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Using Virtual Reality Simulations to Build Professional Skills in Learners with Special Educational Needs

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ABSTRACT

This paper envisaged to examine the role of Virtual Reality (VR) simulations as a pedagogical tool for strengthening professional skills among learners with Special Educational Needs (SEN) at secondary stage of school education. Drawing on experiential learning, the study evaluated how immersive and interactive environments can enhance their preparation for a professional life by offering secure, competency based, and contextually meaningful practice suited to diverse learner profiles. Using a semi-structured interview with educators and participants the investigation assessed the effect of VR-based modules on professional skills such as communication, teamwork, problem-solving, adaptability, and task-related proficiency. The immersive character of VR reduces the performance anxiety associated with traditional instructional approaches, and its adaptive features promote accessibility and inclusivity. Findings affirmed the significance of embedding VR within curricula to enhance professional skills and competencies for individuals with SEN and emphasize the need for collaboration among educators, technology developers, and policymakers to create cost-effective approaches. By demonstrating the

potential of VR to narrow the gap between education and professional life, this study aimed to contribute towards research and practice in inclusive vocational education and offer guidance for designing innovative, learner-centered strategies.

Introduction

In recent decades, the focus of education has shifted from rote memorization and content mastery towards holistic development that includes social, emotional, and professional skills. For learners with Special Educational Needs (SEN), this shift is particularly crucial, as their ability to thrive in future professional environments depends on opportunities for structured and adaptive skill-building during their school years. The secondary stage of education, a critical transitional period from adolescence to young adulthood, often marks the point where learners begin preparing for professional life, internships, and employment opportunities.

However, traditional teaching methods frequently fail to meet the unique learning requirements of SEN students in this regards.Professional skills—such as teamwork, communication, problem-solving, adaptability, and task-specific competence—are now recognized as essential "employability skills" (OECD, 2018). Yet, many students with SEN encounter systemic barriers to developing them. These barriers stem not only from the limitations of conventional instruction but also from broader socio-cultural perceptions that restrict opportunities for learners with disabilities (Lindsay, 2007). Employers often perceive SEN learners as less "work-ready," not because of lack of potential, but because of the absence of structured opportunities to practice workplace competencies in safe and supportive environments (Carter et al., 2012).

It is within this context that Virtual Reality (VR) simulations are gaining traction as a transformative tool in inclusive education. VR refers to immersive, computer-generated environments that allow learners to interact with simulated real-world scenarios using visual, auditory, and sometimes tactile feedback (Slater & Sanchez-Vives, 2016). Unlike passive instructional methods, VR actively engages learners in authentic experiences, creating opportunities to "learn by doing." For learners with SEN, this experiential quality is particularly significant. By providing safe spaces for trial and error, VR reduces performance anxiety and enhances confidence (Kahlon & Lindner, 2020). Moreover, its adaptive features—such as adjustable levels of difficulty, multimodal cues, and repeatability—make learning more personalized and accessible.

The application of VR in special education has been explored across diverse domains, including cognitive development, social skill training, and rehabilitation. For example, Standen and Brown (2005) demonstrated how VR environments could be used to support life-skill training in learners with intellectual disabilities, offering practice in tasks such as shopping or using public transport. More recently, VR has been deployed in training individuals on the autism spectrum to handle social interactions, with promising results in increasing confidence and reducing anxiety (Parsons & Cobb, 2011; Wallace et al., 2017). Despite these advancements, there is relatively limited research specifically focused on VR as a means of strengthening professional or vocational skills in learners with SEN at the secondary stage.

This paper seeks to address this gap by examining how VR simulations can be used to prepare SEN learners for professional life. Specifically, it investigates the effectiveness of VR-based learning environments in enhancing communication, teamwork, adaptability, problem-solving, and task proficiency—skills that are indispensable for employability. The study draws upon experiential learning theory (Kolb, 1984), which emphasizes that meaningful learning occurs when individuals actively engage with experiences, reflect upon them, and apply new insights in subsequent tasks. By aligning VR pedagogy with experiential learning, educators can create structured opportunities for SEN learners to practice professional skills in realistic yet controlled environments.

Moreover, the study acknowledges the broader socio-educational context in which such interventions must operate. The integration of VR into SEN education requires not onlypedagogical innovation but also collaboration among educators, policymakers, and technology developers. Issues such as cost, accessibility, teacher training, and curriculum integration must be addressed to ensure that VR serves as a genuinely inclusive and sustainable solution (UNESCO, 2020).

VR in Vocational and Professional Skills Training

A growing body of empirical work shows VR's promise as a tool for vocational education and for building work-related competencies. Recent systematic and empirical studies report that immersive VR (IVR) can enhance learner engagement, increase motivation, and improve procedural or task-based skills when training is designed around authentic, practice-oriented simulations (Muskhir, 2024; Long et al., 2024). For instance, Long et al. (2024) conducted a comparative analysis of VR in vocational practical training and reported improved student satisfaction and higher levels of procedural mastery in trade-

oriented tasks after IVR interventions. These effects are strongest when the simulation mirrors real work conditions and allows for repeated hands-on practice without real-world risk.

However, the literature also signals nuance: objective gains in declarative knowledge are not always larger in VR than in more traditional formats (e.g., paper or video), but VR frequently outperforms other approaches on measures of motivation, immersion, and procedural fluency—the very outcomes vocational education often prioritizes (Thomann, 2024). In other words, VR's comparative advantage often lies in doing rather than in rote knowing, which directly maps onto vocational and workplace readiness goals.

UNESCO and TVET practitioners have also begun repositioning VR from a niche novelty to a practical innovation for skill systems. Learning labs and practitioner reports from international technical-vocational networks highlight VR's utility for scaling simulated practice across geographically dispersed training centers (UNEVOC/UNESCO, 2024). These policy-level activities reflect early consensus that VR can complement—and sometimes substitute for—expensive or hazardous real-world training setups.

VR for Learners with Special Educational Needs (SEN)

Work exploring VR with SEN populations—especially learners on the autism spectrum, those with learning difficulties, and learners needing motor-skill support—has yielded encouraging results. Parsons and Cobb's foundational reviews argue that virtual environments provide controlled, repeatable, and safe contexts for practicing social and vocational behaviors that might be difficult to rehearse in ordinary classrooms (Parsons & Cobb, 2011). These authors show how VR role-plays can reduce sensory unpredictability while enabling scaffolder exposure to social scenarios.

More recent empirical studies deepen this picture. Didehbani et al. (2016) found that structured VR social-cognition training led to improvements in social understanding and perspective taking for young people with autism—outcomes that are precursors to workplaceCommunication and teamwork skills. Similarly, experts across countries have endorsed VR as a promising medium for motor-skill practice in children with diverse needs, particularly because VR supports repetitive, graded practice with real-time feedback (Karadağ et al., 2025). These findings suggest VR is not a one-size-fits-all solution but a highly adaptable medium that can be tuned to individual profiles.

Qualitative and mixed-methods work also show that learners with SEN often respond favorably to VR's immersive affordances: increased attention, reduced social fear, and greater willingness to attempt tasks

that they might avoid in face-to-face settings (Yeh et al., 2025). At the same time, studies repeatedly call out implementation barriers—cost, teacher readiness, and insufficiently accessible software/hardware—meaning that promising pilot results do not automatically translate into scalable practice without systemic supports.

Literature Review

The integration of Virtual Reality (VR) into education has attracted increasing scholarly attention due to its capacity to simulate authentic, immersive environments that foster both procedural and interpersonal skill development. Within vocational and inclusive education contexts, VR has been examined for its potential to enhance engagement, provide situated practice, and reduce barriers to participation for learners with Special Educational Needs (SEN). This section reviews existing literature across three domains: VR in vocational and professional skills training, VR applications for SEN learners, and the mechanisms through which VR exerts its pedagogical effects.

A growing body of research highlights VR's effectiveness in vocational education, particularly for building work-related competencies. Long et al. (2024) found that immersive VR significantly improved student engagement and procedural mastery in trade-oriented tasks compared to traditional training. Their study emphasized that authentic, practice-oriented simulations allowed students to rehearse tasks repeatedly in low-risk settings. Similarly, Thomann (2024) reported that while VR may not always produce higher outcomes in declarative knowledge, it consistently outperforms traditional approaches in motivation, immersion, and procedural fluency—skills closely tied to employability.

At a broader policy level, UNESCO's technical and vocational education initiatives recognize VR as an innovation with the potential to scale simulated training across contexts, especially where access to real-world practice is limited (UNESCO, 2020). These findings suggest that VR's advantage lies less in replacing conventional methods and more in complementing them by offering safe, repeatable, and context-rich learning environments.

The application of VR in inclusive education has been studied most extensively with learners on the autism spectrum, those with learning difficulties, and individuals requiring motor-skill support. Parsons and Cobb (2011) argued that VR provides controlled, repeatable, and safe environments where learners with autism can rehearse social and vocational behaviorswithout the unpredictability of real-world contexts. Their review established VR as a promising medium for inclusive skill-building.

Building on this, Didehbani et al. (2016) demonstrated that VR-based social cognition training improved perspective-taking and communication skills among young people with autism. Similarly, Karadağ et al. (2025) explored VR for motor-skill development and found it effective in enabling repetitive, graded practice with immediate feedback, a feature especially beneficial for children with SEN. Yeh et al. (2025) further noted that VR increased learners' attention, reduced social fear, and enhanced their willingness to attempt challenging tasks—outcomes strongly linked to workplace readiness.

Nevertheless, barriers to implementation remain. Studies consistently highlight issues such as high costs, teacher preparedness, and the accessibility of hardware and software as challenges to mainstreaming VR in SEN classrooms (Lindgren & Johnson-Glenberg, 2013). These findings underscore the importance of systemic support if VR is to be integrated sustainably into inclusive education.

Kolb's (1984) experiential learning theory provides a strong foundation for understanding VR's pedagogical value. The cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation aligns closely with VR-based practice. Learners can engage in simulated workplace tasks (concrete experience), review and discuss their performance (reflective observation), derive strategies for improvement (abstract conceptualization), and retry the simulation (active experimentation). Empirical studies in vocational education confirm that VR supports deeper learning when coupled with guided reflection (Huang, Rauch, & Liaw, 2010).

Performance anxiety is a significant barrier for many SEN learners, particularly in social or professional contexts. Parsons (2002) and later Kahlon and Lindner (2020) found that VR's controlled environments reduced anxiety by providing opportunities for learners to practice without the immediate social consequences of mistakes. This reduction in fear fosters greater confidence, which is crucial when learners transition from school into workplace environments.

Another mechanism underpinning VR's effectiveness is its adaptability. Lindgren and Johnson-Glenberg (2013) highlighted VR's ability to integrate multimodal inputs—visual, auditory, and kinesthetic cues—that can be adjusted to meet learners' individual needs. Such adaptability supports Universal Design for Learning (UDL) principles and makes professional-skill training accessible to diverse SEN profiles. At the same time, poor interface design or excessive sensory input can undermine these benefits, highlighting the importance of thoughtful design in VR applications (Smith et al., 2021).

VR's capacity to improve procedural and interpersonal skills reduces anxiety, and foster engagement for learners with SEN (Parsons & Cobb, 2011; Long et al., 2024; Thomann, 2024). However, gaps remain in

the evidence base. First, many studies focus on short-termoutcomes rather than long-term transfer of VR-trained skills to real workplaces. Second, there is limited large-scale research on cost-effectiveness and accessibility, particularly in low-resource settings. Third, while autism-focused research is well developed, less is known about VR's role for learners with multiple or severe disabilities.

These gaps justify the present study's focus on SEN learners at the secondary stage and the use of VR for building professional competencies such as teamwork, communication, problem-solving, adaptability, and task proficiency. By centering these skills, the study contributes to a relatively underexplored intersection of inclusive education, vocational preparation, and immersive technology.

Research Objectives and Questions

The overarching objective of this study was to examine how Virtual Reality (VR) simulations can serve as an inclusive pedagogical tool to develop professional skills in learners with Special Educational Needs (SEN) at the secondary school level. The study draws from experiential learning theory to explore how immersive, adaptive, and interactive environments can enable SEN learners to practice and refine professional competencies within a secure and supportive environment.

Objectives

1. To investigate the role of VR simulations in strengthening core professional skills—communication, teamwork, adaptability, problem-solving, and task-specific proficiency.

2. To explore educators' and learners' perceptions of the benefits and challenges of VR-based skill development.

3. To assess the potential of VR in bridging the gap between school education and future professional life for SEN learners.

4. To identify implications for curriculum design, teaching practice, and policy development in inclusive vocational education.

Research Questions:

1. How do VR simulations enhance professional skills among learners with SEN at the secondary stage?

2. What is the impact of immersive VR environments on learners' self-confidence, adaptability, and performance readiness?How do educators perceive the effectiveness of VR in fostering professional skill-building for SEN learners?

3. What are the challenges and limitations of integrating VR into inclusive classrooms?

4. How can VR-based approaches be scaled and embedded into existing school curricula to support inclusive vocational education?

5. Methodology

This study adopted a qualitative exploratory design, given the limited prior research specifically addressing VR in SEN contexts for professional skill development. The approach aimed to generate in-depth insights into experiences, perceptions, and outcomes.

Participants:

Learners: 20 secondary-stage students with mild to moderate learning difficulties, identified through school records.

Educators: 8 special educators and vocational trainers with experience in inclusive classrooms.

Data Collection Method:

Semi-structured interviews were conducted with both educators and learners. This method enabled flexibility in probing while maintaining a structured focus on professional skills development.

Learners were also observed during VR sessions to capture behavioral, emotional, and interactive responses.

VR Modules Used:

The VR modules simulated real-world professional tasks such as customer interaction, group problem-solving, workplace communication, and role-specific activities (e.g., operating equipment in retail or hospitality).

Data Analysis:

Data were analyzed using thematic analysis (Braun & Clarke, 2006), enabling the identification of recurring patterns and themes across participant responses.

Coding categories included: professional skill acquisition, learner confidence, adaptability, inclusivity, and barriers.Ethical Considerations:

- Informed consent was obtained from all participants and their guardians.
- Pseudonyms were used to protect identities.
- Participation was voluntary, with withdrawal permitted at any stage.

Findings and Analysis

The thematic analysis of data from semi-structured interviews, participant observations, and reflective notes revealed five major themes regarding the role of Virtual Reality (VR) in building professional skills for learners with Special Educational Needs (SEN). These themes—enhanced communication, teamwork and collaboration, problem-solving and adaptability, task-specific proficiency, and inclusivity—capture both learner outcomes and educators' perceptions. Each theme is elaborated below with supporting evidence from participants and relevant literature.

1. Enhanced Communication Skills

One of the most significant findings of this study was that VR simulations improved learners' communication abilities. Learners reported feeling more confident when engaging in workplace-like interactions during VR modules. For example, in role-play simulations involving customer service scenarios, learners were able to practise greeting customers, responding to queries, and clarifying instructions without the pressure of a live audience. Educators noted that learners were more willing to speak up and experiment with language in VR settings compared to traditional classroom role plays.

One teacher observed:

"VR allows learners to rehearse communication without fear. They can repeat conversations, hear their own responses, and improve without embarrassment."

This aligns with Parsons and Cobb's (2011) findings that VR provides controlled, repeatable opportunities for practising communication skills, particularly for SEN learners who may experience anxiety in face-to-face settings. Similarly, Didehbani et al. (2016) reported that VR social skills training resulted in measurable improvements in learners' ability to understand and engage in workplace communication scenarios.

From an analytical perspective, this finding suggests that VR's immersive and interactive qualities create a safe practice environment, reducing social barriers and enabling iterative skill improvement. It also highlights the importance of designing VR modules with realistic dialogue and contextual cues to maximise communicative authenticity (Lindgren & Johnson-Glenberg, 2013).Improved Teamwork and Collaboration

Teamwork emerged as another significant area of skill development. VR modules designed around collaborative problem-solving tasks—such as assembling virtual equipment or managing a virtual retail outlet—encouraged peer interaction, shared decision-making, and mutual support. Learners with SEN displayed greater willingness to cooperate in VR settings, often initiating communication and dividing responsibilities organically.

For instance, during a virtual hospitality module, students assumed different roles (host, service provider, cashier) and worked together to meet a task deadline. Educators noted that learners who were typically reluctant to engage in group work in physical classrooms participated actively in VR sessions.

Educator feedback emphasized:

"The immersive environment makes collaboration tangible. Learners see the impact of their joint actions, which strengthens teamwork skills."

This finding is supported by Voogt and Roblin (2012), who emphasise collaboration as a key 21st-century skill. VR's capacity to replicate authentic workplace settings makes it especially valuable for building teamwork skills, allowing learners to experience both the challenges and rewards of cooperative work (Howard & Gutworth, 2020).

Analytically, these results suggest that VR can enhance not only interpersonal collaboration but also cognitive engagement through shared problem-solving. However, effective teamwork training depends on VR module design, requiring scenarios that encourage interaction rather than passive observation.

2. Problem-Solving and Adaptability

The study found that VR simulations significantly improved learners' problem-solving abilities and adaptability. VR modules incorporated dynamic challenges and unexpected changes—such as altered task requirements, time constraints, or simulated technical difficulties—which forced learners to adapt their strategies in real time.

For example, in a virtual retail scenario, learners were required to adjust to changes in customer demand while maintaining service quality. Educators reported that learners initially struggled but gradually developed confidence in adjusting their approach. This adaptability aligns with findings by Lindgren and Johnson-Glenberg (2013), who reported that VR's interactive environments foster cognitive flexibility and situational responsiveness.

Learner reflections indicated increased self-awareness:

"I learned I can try different ways to solve a problem without worrying about failing in real life."From an analytical standpoint, these findings underscore the value of VR for developing higher-order professional skills. Problem-solving and adaptability are not merely technical abilities—they involve situational analysis, emotional regulation, and decision-making under uncertainty, all of which VR can simulate effectively.

3. Task-Specific Proficiency

The repeated practice afforded by VR simulations led to measurable improvements in task-specific proficiency. Learners were able to internalise procedures through iterative practice, supported by immediate feedback within the VR environment. This was particularly evident in modules requiring sequential actions—such as processing orders, assembling items, or following safety protocols.

Educators highlighted:

"Learners could repeat tasks as many times as needed without stress. This repetition helped them master procedures they struggled with in traditional practice."

This observation reflects Long et al. (2024), who noted that VR allows learners to practise procedural skills in a way that traditional methods rarely allow. For SEN learners, who benefit from repetition and scaffolding, this feature of VR is particularly important. The capacity to simulate authentic workplace

tasks with no real-world risk allows learners to gain confidence and competence before applying their skills in actual settings.

4. Inclusivity and Accessibility

The adaptive features of VR—such as adjustable sensory settings, visual prompts, and customizable difficulty levels—were found to be particularly beneficial for SEN learners. Educators observed that these features allowed learners with diverse needs to engage meaningfully with simulations, aligning with Universal Design for Learning principles (CAST, 2018).

However, some limitations were noted. For instance, learners with sensory sensitivity occasionally experienced discomfort due to visual or auditory stimuli, indicating that accessibility features must be carefully designed and adjustable (Smith et al., 2021). Additionally, technical glitches and the need for teacher guidance highlighted the importance of proper training and infrastructure support for effective VR use.

Analytically, these findings suggest that while VR holds great promise for inclusivity, its design must be intentional, flexible, and responsive to individual learner profiles. The success of VR-based professional skill development depends not only on the technology itself but also on how it is integrated into a pedagogical framework that is adaptive and learner-centred.

5. Cross-Theme AnalysisWhen analysed holistically, these themes demonstrate that VR's strength lies in its ability to provide safe, repeatable, context-rich environments for practising professional skills. The immersive nature of VR reduces anxiety and allows for iterative skill development, while adaptive design ensures accessibility for diverse learner profiles. These findings resonate with prior research that underscores VR's role as a complement to traditional pedagogy rather than a replacement (Parsons & Cobb, 2011; Kahlon & Lindner, 2020).

Furthermore, the findings indicate that VR not only develops discrete skills but also contributes to self-efficacy and learner empowerment. Confidence gained through VR practice translates into greater readiness to engage in real-world professional contexts, fulfilling the core aim of vocational education for SEN learners (OECD, 2018).

Discussion

The findings of this study confirm that Virtual Reality (VR) has considerable pedagogical value in developing professional skills for learners with Special Educational Needs (SEN) at the secondary stage. The immersive, interactive, and adaptive qualities of VR make it an effective medium for experiential learning, aligning closely with Kolb's (1984) model, where learners cycle through concrete experience, reflective observation, abstract conceptualization, and active experimentation. This cyclical learning process enables learners not only to acquire skills but also to internalize them for application in real-world settings (Huang, Rauch, & Liaw, 2010).

Communication skills emerged as one of the most positively impacted domains. Learners demonstrated increased comfort and confidence in simulated workplace interactions, an outcome that aligns with findings from Parsons and Cobb (2011) and Didehbani et al. (2016), who reported improved social and communication outcomes among SEN learners through VR-based role play. VR offers a safe, controlled setting for rehearsing communication scenarios without the fear of judgment, which is crucial for learners who experience anxiety in face-to-face interactions (Kahlon & Lindner, 2020).

The teamwork-related findings corroborate the claims of Voogt and Roblin (2012) that collaboration is a critical 21st-century competency. The VR modules provided learners with shared spaces where they could work together to solve problems, simulating authentic workplace environments. This form of experiential group work differs significantly from traditional classroom activities by enabling learners to engage in interactive problem-solving, decision-making, and peer negotiation in real-time.

Problem-solving and adaptability were significantly enhanced through VR simulations that incorporated unpredictable challenges and decision points. These results echo Lindgren and Johnson-Glenberg's (2013) findings that VR promotes deeper cognitive engagement by providing dynamic scenarios that require learners to adapt their strategies. This adaptability isa crucial employability skill, enabling learners to respond effectively to evolving work contexts.

Learners also developed improved task-related competencies, especially through repetitive practice and immediate feedback provided in VR environments. This finding reflects Long et al. (2024), who emphasized that VR offers the advantage of procedural rehearsal without real-world consequences, thereby accelerating skill acquisition. For SEN learners, this advantage is particularly important, as repetition and scaffolded practice help build confidence and competence.

A particularly noteworthy finding was VR's potential for inclusivity. Adaptive features such as adjustable sensory inputs, visual prompts, and customizable levels of difficulty allowed learners with different needs to engage meaningfully. This aligns with the principles of Universal Design for Learning (UDL), which advocate for flexible learning environments to accommodate diverse learners (CAST, 2018). However, educators also emphasized the need for careful design to ensure accessibility and prevent cognitive overload (Smith et al., 2021).

The discussion extends beyond skill outcomes to pedagogical and systemic implications. As UNESCO (2020) stresses, integrating VR into educational practice requires alignment with curriculum objectives, teacher preparedness, and access to resources. Educators in the study highlighted that VR should complement rather than replace traditional methods, ensuring a blended approach that leverages the strengths of both. This integration can enhance inclusivity while providing authentic practice environments for SEN learners.

The findings suggest that VR has potential to narrow the gap between education and employment for learners with SEN. As identified in OECD (2018), employability is not solely about academic achievement but about demonstrating competencies in real-life contexts. VR addresses this by bridging the experiential gap—providing learners with practice opportunities that would be difficult to replicate in conventional classrooms due to logistical, safety, or resource constraints.

Despite the positive outcomes, this study aligns with the literature in acknowledging limitations in VR-based skill training. While VR is effective for procedural and interpersonal skill development, long-term transfer to actual workplace performance is still under-researched (Conrad, 2024). Additionally, accessibility issues, costs, and teacher readiness remain barriers to widespread adoption (Lindgren & Johnson-Glenberg, 2013). Therefore, while VR holds promise, its scalability and sustained effectiveness depend on systemic interventions in teacher training, policy frameworks, and technology design.

Challenges and Limitations

Despite its promise, the study also identified significant challenges:Cost and Infrastructure: High costs of VR equipment and limited availability of technical support hinder large-scale adoption.

Technical Issues: Occasional glitches disrupted learning flow, causing frustration for some learners.

Training Needs: Teachers required specialized training to effectively integrate VR modules. Time Constraints: Limited classroom time restricted opportunities for extended practice.

Sample Size: Findings are based on a small, context-specific group, limiting generalizability.

Recommendations and Implications

Based on the findings, several **recommendations** emerge:

1. Curriculum Integration: VR modules should be embedded within inclusive vocational curricula to ensure structured, competency-based progression.

2. Collaborative Development: Policymakers, educators, and VR developers should collaborate to design cost-effective, context-specific modules tailored to SEN learners.

3. Capacity Building: Professional development workshops are needed to equip educators with skills for VR integration.

4. Scalable Models: Schools should explore shared resource centers where VR equipment can be accessed by multiple institutions.

5. Learner-Centered Approaches: Future VR designs should prioritize adaptive, customizable features to address diverse learner profiles.

The findings of this study point to several **implications** for future research and practice:

Longitudinal Studies: Future research should explore the long-term impact of VR-based training on employment outcomes for SEN learners. This includes whether VR-trained skills transfer effectively into workplace performance.

Cost–Benefit Analyses: Research should examine the economic viability of VR adoption in inclusive education to guide sustainable investment decisions.Scalability Studies: Research should explore models for scaling VR in inclusive education, including shared infrastructure and low-cost VR solutions.

Conclusion

This study highlights the transformative potential of Virtual Reality (VR) as a pedagogical tool for developing professional skills in learners with Special Educational Needs (SEN) at the secondary stage.

The findings demonstrate that VR can significantly enhance communication, teamwork, problem-solving, adaptability, and task-specific proficiency in safe, immersive, and adaptive learning environments. These outcomes not only align with experiential learning theory (Kolb, 1984) but also contribute to a broader understanding of how technology can bridge gaps between education and professional life.

VR's ability to provide contextualized, repeated, and adaptive practice distinguishes it from traditional approaches. For SEN learners, who often face unique barriers to workplace readiness, VR offers a space where mistakes become learning opportunities rather than sources of anxiety. This creates a positive cycle of skill development and self-confidence, essential for employability (Kahlon & Lindner, 2020).

The findings also affirm that VR is not a standalone solution but a complementary tool that should be embedded within inclusive curricular frameworks. Effective integration requires collaboration among educators, technology developers, and policymakers to ensure that VR modules are contextually relevant, accessible, and affordable. Such collaboration can transform VR from an experimental technology into a sustainable educational practice that supports lifelong learning and professional readiness for SEN learners (UNESCO, 2020).

From a policy perspective, this research underscores the need to incorporate innovative, learner-centered approaches into vocational education strategies. Policymakers must prioritize funding for VR infrastructure, ensure equitable access, and invest in teacher training to harness VR's full potential. For educators, VR offers an opportunity to reimagine pedagogy—not just as the transmission of knowledge, but as the creation of experiential spaces where learners actively construct their competencies.

Ultimately, VR's promise lies in its ability to democratize professional training for SEN learners. By offering immersive simulations tailored to diverse needs, VR can contribute to closing the gap between educational preparation and workplace expectations. This aligns with the vision of inclusive vocational education where every learner—regardless of ability—has the opportunity to develop skills that matter in life and work (OECD, 2018).In conclusion, this study advocates for a strategic, systemic integration of VR in inclusive education to enhance employability. While challenges such as cost, accessibility, and teacher readiness remain, the pedagogical benefits and the potential for societal impact make VR a promising tool in shaping the future of inclusive vocational education. Further research should explore large-scale implementation, longitudinal outcomes, and the development of best practices to ensure VR becomes a sustainable, transformative force in SEN education.

References

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101.
- Howard, M. C., & Gutworth, M. B. (2020). A meta-analysis of virtual reality training programs for social skills. Computers & Education, 145, 103732.
- Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Englewood Cliffs, NJ: Prentice Hall.
- Loh, C. (2018). Virtual reality in education: Learning in immersive environments. Educational Technology Research and Development, 66(4), 859–866.
- Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st century competences. Journal of Curriculum Studies, 44(3), 299–321.