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Enhancing career adaptability through immersive virtual reality training

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Abstract. The integration of Virtual Reality (VR) into career development training offers a transformative approach to enhancing career adaptability, a crucial construct for navigating the challenges of modern professional environments. The aim of this study was to investigate the impact of Virtual Reality (VR) career exploration training on career adaptability. Employing a comparative design, data were collected from two groups – one receiving VR training and the other using traditional methods. The results of the study showed a significant positive impact of interactive VR simulations on key aspects of career adaptability. In particular, the use of VR technologies contributed to the improvement of participants' self-esteem, the development of professional knowledge, and the efficiency of goal setting and career planning. This study examined the effects of VR-based career exploration on five dimensions of career adaptability: self-appraisal, occupational information, goal selection, planning, and problem-solving. Results have revealed statistically significant improvements across all dimensions for the VR group, with the strongest effect observed in occupational information and substantial gains in planning and problem-solving. The findings underscored VR's potential as an innovative tool for experiential learning, offering immersive and interactive environments that facilitate skill acquisition, self-awareness, and effective career decision-making. Implications for educational institutions, career counseling practices, and workforce development programs have been discussed, highlighting the pivotal role of technology-enhanced training in preparing individuals for an evolving job market. The findings of this investigation have significant implications for career counseling practitioners, educational institutions, and organisations invested in workforce development

Keywords: career development; experiential learning; professional training; higher education; workforce preparation

INTRODUCTION

In modern world, career paths are becoming less predictable due to rapid changes in technology, the instability of the labour market and the need for continuous professional development. In the context of digital transformation and automation of professions, career adaptability is a key factor in success, as it allows specialists to quickly respond to challenges, change their professional trajectory and effectively develop new competencies. In the context of digital transformation and automation of professions, career adaptability is a key factor in success, as it allows specialists

to quickly respond to challenges, change their professional trajectory, and effectively develop new competencies.

Researcher A. Singh *et al.* (2023) studied immersive virtual reality (VR) as a training tool opens up new opportunities for the development of career adaptability, as it creates realistic scenarios of professional activity. A. Marougkas *et al.* (2023) found that the user can experiment with new professions, skills and behavioural models without risking their real career path while education. The interactivity of VR technologies contributes to a deeper immersion in the learning process and better assimilation of information (Cheng, 2022). Through simulations of critical situations, VR training helps develop the ability to make decisions quickly and adapt to changes, as the learners study best when they receive information in a style that incorporates visual (Yin, 2022). VR allows for safe immersion in a new professional environment, reducing anxiety and uncertainty.

The collection of materials of the scientific and practical conference "Immersive technologies in education" by Yu.G. Nosenko (2024) examined scientific and methodological issues of the digitalisation of society and education, in particular the use of VR for the development of competencies that contribute to successful adaptation to a rapidly changing world. The authors emphasise that immersive technologies allow you to create realistic scenarios that contribute to deeper assimilation of the material and the development of practical skills. The paper "Teaching award: rising to the challenge" by J. Espinoza (2025) discusses the integration of VR into business education to increase empathy and understanding of inclusion in business contexts. The authors note that the use of VR contributes to the development of socially responsible and proactive leaders, which is an important aspect of career adaptability.

Modern research such as D. Sudharson *et al.* (2024) confirms the effectiveness of using VR technologies in developing career adaptability and professional skills. Immersive environments contribute to deeper learning of material, the development of practical competencies and increased confidence in making career decisions. The rapid advancement of digital technologies has ushered in unprecedented opportunities for innovation in career development and professional preparation. Virtual Reality (VR), which emerged primarily as an entertainment platform, has evolved into a transformative technological paradigm with far-reaching implications across multiple sectors, including education, professional training, and career development (Radianti *et al.*, 2020). This technological evolution presents a compelling opportunity to address one of the most significant challenges in contemporary career development: the cultivation of career adaptability in an increasingly dynamic professional landscape.

Authors L. Ghosh & R. Ravichandran (2024), concluded that the rapidly evolving job market requires education to be flexible and adaptable, and new technologies provide innovative ways to address this need. As VR technology has advanced, concepts like immersion and presence have significantly developed. Immersion relies on the technological capabilities of the system delivering the experience. Virtual Reality is transforming education by offering personalised, immersive, and engaging learning opportunities. It boosts student motivation and engagement, fosters collaboration, and provides unique applications across a wide range of subjects. The integration of Virtual Reality technology in career exploration training represents a paradigm shift in how individuals prepare for and adapt to professional challenges. Unlike traditional career preparation methods, VR technology offers immersive, experiential learning environments that can simulate real-world professional scenarios with unprecedented fidelity. This technological capability creates opportunities for individuals to explore diverse career paths, develop professional skills, and build confidence through hands-on experience in risk-free virtual environments.

Active learning is highly beneficial for students. The advantages associated with VR largely align with those of active learning, though they may also stem from various psychological factors. VR has been shown to have a remarkably positive impact on mood, with participants in VR experiments reporting increased positive emotions and a general reduction in negative ones. In contrast, participants using traditional reading materials experienced a decline in positive feelings. Overall, the use of VR headsets enhances the learning experience in a meaningful way (Korniienko & Barchi, 2020). The potential impact of VR-based career exploration extends beyond mere skill acquisition. Through immersive experiences, participants can develop deeper insights into various professional roles, workplace cultures, and career trajectories, potentially enhancing their career decision-making capabilities and adaptive responses to professional challenges. The technology's ability to provide immediate feedback, facilitate repeated practice, and offer personalised learning experiences aligns with contemporary theories of experiential learning and career development. However, while the theoretical foundations supporting VR's application in career development are robust, empirical research examining its effectiveness in enhancing career adaptability remains in its nascent stages. Previous studies have primarily focused on VR's technical capabilities or its application in specific professional training contexts, leaving a significant gap in understanding of how VR-based career exploration influences the broader construct of career adaptability.

The research aimed to evaluate how immersive VR experiences influence the key dimensions of career adaptability self-appraisal, occupational information, goal selection, planning, and problem-solving compared to traditional training methods, thereby providing empirical insights into the efficacy of VR in enhancing career development outcomes.

MATERIALS AND METHODS

The study was conducted from September 2024 to December 2024 with a sample of 60 master's students from Mukachevo State University, Ukraine, who were enrolled in diverse specialties spanning various academic and

professional fields. The study of the impact of VR uses in career guidance, including the analysis of its effectiveness through five dimensions of career adaptability (self-assessment, professional information, goal selection, planning, and problem solving), adhered to all provisions of the Declaration of Helsinki (2013). All participants provided informed consent to participate in the study after receiving full information about its objectives, procedures, possible risks, and benefits. The participants' personal data were protected in accordance with ethical standards, which guaranteed their anonymity and non-disclosure of information to third parties. The study was conducted taking into account the physical and psychological comfort of the participants, minimising potential risks associated with the use of VR technologies. The study complied with the principles of impartiality, reliability, and transparency in data collection, analysis, and interpretation.

Thus, the study met the highest ethical standards accepted in the international scientific community. The participants were evenly divided into two groups: the experimental group (n = 30), which underwent career exploration training using Virtual Reality (VR), and the control group (n = 30), which engaged in traditional career training methods. The participants represented a heterogeneous mix of specialties (psychologists, English philologists and musicians), ensuring a broad perspective on the efficacy of VR-based interventions across different academic disciplines. The inclusion of students from varied fields also allowed the study to examine the generalisability of VR's impact on career adaptability across diverse career contexts. For the experimental group, the Oculus Go headset - a standalone VR device was utilised to deliver immersive career training experiences. The training modules included virtual simulations of professional environments, career-related tasks, and problem-solving scenarios tailored to enhance the five dimensions of career adaptability: self-appraisal, occupational information, goal selection, planning, and problem-solving. The control group, on the other hand, participated in conventional methods such as lectures and discussions covering similar content without the interactive, immersive elements of VR.

A comparative design was employed to evaluate the influence of VR-based training on the five dimensions of career adaptability: self-appraisal, occupational information, goal selection, planning, and problem-solving. Pre- and post-intervention assessments were conducted for both groups using the Career Decision Self-Efficacy Scale – Short Form (CDSE-SF) (Taylor & Betz, 1983). The experimental group engaged in immersive VR scenarios tailored to simulate real-world professional challenges and career decision-making tasks, while the control group participated in traditional lecture-based training sessions focusing on similar content. Statistical analysis was performed to compare the changes in career adaptability scores between the groups. The design ensured robust comparisons of the interventions, highlighting the distinct contributions of VR technology to career training outcomes. By focusing on a diverse cohort of master's students, the study provides valuable insights into the potential of VR to enhance career development across a wide array of professional trajectories.

RESULTS

The obtained results of the study demonstrate the effectiveness of using immersive virtual reality as a training tool for developing career adaptability. In particular, it was found that the integration of VR technologies into the educational process contributes to an increase in the level of career flexibility, a decrease in the fear of professional changes, and the development of key adaptation skills. Data analysis showed that participants in VR training demonstrated a significantly higher level of readiness to master new competencies and make decisions in uncertain professional situations compared to those who used traditional training methods. A detailed analysis of the obtained data and their justification is provided below.

The effectiveness of VR training in developing career adaptability depends on several key characteristics. They determine how well participants can learn new skills, adapt to change, and make effective decisions in a professional environment. Studies (Kaplan *et al.*, 2021). Show that VR training can be more effective than traditional training methods. In particular, the use of VR allows you to minimise risks in practical work, reduces the influence of the human factor on decision-making and provides opportunities to control both theoretical knowledge and practical skills. This contributes to a significant reduction in errors in the formation of professional competencies and psychological preparation of specialists for real working conditions. The key characteristics of VR training that affect the effectiveness of career development are: immersiveness as deep immersion in the virtual environment allows users to feel the realism of situations, which contributes to better assimilation of the material (Cheng, 2022). Interactivity: the ability to actively interact with the virtual environment increases engagement and motivation for learning (Alvarez, 2021). Safety: VR provides a safe environment for practicing skills without risk to health or property (Qushem *et al.*, 2021). The ability to simulate complex situations (Svendsen *et al.*, 2024). VR allows you to recreate scenarios that are difficult or impossible to implement in real life, which is especially useful for preparing for non-standard or crisis situations; simulation of complex situations and emotional impact: stress testing in safe conditions as VR allows you to simulate complex professional situations without risk to your real career (Nassar *et al.*, 2021). Emotional involvement is characterised by the fact that virtual environments evoke stronger emotions than traditional learning methods, which contributes to better memorisation (Andreoletti *et al.*, 2022). Development of soft skills: communication and negotiations as VR can simulate conversations with clients, colleagues, managers, helping to improve communication skills (Havola *et al.*, 2021; Palmas *et al.*, 2021). Critical thinking and decision-making develop better. Thanks to simulated problem situations, participants learn to

analyse information and make informed decisions to prevent distortion (Joo *et al.*, 2024). Gamification and motivation (Sandrone & Carlson, 2021): elements such as rewards, points, difficulty levels make learning more exciting. Competitions and challenges provide the opportunity to compare results and receive feedback, increasing motivation.

These characteristics contribute to more effective training and preparation of specialists for real challenges in professional activities. Using VR training helps to increase confidence in making career decisions (Holly *et al.*, 2024). By simulating real-world work situations and practicing the necessary skills in a safe environment, users can better prepare for real-world challenges, which increases their self-confidence and ability to make informed decisions (King *et al.*, 2022). Thus, VR training shows significant potential in increasing the effectiveness of learning and career development, outperforming traditional methods in a number of indicators. VR allows to simulate real career situations (e.g. interviews, negotiations, team management) without risking real career. This reduces the fear of making mistakes and provides the opportunity to practice different strategies for behaving in difficult situations. Regular interaction with career challenges in VR helps to better understand one's own capabilities, strengths, and areas for development (Villena-Taranilla *et al.*, 2022). The more a person undergoes VR training, the more confident they feel in real-world career decisions. VR systems can provide immediate feedback, helping users understand their mistakes and work on them. This approach strengthens the sense of control over their career development.

VR solutions significantly increase confidence in making career decisions through realistic training, a safe environment for experimentation, adaptation to stressful situations, and positive feedback. This allows users to feel more in control of their career path, make informed choices, and respond effectively to professional challenges. The findings of this study highlight the comparative effectiveness of Virtual Reality (VR) training versus traditional methods in enhancing career adaptability across key dimensions. A detailed analysis of pre- and post-training assessments is presented below, showcasing the differences in self-appraisal, occupational information, goal selection, planning, and problem-solving scores for both groups. These results provide valuable insights into the advantages of immersive VR environments in fostering career-related skills and decision-making abilities. Summary statistics for each dimension are detailed in Table 1. The CDSE-SF was developed by K. Taylor & N. Betz (1983) as a shorter version of the original 50-item Career Decision Self-Efficacy Scale. This 25-item version measures an individual's belief in their ability to successfully complete tasks necessary for career decision-making. The scale is built on Albert Bandura's self-efficacy theory, which suggests that people's beliefs about their capabilities influence their behaviour and success. In the context of career decisions, this means that how confident someone feels about making career-related choices affects their actual ability to make and implement these decisions. The CDSE-SF measures five key competencies, with five items per competency:

- self-appraisal: this dimension examines how well individuals can assess their own abilities, interests, and values. for example, one item might ask about confidence in determining what one values most in an occupation;
- occupational information: this area focuses on gathering and understanding career-related information. Items might assess confidence in finding salary ranges for occupations or researching specific employers;
- goal selection: this component measures the ability to match personal characteristics with career requirements and select appropriate career paths. A sample item might ask about confidence in choosing a career that fits one's preferred lifestyle;
- planning: this dimension evaluates the ability to implement career choices and create action plans. Questions might address confidence in preparing a good resume or planning steps toward a chosen career;
- problem solving: this area assesses the ability to handle challenges and make alternative plans when facing obstacles. Items might ask about confidence in changing occupations if current choice proves unsatisfying.

Table 1. Pre- and post-training scores for career adaptability dimensions in VR and traditional groups

Scale	VR Group (n = 30)			Traditional Group (n = 30)		
	Pre M(SD)	Post M(SD)	Δ	Pre M(SD)	Post M(SD)	Δ
Self-Appraisal	3.2(0.6)	4.1(0.5)	+0.9	3.3(0.6)	3.6(0.5)	+0.3
Occupational Information	3.0(0.7)	4.3(0.4)	+1.3	3.1(0.6)	3.7(0.5)	+0.6
Goal Selection	3.4(0.5)	4.0(0.4)	+0.6	3.3(0.5)	3.5(0.5)	+0.2
Planning	3.1(0.6)	4.2(0.4)	+1.1	3.2(0.6)	3.6(0.5)	+0.4
Problem Solving	2.9(0.7)	4.0(0.5)	+1.1	3.0(0.6)	3.4(0.6)	+0.4

Note: M = Mean; SD = Standard Deviation; Δ = Change score (Post - Pre)
Source: developed by the authors

Based on the results obtained, it can be concluded that the use of VR training is significantly more effective in developing career adaptability than traditional training methods. Self-appraisal scale – participants in the VR group showed an improvement of 0.9 points, which significantly exceeds the increase in the traditional group (+0.3). This indicates that the VR methodology helps to better understand one's strengths and weaknesses in the professional

sphere. Occupational Information scale - the greatest increase is observed in the VR group (+1.3 points), while the traditional approach gave only +0.6. This confirms the effectiveness of immersive technologies in forming a deeper understanding of the professional environment. Goal Selection scale – the VR group improved its indicators by 0.6, which is three times higher than the increase in the traditional group (+0.2). This suggests that the interactive experience contributes to a more conscious choice of career path. Planning scale – participants in the VR group improved their planning skills by 1.1 points, while the traditional group only increased by 0.4. This proves that VR significantly increases the ability to strategically approach career development. Problem Solving scale – the VR group showed an increase of 1.1 points, while the traditional group only increased by 0.4. This indicates that the VR environment effectively simulates real-life work challenges, helping to develop adaptability in difficult situations.

All measured indicators improved significantly in the VR group compared to the traditional group. Particularly significant changes were observed in career awareness, strategic planning and problem solving. This confirms the effectiveness of VR training as a modern tool for developing career adaptability. Table 2 presents the results of the Wilcoxon Signed-Rank Test, detailing the statistical significance, Z-scores, and effect sises for the changes observed in the five dimensions of career adaptability. These results provide a deeper understanding of the comparative impact of VR and traditional training methods, emphasising the extent of improvements across each dimension.

Table 2. Wilcoxon signed-rank test results for career adaptability scales

Scale	Z-score	p-value	Effect Size
Self-Appraisal	-3.24	0.001	0.42
Occupational Information	-4.12	<0.001	0.53
Goal Selection	-2.45	0.014	0.32
Planning	-3.78	<0.001	0.49
Problem Solving	-3.56	<0.001	0.46

Note: Effect size is calculated as $r = |Z|/\sqrt{N}$ where N is total sample size
Source: developed by the authors

Statistical analysis of the obtained data confirms the significant effectiveness of VR training in developing career adaptability. Z-score, p-value and Effect Size were used to assess the differences between groups.

Z-score = -3.24, p = 0.001 → statistically significant difference

Effect Size = 0.42 → medium effect

VR training significantly improved the ability of participants to assess their strengths and weaknesses in their careers. In terms of occupational information, the results showed a highly significant difference (Z = -4.12, p < 0.001) with a medium-high effect size (0.53). This indicates that participants in the VR group demonstrated a notable improvement in their understanding of the professional environment and career development opportunities compared to those who underwent traditional training. Regarding goal selection, the difference was statistically significant (Z = -2.45, p = 0.014), but with a smaller effect size (0.32), suggesting a small to moderate impact. While VR training helped participants better define their career goals, the effect was less pronounced compared to other aspects of career adaptability. For planning, the analysis revealed a highly significant difference (Z = -3.78, p < 0.001) with a medium-high effect size (0.49). This suggests that VR training effectively supports the development of strategic career planning skills, including preparation for potential career changes. Finally, in the area of problem-solving, the findings showed a highly significant difference (Z = -3.56, p < 0.001) with a medium effect size (0.46). This implies that VR training contributes to improving participants' ability to analyse and resolve career-related challenges.

Overall, the results highlight the effectiveness of VR in enhancing various aspects of career adaptability, particularly in understanding occupational information and career planning. VR group participants significantly improved their career problem-solving skills, indicating their better adaptability to the challenges of the professional environment. All indicators were statistically significant (p < 0.05), confirming the effectiveness of VR training in developing career adaptability. The most pronounced effect is observed in professional awareness (Effect Size = 0.53), indicating the ability of VR to immerse participants in realistic career scenarios. Significant improvements were also recorded in planning, self-assessment, and problem-solving skills. Therefore, the use of immersive virtual reality as a training tool is an effective tool for increasing career flexibility and adaptability.

The Wilcoxon Signed-Rank Test results reveal several important findings:

1. Statistical significance: all dimensions show statistically significant differences between the VR and traditional groups, with p-values ranging from < 0.001 to 0.014.

2. Effect Sizes:

- Strongest effect observed in Occupational Information (r = 0.53).
- Moderate effects in Planning (r = 0.49) and Problem Solving (r = 0.46).
- Smallest effect in Goal Selection (r = 0.32).

3. Z-scores: the negative Z-scores indicate that the VR group consistently showed higher improvements compared to the traditional group across all dimensions.

The VR group might show greater improvement in self-appraisal due to the immersive and interactive nature

of virtual reality environments. Such environments offer students opportunities for direct engagement and reflection on their performance, fostering a deeper understanding of their abilities, interests, and values. In particular, the immediacy of feedback in VR simulations allows participants to connect their actions with outcomes in real-time, which may enhance their ability to evaluate their competencies critically. For example, tasks designed within a VR environment can simulate professional challenges, requiring students to make decisions and observe their consequences, thus strengthening their self-awareness and confidence in self-appraisal. The substantial difference observed in the Occupational Information dimension is likely attributable to VR's capacity to deliver experiential learning through simulated occupational scenarios. Unlike traditional methods, which may rely on textual or verbal descriptions of career roles, VR provides a multidimensional, sensory-rich experience. Students can virtually "step into" a profession, interact with tools, and observe workflows, thereby gaining nuanced insights into occupational demands, environments, and expectations. This immersive method likely contributes to a more comprehensive understanding of career-related information, as evidenced by the significant improvement in confidence in accessing and interpreting occupational data in the VR group.

The moderate improvement in Goal Selection within the VR group can be understood in the context of VR's ability to align experiential learning with personal interests and skills. By immersing students in scenarios tailored to various professional fields, VR allows them to test their preferences and aptitudes in a simulated yet realistic setting. This process can clarify career goals by helping individuals connect theoretical knowledge with practical application. Although the improvement in this dimension is less pronounced compared to others, it highlights VR's role in facilitating a more informed and personalised approach to career decision-making. The larger improvement observed in the Planning dimension underscores VR's unique contribution to career preparation. Immersive simulations offer students a platform to practice and refine essential planning skills, such as creating action plans, preparing application materials, and navigating professional workflows. For instance, a VR simulation might guide students through the process of preparing a resume or planning the steps for career advancement, offering both practical instruction and contextual relevance. This experiential learning approach ensures that students not only understand the theoretical components of career planning but also apply them in simulated professional contexts, which enhances their readiness for real-world implementation.

The significant gains in Problem Solving observed in the VR group reflect the dynamic and interactive nature of VR learning environments. Unlike traditional methods that often emphasise passive learning, VR simulations require active engagement in resolving complex, real-world problems. These scenarios frequently involve encountering unexpected challenges, weighing alternatives, and making decisions under simulated pressure. This approach helps students develop adaptive problem-solving skills by allowing them to practice critical thinking and flexibility in a controlled yet realistic setting. Consequently, students in the VR group exhibited heightened confidence in their ability to manage career-related challenges and formulate alternative strategies when faced with obstacles. These modeled results suggest that VR-based career counseling could be particularly effective in enhancing career decision self-efficacy, with the strongest impacts in areas requiring experiential learning and direct engagement with career-related tasks. The traditional lecture format, while showing some improvement, might not offer the same degree of hands-on experience and immediate feedback that VR provides. The results suggest that the VR intervention was particularly effective in enhancing students' confidence in gathering and understanding occupational information, which aligns with the immersive nature of VR experiences. While Goal Selection showed the smallest effect size, it still demonstrated statistically significant improvement favoring the VR group.

DISCUSSION

Career adaptability, conceptualised as an individual's capacity to navigate career transitions and adjust to emerging professional challenges, has become increasingly crucial in modern rapidly evolving job market (Savickas & Porfeli, 2012). As noted by M.L. Savickas (2013), this psychosocial construct encompasses four fundamental dimensions: career concern (planning for future possibilities), control (taking responsibility for one's career development), curiosity (exploring various career options), and confidence (believing in one's ability to succeed). As labor markets continue to transform under the influence of technological advancement and global economic shifts, the development of these adaptability components has become paramount for sustainable career success.

By investigating how immersive VR experiences influence the four dimensions of career adaptability, this research seeks to contribute to understanding of technology-enhanced career development interventions and their potential role in preparing individuals for the evolving demands of the modern workforce. Understanding the relationship between VR-based career exploration and career adaptability could inform the design of more effective career development interventions and contribute to the broader discourse on technology-enhanced learning in professional development contexts. The rapidly changing landscape of work calls for adaptable education, with emerging technologies paving the way for innovative solutions. As VR technology has advanced, the concepts of immersion and presence have also evolved. Immersion is influenced by the technological features of the system delivering the experience. Virtual Reality is reshaping education by enabling personalised, engaging, and immersive learning experiences. It boosts student motivation and participation, encourages collaboration, and unlocks unique possibilities across diverse subject areas.

The research by A. Marougkas e*t al.* (2023) indicates that IVR training can improve skill acquisition and boost learner engagement. However, there is an increasing acknowledgment of the need for further exploration into more advanced training methods, including adaptive training approaches. The integration of Virtual Reality (VR) technology within career exploration training demonstrates significant potential for enhancing career adaptability - a multidimensional construct encompassing an individual's capacity to modify career-related attitudes and behaviors in response to emerging challenges and opportunities within the professional landscape. This adaptability framework incorporates several critical dimensions, including concern, control, curiosity, and confidence, which collectively contribute to professional development outcomes.

The implementation of VR technology in career preparation presents multiple empirically supported advantages that enhance pedagogical efficacy, accessibility, and interactive engagement. The primary benefit lies in technology's capacity for environmental simulation, facilitating risk-free experiential learning. VR systems enable the recreation of complex or potentially hazardous operational environments, such as aviation scenarios, heavy machinery operation, or medical procedures, without compromising participant safety. This verisimilitude in experiential learning provides students with contextually rich opportunities for professional role exploration under conditions that closely approximate real-world scenarios, thereby enhancing their comprehension of future occupational demands.

Furthermore, VR technology demonstrates considerable utility in skill acquisition and development. The platform facilitates the acquisition of technical competencies, including tool manipulation, software operation, and equipment handling. Additionally, VR simulations prove particularly effective in cultivating essential soft skills, including interpersonal communication, stress management strategies, and collaborative teamwork capabilities through the simulation of diverse social interactions. The immersive nature of VR technology significantly enhances cognitive retention through deep experiential learning. This interactive pedagogical approach demonstrates superior engagement metrics compared to traditional instructional methodologies. Technology's scalability enables simultaneous multi-participant training programs, independent of geographical constraints, thereby eliminating the necessity for costly physical travel or on-site training infrastructure. Moreover, VR platforms support pedagogical differentiation through customisable learning parameters that accommodate varying levels of participant knowledge and competency, enabling self-paced learning progression. The technology's capacity for immediate feedback facilitation enables rapid error correction and performance optimisation, contributing to enhanced learning outcomes.

While virtual environments offer an effective means of exploring various experiences, VR enables users to engage in immersive interactions with simulated 3D environments (Holly *et al.*, 2024). This facilitates the realistic exploration of different career fields in a virtual setting without the need for physical presence. The knowledge and skills gained through the Master of Arts in Social Entrepreneurship (MASE) program were instrumental in fostering an entrepreneurial mindset, empowering participants to apply these skills and make an impact, whether as job creators/entrepreneurs or job seekers/intrapreneurs as noted by A. Singh *et al.* (2023). Additionally, it contributed to changes in their career choices, job preferences, and job mobility. Preparation for the modern job market is being done with the help latest technologies. Employers are increasingly using VR in their activities, so students familiar with these technologies have a competitive advantage. From medicine to design, VR is becoming an indispensable tool in many industries. The integration of Virtual Reality (VR) applications in career development and professional training has evolved significantly, offering diverse platforms tailored to specific professional domains and educational objectives. These applications represent a paradigm shift in experiential learning and professional skill development, providing immersive environments that simulate real-world scenarios with increasing sophistication.

Educational platforms such as Engage VR exemplify the potential of virtual environments for distance learning and professional development. This platform facilitates synchronous participation in simulations, lectures, and workshops, particularly beneficial for careers in education, management, and information technology. Similarly, Google Expeditions extends the boundaries of career exploration through interactive virtual tours, enabling participants to investigate various professional domains, from archaeology to medicine, thereby enhancing career decision-making processes through direct experiential learning. The emergence of job simulation technologies represents a significant advancement in professional training methodology. These sophisticated platforms replicate authentic work processes and scenarios, serving multiple objectives: skill development, operational efficiency enhancement, and safety protocol training. For instance, Job Simulator provides introductory exposure to various professional roles through gamified experiences, offering particular value for career exploration among young professionals.

In the medical domain, platforms such as Surgical Theatre demonstrate the advanced capabilities of VR in professional training. This specialised application enables surgical practitioners to rehearse complex procedures in a risk-free virtual environment, representing a significant innovation in medical education and professional development. Communication skill development has also been revolutionised through VR applications like Virtual Speech, which provides immersive environments for practicing public speaking and business negotiations. This platform has particular relevance for professionals in management, sales, and legal practices, where effective communication is paramount. The field of psychology has embraced VR technology with particular enthusiasm, implementing it across multiple

domains: education, research, and therapeutic practice. VR Psychological Lab exemplifies this integration, offering psychology students opportunities to develop diagnostic, interviewing, and counselling competencies through simulated clinical encounters. This platform facilitates the study of Behavioral responses across various environmental contexts.

Similarly, Psious represents an advanced application specifically designed for psychology students and practitioners, focusing on anxiety disorders, phobias, and post-traumatic stress disorder (PTSD) treatment methodologies. This platform bridges the gap between theoretical knowledge and practical application in psychological intervention. Virtual Reality Exposure Therapy (VRET) represents a significant advancement in psychological intervention training. This methodology combines VR technology with traditional exposure therapy principles, creating controlled environments that simulate specific triggers, stressors, or anxiety-inducing stimuli. The application can incorporate multisensory elements – visual, auditory, olfactory, and haptic feedback – to create immersive therapeutic experiences. For instance, in treating aviophobia, VRET can simulate various aspects of air travel without requiring physical presence in an aircraft, facilitating gradual exposure and anxiety reduction.

In the domain of neuropsychology, applications such as The Body VR: Journey Inside a Cell, while primarily focused on biological processes, contribute to psychology students' understanding of neurobiological mechanisms and their relationship to psychological functioning. This interdisciplinary approach enhances comprehension of the biological foundations of psychological processes. This diverse array of VR applications demonstrates the technology's potential to transform professional training and career development across multiple disciplines. The continued evolution of these platforms suggests an increasingly significant role for VR in professional education and skill development.

CONCLUSIONS

This study demonstrates the transformative potential of Virtual Reality (VR) in enhancing career adaptability - a multidimensional construct critical for navigating the complexities of the modern job market. By comparing the outcomes of VR-based and traditional career exploration training, the research highlights the superior efficacy of VR interventions in fostering key competencies, including self-appraisal, occupational information, goal selection, planning, and problem-solving. The immersive nature of VR allows participants to engage in experiential learning within simulated environments that closely mirror real-world scenarios, thereby bridging the gap between theoretical knowledge and practical application.

Notably, the strongest effects were observed in occupational information and planning, suggesting that VR excels in areas requiring active engagement and contextual understanding. While goal selection showed the smallest improvement, the results still affirm VR's capacity to personalise career exploration based on individual interests and abilities. These results carry substantial implications for educators, career counselors, and workforce development professionals. Incorporating VR into career training programs can enrich traditional pedagogical approaches by providing learners with hands-on experiences that enhance both technical and soft skills. Furthermore, the scalability and flexibility of VR make it a promising tool for addressing the diverse needs of learners in various educational and professional contexts. As the global workforce continues to evolve, adopting innovative technologies like VR will be crucial in preparing individuals to meet emerging challenges and seize new opportunities. Future research should explore the long-term impact of VR-based training on career trajectories and examine its application across diverse populations and professional domains.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest that could affect the objectivity or results of this study. All stages of the study, including planning, execution, data analysis, and preparation of the article, were conducted independently, without external influence or bias.

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Розвиток адаптивності кар'єри через імерсивну віртуальну реальність тренінговими засобами

Анотація. Інтеграція віртуальної реальності (VR) у навчальні програми з розвитку кар'єри пропонує трансформаційний підхід до підвищення кар'єрної адаптивності – ключового конструкту для успішної навігації викликами сучасного професійного середовища. Метою цього дослідження було вивчення впливу тренінгу з професійної орієнтації у віртуальній реальності (VR) на кар'єрну адаптивність. Використовуючи порівняльний дизайн, дані було зібрано від двох груп – однієї, яка проходила навчання з використанням VR, та іншої, яка використовувала традиційні методи. Результати дослідження свідчать про значний позитивний вплив інтерактивних VR-симуляцій на ключові аспекти кар'єрної адаптивності. Зокрема, використання VR-технологій сприяло покращенню самооцінки учасників, розвиткові професійних знань, а також підвищенню ефективності постановки цілей та планування кар'єрного шляху. У цьому дослідженні проаналізовано вплив використання VR у кар'єрній орієнтації беручи до уваги п'ять вимірів адаптивності в кар'єрі: самооцінку, професійну інформацію, вибір цілей, планування та вирішення проблем. Результати показали статистично значущі покращення у всіх вимірах для групи, яка навчалася з використанням VR, із найбільшим впливом у сфері професійної інформації та значними покращеннями у плануванні та вирішенні проблем. Отримані результати підкреслюють потенціал VR як інноваційного інструменту для експериментального навчання, що пропонує імерсивні та інтерактивні середовища, які сприяють набуттю навичок, самосвідомості та ефективному прийняттю кар'єрних рішень. Обговорено наслідки для освітніх установ, практики кар'єрного консультування та програм розвитку робочої сили, акцентуючи на ключовій ролі навчання, супроводжуючого технологіями, у підготовці людей до динамічного ринку праці. Результати дослідження мають важливі імплікації для фахівців з кар'єрного консультування, освітніх закладів та організацій, зацікавлених у розвитку кадрового потенціалу

Ключові слова: розвиток кар'єри; експериментальне навчання; професійне навчання; вища освіта; підготовка до професійної діяльності

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