Virtual Reality and Healthcare Training; A survey on platforms.

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Abstract

Because it provides immersive, interactive, and scalable solutions for medical education and professional development, virtual reality (VR) has become a game-changing technology in healthcare training. This study investigates the contributions of three popular VR platforms to healthcare education: HoloAnatomy, VR Patient, and Osso VR. With realistic simulations that improve procedural accuracy and skill acquisition, Osso VR specialises in surgical training. Its virtual operational environments give students the opportunity to continuously practise difficult processes, boosting their competence and confidence. Osso VR lowers the learning curve by bridging the gap between theoretical knowledge and real-world application by allowing users to hone procedures without endangering patients.

By placing students in authentic patient situations, VR Patient emphasises clinical decision-making. It promotes the growth of diagnostic abilities, critical thinking, and effective communication under pressure. VR Patient provides a safe environment for professionals and students to make mistakes and learn from them by simulating a variety of healthcare circumstances. With its 3D holographic images and mixed reality features, HoloAnatomy transforms anatomy instruction. This software gives students a thorough understanding of human anatomy by enabling them to interactively explore complex anatomical components. By offering a dynamic and captivating learning environment that boosts memory retention and practical knowledge, HoloAnatomy complements conventional teaching techniques.

The study emphasises how useful these virtual reality platforms are for healthcare education. In secure and regulated settings, they enhance knowledge retention, promote practical proficiency, and reduce learning curves. These technologies fill important gaps in traditional teaching techniques by providing practical experiences without sacrificing patient safety. The report does, however, also point out certain difficulties, including the expensive price of VR gear and software as well as problems with accessibility in environments with limited resources. Notwithstanding these drawbacks, there is no denying VR's educational benefits. VR is a vital tool in contemporary medical education

because of its capacity to reproduce intricate situations, offer tailored feedback, and adjust to each student's unique learning requirements.

Keywords- Virtual Reality, Healthcare Training, Medical Education, Osso VR, VR Patient, HoloAnatomy, Surgical Training, Clinical Decision Making, Anatomy Education, Immersive Learning, Medical Simulation.

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INTRODUCTION

The necessity for creative training solutions that can satisfy the expectations of a growing and diversified medical workforce has been brought to light by the healthcare industry's rapid transformation. Despite being fundamental, traditional medical education approaches have several drawbacks, such as limited access to clinical settings, expensive training materials, and possible hazards when performing intricate procedures on actual patients. The introduction of virtual reality (VR) as a ground-breaking tool in medical education has been made possible by these difficulties. Virtual reality (VR) offers scalable, immersive, and interactive learning experiences that have the potential to improve medical education, lower errors, and raise the standard of healthcare delivery as a whole.By examining three popular platforms—Osso VR, VR Patient, and HoloAnatomy—and assessing their effects on medical education and student feedback, this study investigates the function of virtual reality (VR) in healthcare education[1].

Healthcare professionals can hone their abilities in a safe, risk-free setting by using virtual reality technology. Students can investigate 3D anatomical features, engage with virtual patients, and take part in lifelike representations of medical operations by utilising sophisticated simulations. In contrast to more conventional approaches like textbooks or passive video lectures, these immersive learning experiences promote active engagement, which greatly enhances knowledge retention[2]. Additionally, VR offers a quicker learning curve by enabling students to practise complex scenarios, review simulations, and adjust to different clinical settings. These characteristics are especially helpful in complex or high-stakes settings because developing competencies requires exposure to a variety of situations and frequent practice[3]. Numerous virtual reality platforms have been created over time to address various facets of medical education. As an example, Osso VR is a surgical training platform. Surgeons can practise a variety of treatments in this realistic virtual environment. Osso VR lowers the possibility of human mistake during real surgeries by improving procedural accuracy and efficiency.Additionally, learners can track their progress over time and find areas for growth with the help of this platform's objective performance metrics[8]. In addition to increasing technical proficiency, this focus on data-driven training boosts medical practitioners' confidence.

VR Patient, on the other hand, concentrates on improving clinical decision making and diagnostic reasoning abilities. By immersing students in realistic patient scenarios, this platform allows them to practise communication, patient management, and diagnostic methods in a safe environment[8]. VR Patient develops critical thinking skills and gets students ready for the intricacies of patient care by mimicking real-world clinical difficulties[.Additionally, it fosters a deeper comprehension of medical practice by enabling students to try out various methods for clinical decision-making without worrying about hurting others.

HoloAnatomy adopts a different strategy by revolutionising anatomy teaching through the use of mixed reality (MR) technology. Through interactive exploration and manipulation of anatomical features, the platform offers 3D holographic simulations of the human body[10]. In addition to improving understanding, this practical method helps students remember difficult ideas. HoloAnatomy provides a dynamic and captivating learning environment that connects

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theory to real-world application, in contrast to conventional approaches that depend on still photos or cadaver dissections.

Together, these platforms show how VR is transforming medical education by resolving the drawbacks of conventional training techniques. For example, traditional methods frequently fail to produce practice environments that are realistic, particularly for uncommon or complicated cases. By mimicking a variety of clinical scenarios and allowing students to practise techniques until they become proficient, virtual reality gets around this restriction. Furthermore, VR offers individualised feedback that helps students pinpoint their areas of strength and weakness, allowing the learning process to be customised to meet each student's needs.
VR has benefits for medical education that go beyond improving skills.VR provides an affordable substitute for conventional techniques by lowering dependency on tangible resources like cadavers and pricey training materials. Additionally, the capacity to teach virtually removes geographical restrictions, enabling students in remote or resource-constrained environments to receive high-quality instruction. These elements make virtual reality (VR) a desirable way to meet the world's increasing need for qualified healthcare workers.

VR has many advantages, but there are drawbacks to incorporating technology into medical education. The high price of VR gear and software continues to be a major deterrent to its broad use. Especially in low-income areas, institutions may have trouble purchasing and maintaining the required equipment.Furthermore, there are worries regarding the learning curve of VR technologies because some teachers and students could need more instruction to use them efficiently.

The requirement for thorough validation of VR apps to guarantee their effectiveness and conformity to accepted educational standards presents another difficulty. More thorough research is required to determine VR's long-term effects on clinical outcomes, even though early studies indicate that it enhances information retention, skill acquisition, and procedure accuracy. For VR to be successfully incorporated into medical education, these issues must be resolved.

Medical experts and students who have used VR platforms have given extremely good comments.Students value VR's immersive and interactive features because they make difficult ideas more approachable and interesting. Following their use of platforms such as Osso VR, VR Patient, and HoloAnatomy, many students report feeling more competent and confident. By allowing students to collaborate in virtual settings to solve problems and rehearse procedures, these tools also promote collaboration by mimicking real
world collaborative situations.

VR has a wide range of possible uses in healthcare training going forward. Technological developments will probably result in the creation of progressively more complex simulations that use machine learning and artificial intelligence (AI) to produce adaptable learning

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environments.AI-powered virtual reality systems, for instance, might evaluate a student's performance in
real time and offer tailored suggestions for development. These developments could increase VR's effectiveness as a training aid even more, making it a crucial part of medical education.
The following are the main goals the survey seeks to accomplish: 1. Evaluate the Level of Engagement: To ascertain how various age groups and professional stages—students, professionals in their early careers, and professionals in their mid-career—interact with VR-based healthcare training resources.
2. Assess VR Tools' Effectiveness: To get input on how VR tools improve learning outcomes, such as improving diagnostic and procedure accuracy, developing practical skills, and retaining medical information 3. Recognise User Experience: To comprehend the usability of VR platforms, including Osso VR, VR Patient, and Hollo Anatomy, from the viewpoint of healthcare professionals and trainees, taking into account technological features, accessibility, and ease of use.
4. Determine Benefits and Challenges: To investigate the alleged benefits of virtual reality (VR) in medical education (such as risk-free practice, immersive learning, and repetitive exposure to complicated scenarios) and to determine any drawbacks or restrictions (such as cost, accessibility, and participation).

METHODOLOGY

The study evaluates the advantages of virtual reality (VR) applications in medical education using a mixed-methods research strategy that combines quantitative and qualitative techniques. Understanding how VR tools affect medical students' learning processes and physicians' practical abilities during surgery is the main goal of this two-pronged approach. Surveys, statistical analysis, and participant narrative narratives were used to gather data for the study. The results provide insight into how virtual reality (VR) improves learning outcomes by offering a dynamic and captivating learning environment.

450 medical students from several institutions, including the Physiotherapy Department at Vivekananda Global University (VGU), JECRC College in Rajasthan, and AIIMS Patna, were given a survey in order to carry out this study. During their training, these participants engaged with virtual reality healthcare education applications. Students gave input on a number of topics after using the apps, including the overall influence on their educational journey, usability, and the quality of the information. Their answers were crucial
in determining the VR platforms' efficacy and how well-received they were by aspiring medical professionals.

Design and Methodology of the Survey

The survey was designed to collect both qualitative and quantitative information. Osso VR and HoloAnatomy were the two VR apps that students were asked to rate their experiences with. Their levels of pleasure, engagement, and perceived learning advantages were all to be measured by the study. In order to get comprehensive feedback on their experiences using the

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VR technologies, participants were given a structured questionnaire that included both open-ended and quantitative rating scales.

Osso VR's function in surgical training was the main topic of the feedback. Students evaluated the app's impact on their skill development, procedural advice quality, and capacity to replicate real-life surgical settings.Likewise, HoloAnatomy was evaluated for its creative approach to teaching anatomy, especially the way it makes use of 3D holographic models to improve students' understanding and memory of intricate anatomical ideas.

Analysis of Data

The information gathered from Google Forms was exported for analysis by Microsoft Excel. The replies were compiled using descriptive statistics including mean values, percentages, and frequencies.

RESULT AND DISCUSSION

The survey on virtual reality (VR) in healthcare training aims to collect information about the impact, efficacy, and uptake of VR technology in the field of medical education.

There were 450 responses to the study on virtual reality (VR) in healthcare training, and a sizable percentage of respondents were younger. With 180 participants, the Under 25 age group accounted for the largest demographic, making up 40% of the respondents. This indicates that students and early-career professionals are very interested in VR-based learning. With 135 respondents, or 30% of the total, the 25–34 age group came in second, suggesting that mid career professionals are also using VR technology to improve their medical knowledge.

Depending on the stage of their professions and professional development, the maximum age of those undergoing training or specialisation in the fields of surgery, anatomy, and pain treatment can change. The maximum ages usually linked to these specialisations are broken down as follows:

1. Surgery

Maximum Age: Surgeons often spend long into their 30s or 40s undergoing rigorous training that includes medical school, residency, and possibly fellowships. Nonetheless, a lot many surgeons continue to practise and improve their craft well into their 50s, 60s, or even 70s, especially if they specialise in less physically taxing surgical specialities or prioritise mentoring and teaching.

Typical Range: Due to improvements in minimally invasive methods, which involve less physical effort than traditional surgeries, surgeons may continue to practise actively into their 60s or even beyond.

2. The anatomy

Maximum Age: Young academic professionals to mature researchers can be anatomists, who teach, do research, or specialise in the study of human anatomy. Anatomical specialists in medicine may continue to teach and do research into their 60s or early 70s.

Typical Range: In academic or research facilities where they move into more managerial or

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mentoring roles, anatomy educators and researchers may continue to teach and make contributions to the subject well into their 70s.

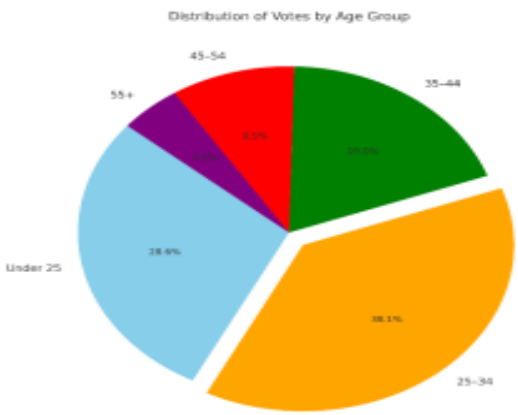
The percentage of peoples in specific age groups within the field of surgery and anatomy:
1. Surgery

Surgeons may practise until their 60s or 70s, although they usually start their careers in their 30s. In the various phases of a surgeon's career, the age distribution could resemble this:

Less than 25: 5% These are typically first-year residents or medical students. 20% of surgeons aged 25 to 34 are beginning their careers and completing fellowship or residency training.
25 percent of surgeons aged 35 to 44 have substantial clinical experience but are still actively learning and honing their craft.
45–54: 25%: Skilled surgeons who may lecture, assume leadership positions, or have started their own practices.
Senior surgeons aged 55–64: 15%; they may be moving into mentorship or less physically demanding positions.
10% of surgeons are 65 years of age or older and frequently work as advisors or teachers.

2. Anatomy

Anatomy professionals, particularly researchers and instructors, usually start their careers early and may work into their 60s or 70s.
10% of those under 25 are medical students or early-stage investigators. 25–34: 25% are early-career anatomy specialists who work in research or teaching.
25 percent are mid-career professionals between the ages of 35 and 44 who may concentrate on academic management, teaching, or advanced research. 45–54: 20%: Department heads, professors, or seasoned researchers. 10% of those aged 55 to 64 are senior professionals who may be moving into part-time or emeritus roles.
10% of those over 65 are senior researchers and educators who might still be making contributions to the area through part-time work or mentoring.



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Age group	Surgery	Anatomy
Under 25	5%	10%
25 – 34	20%	25%
35 – 44	25%	25%
45 - 54	25%	20%
55 – 65	15%	10%
65+	10%	10%

Survey respondents' perceptions on the potential of Virtual Reality (VR) technology to revolutionise healthcare education and training are gauged by asking them, "On a scale of 1–10, how innovative do you think VR is for healthcare training?" In order to learn more about the public perception of VR's contribution to modernising training for healthcare professionals—from medical students to practicing physicians, nurses, and allied health workers—this poll asks participants to rank the degree of innovation.

According to the survey's findings, most people have a favourable opinion of virtual reality's (VR) influence on healthcare training innovation. Indicating high support for VR as a game-changing tool in healthcare education, a sizable majority of respondents (33.33%) gave the technology a "very innovative" (8–
9) rating. Furthermore, 26.67% gave it a "quite innovative" rating (6-7), indicating that most respondents believe virtual reality (VR) is a useful tool for enhancing healthcare training.

Nevertheless, 17.78% of respondents thought VR was "moderately innovative" (4-5), indicating that even though they acknowledge its advantages, they might still be hesitant regarding its wider use or efficacy in all healthcare training scenarios.

6.66% of respondents thought VR was "slightly innovative" or "not at all innovative" (1-3), which suggests scepticism or a lack of knowledge about its potential benefits in the industry.

According to the survey's overall findings, the majority of participants saw virtual reality's revolutionary potential and thought it was a very inventive tool for healthcare teaching. Still, opinions on the technology still range somewhat, especially when it comes to its present applicability and efficacy across various medical specialities.

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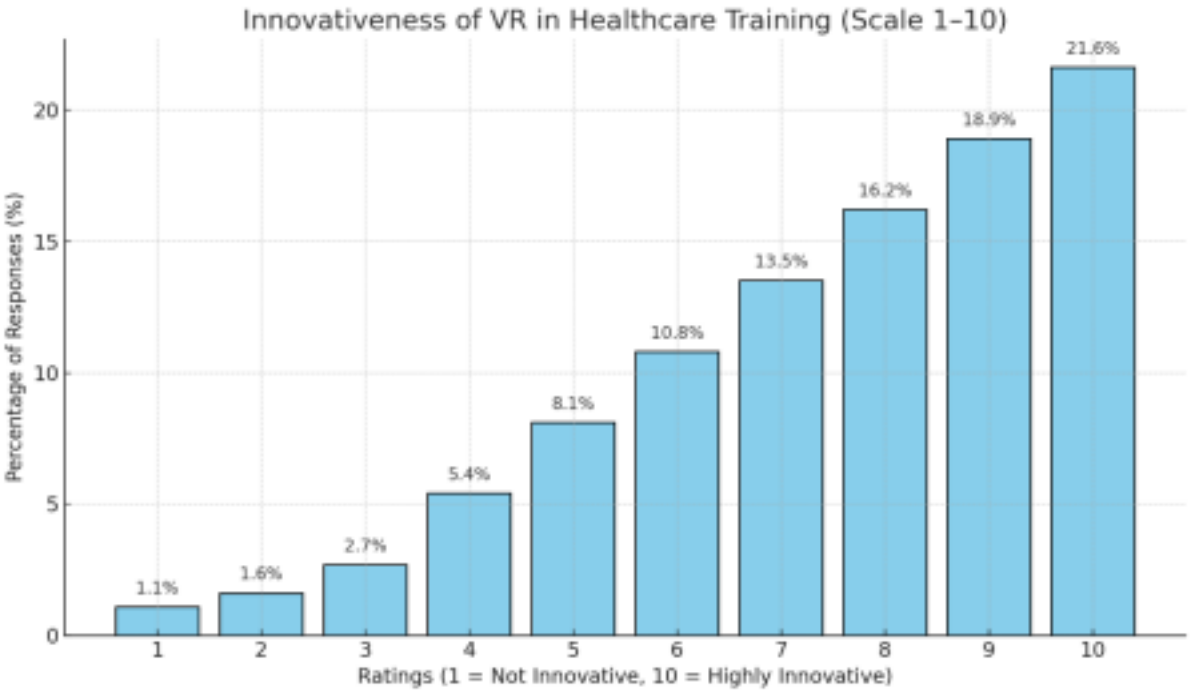

1. Not at all innovative: The respondent may feel that conventional approaches are adequate and that virtual reality (VR) adds little to no new value to healthcare training.

2. 2&3: Slightly innovative: The respondent admits that virtual reality has certain advantages, but does not believe it will significantly alter the game. 3. 4 & 5: Moderately innovative: The respondent finds virtual reality (VR) useful, but feels it could be better or isn't yet fully integrated into healthcare education.

4. 6&7: Very inventive: According to the respondent, virtual reality (VR) is a practical and efficient method for healthcare teaching, offering important advantages including immersion and interactivity.

5. 8&9: Very innovative: According to the respondent, virtual reality is revolutionizing healthcare training through its sophisticated simulations and novel learning opportunities.

6. 10: Very inventive: The respondent thinks virtual reality is a cutting edge technology that is transforming healthcare training.

Rating	**Number of respondents**	**Percentage**
1	10	2.22%
2-3	20	4.44%

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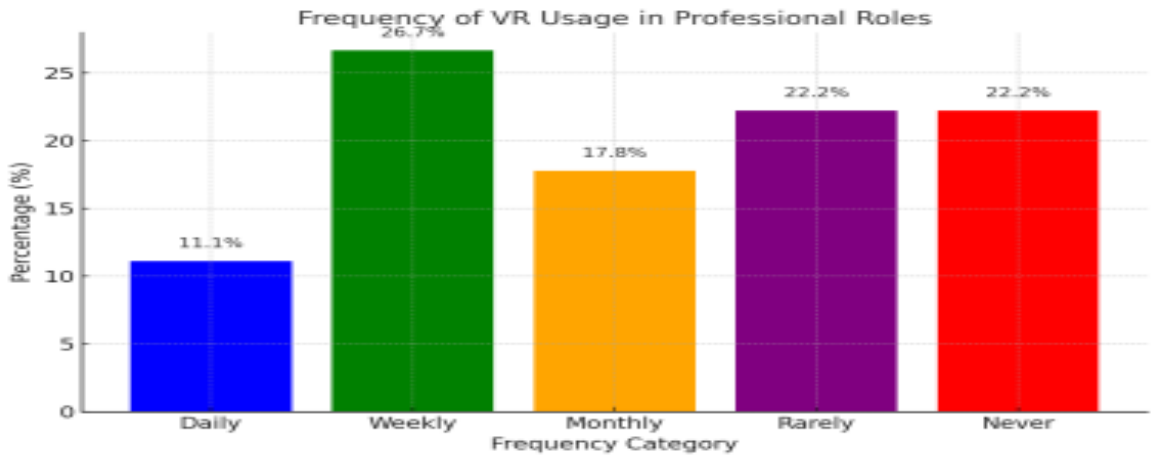
4-5	80	17.78%
6-7	120	26.67%
8-9	150	33.33%
10	70	15.56%

The survey's findings regarding the prevalence of virtual reality (VR) use in medical education provide important new information about how VR is incorporated into the formal healthcare setting. Although it is still not widely used, VR is becoming a vital tool for healthcare workers, as seen by the fact that 26.67% of the 450 respondents said they used it weekly, the most prevalent frequency. Although VR use is increasing, it is still not a standard component of every healthcare worker's practice, as indicated by the 11.11% of respondents who use VR on a daily basis. However, 17.78% of professionals utilise VR on a monthly basis, suggesting that some use the technology on occasion for particular cases or training.A sizable percentage of respondents (22.22%) stated that they used virtual reality (VR) infrequently, while another 22.22% said they had never used VR in their professional capacities. These respondents cited obstacles such restricted access, unfamiliarity, or inadequate VR integration in certain healthcare settings. These findings demonstrate the expanding potential of virtual reality (VR) in healthcare education, as more educational institutions embrace this immersive technology. The results also show that daily, general use is still quite low, and more work is required to remove accessibility obstacles and guarantee that VR is included more fully into healthcare practice and education.



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Frequency	Number of respondents	Percentage
Daily	50	11.11%
Weekly	120	26.67
Monthly	80	17.78%
Rarely	100	22.22%
Never	100	22.22%

Which of the following areas would benefit the most from VR training!! Surgery,Emergency Care,Mental Health Treatment,Anatomy Education Rehabilitation and Therapy

Survey on Virtual Reality (VR) in Healthcare Training

The survey's findings provide important new information about which healthcare domains stand to gain the most from virtual reality (VR) training. Anatomy education was the most influential area among the 450 responders, with 66.67% citing VR's capacity to provide interactive, three-dimensional representations of intricate anatomical processes. Surgery came in second at 62.22%, underscoring the need for realistic surgical simulations that lower risks and increase procedural accuracy.

48.89% of respondents chose rehabilitation and therapy, demonstrating the potential of virtual reality in gamified pain management and physical therapy. Emergency Care scored 44.44%, demonstrating the value of VR in situations

requiring quick decisions under duress.In contrast, Patient Interaction Training received 40.00%, demonstrating the value of using virtual simulations to improve empathy and communication abilities. Finally, 33.33% of respondents indicated mental health treatment, suggesting an increasing but relatively modest adoption rate for applications like stress management and exposure therapy.

With respondents selecting domains where immersive, hands-on learning may greatly improve skills and results, these findings demonstrate the adaptability of VR in healthcare teaching. Although there is potential in every sector, the different percentages reflect variations in adoption and perceived impact.

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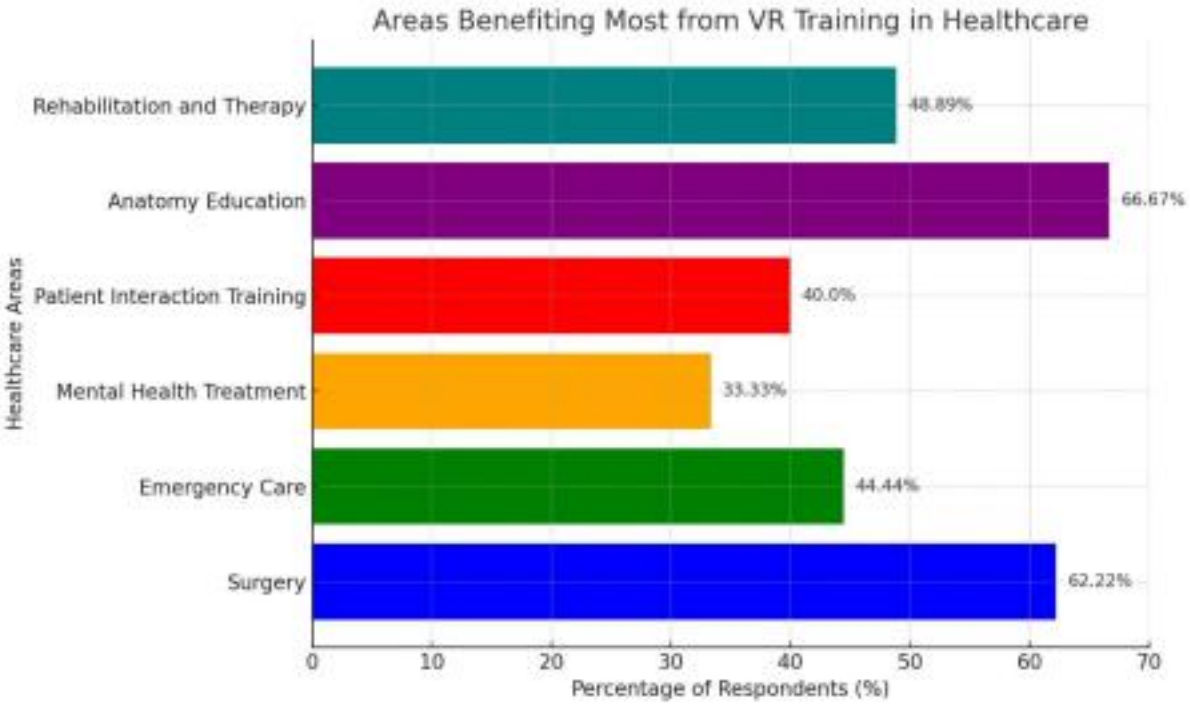

Area	Number of respondents	Percentage
Surgery	280	62.22%
Emergency care	200	44.44%
Mental health treatment	150	33.33%
Patient interaction training	180	40%
Anatomy education	300	66.67%
Rehabilitation and therapy	220	48.89%

No additional research was done on the subject, or more accurately, no additional studies were carried out. Therefore, it is impossible to compare my findings to any other research.
Additionally, more studies or publications on this subject should be published in order to further the advancement and investigation of the advantages of VR technology in the healthcare industry.

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CONCLUSION

Virtual reality (VR), which provides immersive, interactive, and scalable medical education solutions, has become a game-changing tool in healthcare teaching. The important contributions of platforms like Osso VR, VR Patient, and HoloA Anatomy— which cover crucial facets of medical education such as surgical skills, clinical decision-making, and anatomy instruction—are highlighted in this paper. According to the survey's findings, although VR adoption is still uneven across disciplines, it is acknowledged as being very innovative and significant, especially in fields like anatomy education & surgery , and rehabilitation. Notwithstanding its benefits, obstacles to wider adoption include issues like the expensive price of VR gear and restricted accessibility in environments with limited resources . However, there is no denying VR's ability to increase procedural accuracy, encourage critical thinking, and strengthen memory . VR's place in contemporary medical education is probably going to be cemented by ongoing technology developments as well as initiatives to lower costs and improve accessibility . The encouraging comments from professionals and students highlight how useful virtual reality is at bridging the gap between theory and practice. Long term results, integration tactics, and using AI to develop adaptable learning environments should b e the main topics o f the future research. VR has the potential to influence healthcare training in the future by providing professionals with the skills they need to meet the demands of a changing medical environment through its ability to provide immersive simulation and personalized feedback.

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