educsci10110316.
 24. Wang, Z., Bai, X., Zhang, S., Billingham, M., He, W., Wang, P., Lan, W., Min, H., Chen, Y. A Comprehensive Review of Augmented Reality-Based Instruction in Manual Assembly, Training, and Repair // Robotics and Computer-Integrated Manufacturing. 2022. DOI: 10.1016/j.rcim.2022.102407.
 25. Wu, H.K., Lee, S.W.Y., Chang, H.Y., Liang, J.C. Current Status, Opportunities and Challenges of Augmented Reality in Education // Computers & Education. 2013. Vol. 62. P. 41-49. DOI: 10.1016/j.compedu.2012.10.024.
 26. Sari, R.C., Sholihin, M., Yuniarti, N., Purnama, I.A., Hermawan, H.D. Does Behavior Simulation Based on Augmented Reality Improve Moral Imagination? // Education and Information Technologies. 2020. DOI: 10.1007/s10639-020-10263-8.
 27. Arici, F., Yildirim, P., Caliklar, S., Yilmaz, R.M. Research Trends in the Use of Augmented Reality in Science Education: Content and Bibliometric Mapping Analysis // Computers & Education. 2019. Vol. 142. DOI: 10.1016/j.compedu.2019.103647.
 28. Devagiri, J.S., Paheding, S., Niyaz, Q., Yang, X., Smith, S. Augmented Reality and Artificial Intelligence in Industry: Trends, Tools, and Future Challenges // Expert Systems With Applications. 2022. Vol. 207. DOI: 10.1016/j.eswa.2022.118002.
 29. Roopa, D., Prabha, R., Senthil, G.A. Revolutionizing Education System with Interactive Augmented Reality for Quality Education // Materials Today: Proceedings. 2021. Vol. 46. P. 3860-3863. DOI: 10.1016/j.matpr.2021.02.294.
 30. Kumar, V.V., Carberry, D., Beenfeldt, C., Andersson, M.P., Mansouri, S.S., Gallucci, F. Virtual Reality in Chemical and Biochemical Engineering Education and Training // Education for Chemical Engineers. 2021. Vol. 36. P. 143-153. DOI: 10.1016/j.ece.2021.05.002.
 31. Theodoropoulos, A., Lepouras, G. Augmented Reality and Programming Education: A Systematic Review // International Journal of Child-Computer Interaction. 2021. Vol. 30. DOI: 10.1016/j.ijcci.2021.100335.

Білім беру деңгейінде толықтырылған шындық зерттеулеріне шолу

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Аңдатпа. Толықтырылған шындықты (AR) қолдана отырып, жоғары оқу орындарында оқыту сапасын енгізу мен жақсартудың рөлін түсіну үшін мақала авторлары келесі сұрақтарды анықтауға тырысты: бұл технологиялар білімге қандай үлес қоса алады? Толықтырылған шындық зерттеулерінің нәтижелері қандай? Толықтырылған шындық технологиялары оқу процестеріне қалай әсер етеді? Бұл мақалада біз Scopus, Science Direct және Web of Science дерекқорларында жоғары білім беруде кеңейтілген шындық технологияларын қолдануды және олардың оқу нәтижелеріне әсерін сипаттайтын мақалаларды іздейміз. Біз 150 мақаланы анықтадық, оның ішінде бірнеше тексеру және іріктеу кезеңдерінен кейін 29 мақала экстракция сатысында қалды, оның 16 шолуы және толық шолу мен презентацияны қамтитын 13 эмпирикалық зерттеу мақалалары алынды. Зерттеу нәтижелері қарастырылған зерттеулердің 80% - ы STEM және физика салаларында оң нәтиже беретіндігін көрсетті, өйткені күрделі процестерді бейнелеу мен бейнелеудің жақсарғаны байқалады. Дегенмен, AR әсері аз зерттелген. Жүргізілген зерттеу AR тех-

нологиясы есебінен білім беру сапасын арттыру әлеуетін көрсетеді және оларды білім беру процесіне біріктіру мүмкіндіктерін ұсынады.



Кілтті сөздер: толықтырылған шындық, білім беру, ақпараттандыру процесі, зерттеу, шолу.

Обзор исследований в области дополненной реальности в образовании

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Аннотация. Чтобы понять роль внедрения и повышения качества обучения в высших учебных заведениях с использованием дополненной реальности (AR), авторы статьи попытались определить следующие вопросы: Какой вклад эти технологии могут внести в образование? Каковы результаты исследований в области дополненной реальности? Как технологии дополненной реальности влияют на процессы обучения? В этой статье мы проводим поиск в базах данных Scopus, Science Direct и Web of Science статей, описывающих использование технологий дополненной реальности в высшем образовании и их влияние на результаты обучения. Мы выявили 150 статей, из которых после нескольких этапов проверки и отбора 29 статей были оставлены на стадии извлечения, из которых было извлечено 16 обзоров и 13 статей эмпирических исследований, содержащих полный обзор и презентацию. Результаты исследований показали, что 80% рассмотренных исследований обеспечивает положительные результаты в области STEM и физики, поскольку отмечается более улучшенная визуализация и представление сложных процессов. Тем не менее влияние AR является мало изученным. Проведенное исследование показывает потенциал повышения качества образования за счет AR технологии и представляет возможности интеграции их в образовательный процесс.



Ключевые слова: дополненная реальность, образование, процесс информатизации, исследования, обзоры.

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