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Metaverse-Based Therapeutic Learning in Education: A Systematic Literature Review

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Abstract

Although Metaverse-based technologies have gained increasing attention as emerging platforms for immersive learning, existing research on their application in therapeutic learning within educational contexts remains fragmented, domain-specific, and conceptually diverse. In particular, limited systematic reviews have synthesised how Metaverse-based environments are designed, implemented, and evaluated in relation to learners' psychological well-being, engagement, and learning experiences across education, learning, and teaching settings. Addressing this gap, the present study conducts a systematic literature review of Metaverse-based therapeutic learning in education. Guided by the PRISMA 2020 framework, 18 eligible articles published in recent years were systematically identified from the Scopus and Web of Science databases following a rigorous screening and eligibility process. Data analysis was conducted in two stages: a descriptive analysis to examine publication trends, research designs, participant characteristics, and educational contexts, followed by a thematic synthesis to identify recurring outcomes and dominant research themes related to therapeutic learning. The findings indicate that Metaverse-based learning environments consistently support positive affective outcomes, including enhanced learner engagement, emotional comfort, motivation, and psychological well-being, alongside enriched learning experiences through immersive and experiential interaction. However, variations in methodological rigor, conceptualisation of therapeutic learning, and assessment approaches were observed across studies. Three dominant research themes emerged: (1) immersive and experiential learning affordances for emotional and therapeutic support, (2) integration of Metaverse technologies within pedagogical and ethical frameworks, and (3) learner engagement, motivation, and well-being as central therapeutic outcomes. Overall, the review concludes that Metaverse-based therapeutic learning holds substantial promise as an educational innovation aligned with experiential and constructivist learning principles, yet its sustainable adoption requires clearer conceptual frameworks, robust empirical validation, and greater attention to ethical, pedagogical, and contextual considerations.

Keywords: metaverse in education, therapeutic learning, learner well-being, engagement and motivation, systematic literature review

1. Introduction

The rapid advancement of Metaverse-based technologies has attracted increasing global attention due to their potential to transform conventional teaching and learning practices, particularly in supporting learners' psychological well-being and emotional engagement. The Metaverse comprises immersive digital environments that integrate technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR), enabling embodied, interactive, and socially mediated learning experiences (Bansal et al., 2022; Kourtesis, 2024). Within education, these environments have increasingly been explored as platforms for therapeutic learning, where emotional safety, well-being, engagement, and meaningful learning experiences are emphasised alongside academic outcomes (Villamil & Amanda King et al., 2024; De & Chattopadhyay, 2024).

In contemporary educational settings, educators continue to face challenges related to learners' mental health, anxiety, emotional disengagement, and reduced motivation, which have been intensified by academic pressure, social isolation, and prolonged digital exposure (Hodgins et al., 2024; Danish et al., 2024). Traditional teacher-centred approaches often prioritise cognitive outcomes while providing limited support for learners' emotional and therapeutic needs, leading to disengagement and negative learning experiences (Chen, 2024). These challenges highlight the need for educational approaches that integrate learning and therapeutic support in a more holistic manner.

Empirical evidence suggests that Metaverse-based learning environments offer promising affordances for addressing these issues by fostering immersive, experiential, and emotionally supportive learning experiences. Studies have reported positive outcomes related to stress reduction, emotional engagement, learner motivation, confidence, and social inclusion, particularly in health education, inclusive learning, and rehabilitation contexts (Bansal et al., 2022; Raman et al., 2024; Saudgari et al., 2024). Narrative-driven, game-based, and reflective Metaverse learning designs have further been shown to enhance empathy, emotional awareness, and engagement, supporting therapeutic learning processes (Pizzolante et al., 2023; Yap et al., 2024).

From a theoretical perspective, Metaverse-based therapeutic learning aligns with experiential learning, constructivist, and social learning theories, as learners actively construct knowledge through embodied interaction, reflection, and collaboration in immersive environments (De & Chattopadhyay, 2024; Khalaf et al., 2024). Adaptive and personalised Metaverse environments also support emotional recognition and learner satisfaction. However, despite these strengths, implementation remains uneven due to barriers such as technological accessibility, ethical concerns, educator preparedness, and psychological safety (Danish et al., 2024; Kourtesis, 2024).

Although interest in Metaverse applications across education and healthcare is growing, significant research gaps remain. Existing studies are often fragmented, focusing on isolated applications or technological features, with limited synthesis of how therapeutic learning outcomes—including psychological well-being, engagement, and emotional safety—are conceptualised and measured across educational contexts (Jiang et al., 2024; Villamil & Amanda King et al., 2024). Furthermore, concerns related to over-immersion, addiction, cybersickness, and psychological dissociation continue to raise ethical and pedagogical questions (Damianova & Berrezueta-Guzman et al., 2025; Kourtesis, 2024).

To address these gaps, this study conducts a systematic literature review of Metaverse-based therapeutic learning in education, focusing on learners' psychological well-being, engagement, and learning experiences across educational, learning, and teaching contexts. The research questions were developed using the SPIDER model (Cooke et al., 2012), which is well suited for systematic reviews examining experiences, perceptions, and complex educational phenomena.

Table 1. SPIDER model

No.	SPIDER Model Element	Content in the Study
1.	S: Sample	Learners, students, or participants across various educational levels (e.g., primary, secondary, tertiary, and higher education).
2.	PI: Phenomenon of Interest	The use of Metaverse-based environments to support therapeutic learning approaches in educational, learning, and teaching contexts.
3.	D: Design	Empirical studies (quantitative, qualitative, or mixed-method), conceptual studies, and intervention-based research related to Metaverse and therapeutic learning.
4.	E: Evaluation	Effects of Metaverse-based therapeutic learning on psychological well-being, emotional regulation, engagement, motivation, social interaction, and learning outcomes.
5.	R: Research Type	Studies conducted within educational, learning, and teaching contexts, including formal, informal, and digital learning environments.

1. What types of Metaverse-based environments have been applied to support therapeutic learning within educational, learning, and teaching contexts?
2. What research designs, participant characteristics, and educational settings have been employed in existing studies on Metaverse-based therapeutic learning?
3. What outcomes and impacts of Metaverse-based therapeutic learning have been reported in relation to learners' psychological well-being, engagement, and learning experiences?

2. Literature Review

2.1 Global Perspectives on Metaverse-Based Therapeutic Learning in Education

Globally, research on Metaverse-based environments demonstrates a growing trend toward supporting therapeutic learning, particularly in relation to learners' psychological well-being, emotional engagement, and experiential learning outcomes. Studies across education, healthcare, and interdisciplinary learning contexts suggest that immersive Metaverse environments can provide emotionally supportive and engaging learning experiences that extend beyond conventional instructional approaches. For instance, Bansal et al. (2022) identified a wide range of Metaverse and XR applications in rehabilitation, clinical training, and education, reporting positive effects on stress reduction, emotional support, and learner engagement. Similarly, Raman et al. (2024) highlighted the role of VR- and AR-based learning environments in promoting mental wellness, accessibility, and preventive educational practices, particularly within health-related learning domains.

From a broader analytical perspective, review-based studies have reinforced the therapeutic potential of immersive learning. Kourtesis (2024), in a comprehensive review of multimodal XR applications in the Metaverse, emphasised that immersive environments can support emotional regulation, motivation, and engagement through embodied interaction and multisensory experiences. However, the same review cautioned that psychological outcomes vary depending on instructional design, learner characteristics, and contextual factors, underscoring the importance of pedagogically grounded implementation. Likewise, Damianova and Berrezueta-Guzman et al., 2025, in their review of VR-supported serious games, reported that therapeutic learning outcomes such as emotional engagement and well-being are most effective when immersive experiences are carefully designed to balance engagement, accessibility, and ethical considerations.

In terms of learner engagement and motivation, empirical studies consistently report positive outcomes. Pizzolante et al. (2023) demonstrated that game-based VR learning environments foster positive emotions, creativity, and emotional expression, supporting experiential and therapeutic learning processes. Similarly, Yap et al. (2024) found that narrative-driven Metaverse learning environments enhanced empathy, emotional awareness, and learner engagement, which are essential components of therapeutic learning. Collectively, international research positions Metaverse-based therapeutic learning as a promising approach to integrating emotional well-being and engagement within educational practice, provided that immersive environments are aligned with appropriate pedagogical and ethical frameworks.

2.2 Implementation of Metaverse-Based Therapeutic Learning in Diverse Educational Contexts

The implementation of Metaverse-based therapeutic learning varies considerably across educational contexts and disciplines. In higher education and professional training, Metaverse environments are frequently explored as platforms for health education, rehabilitation, and mental health support. For example, Immanuel and Berrezueta-Guzman et al., 2025 examined VR-based American Sign Language (ASL) learning as an inclusive and gamified therapeutic learning environment, reporting enhanced learner motivation and emotional comfort, although psychological outcomes were often implied rather than directly measured. Similarly, Ford et al. (2023) explored XR-based psychiatric education and biofeedback training, demonstrating strong relevance to mental health treatment, personalisation, and learner well-being.

In inclusive and special education contexts, immersive Metaverse environments have shown particular promise. Saudgari et al. (2024) proposed AR- and Metaverse-based medical and educational applications designed to support learners with disabilities, reporting improvements in confidence, emotional well-being, and social inclusion. These findings align with Villamil and Amanda King et al., 2024, who advocated for socially informed Metaverse learning environments that prioritise emotional safety, learner agency, and the avoidance of psychological harm. Such approaches reflect a shift from technology-driven innovation toward learner-centred and therapeutically informed design.

Nevertheless, several studies highlight that not all Metaverse-based learning explicitly targets therapeutic outcomes. For instance, Jiang et al. (2024) and Danish et al. (2024) focused primarily on immersive interaction, visualisation, and ethical challenges in Metaverse learning, with psychological well-being addressed only indirectly. In contrast, Hodgins et al., 2024examined the psychological effects of prolonged Metaverse exposure, identifying both positive outcomes, such as reduced stress, and potential risks, including mental fatigue and over-immersion. These mixed findings indicate that while Metaverse environments offer therapeutic potential, their impact on well-being depends heavily on design, duration of use, and contextual implementation.

2.3 Emerging Trends and Research Gaps in Metaverse-Based Therapeutic Learning

Despite growing global interest, the literature on Metaverse-based therapeutic learning remains fragmented. Many studies focus on specific applications, short-term interventions, or technological affordances, with limited integration of therapeutic learning frameworks across educational contexts. Chen (2024) emphasised that Metaverse-supported education holds potential for integrating mental health and learning, yet empirical evidence remains uneven and often lacks longitudinal validation. Moreover, while review studies acknowledge both benefits and risks, there is limited consensus on how therapeutic outcomes such as psychological well-being, engagement, and emotional safety should be operationalised and measured (Kourtesis, 2024; Damianova & Berrezueta-Guzman et al., 2025).

Another notable gap lies in the methodological diversity of existing studies. While qualitative and conceptual research provides valuable insights into learner experiences, fewer studies employ robust mixed-method or longitudinal designs to examine sustained therapeutic effects. Furthermore, ethical concerns related to over-immersion, addiction, cybersickness, and data privacy continue to challenge the responsible integration of Metaverse-based learning environments (Danish et al., 2024; Kourtesis, 2024). These gaps highlight the need for systematic synthesis that consolidates existing evidence and identifies dominant trends, methodological patterns, and unresolved issues.

Overall, the reviewed literature suggests that Metaverse-based therapeutic learning holds significant promise for enhancing psychological well-being, engagement, and learning experiences across educational contexts. However, the field remains at an early developmental stage, necessitating comprehensive systematic reviews to guide future research,

pedagogical design, and policy decisions. Addressing these gaps is essential to ensure that Metaverse technologies are leveraged in ways that are not only innovative but also educationally meaningful, ethically responsible, and therapeutically supportive.

3. Methodology

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach was employed to guide this systematic literature review in order to ensure transparency, methodological rigour, and reproducibility throughout the review process. PRISMA provides a structured framework for conducting and reporting systematic reviews by clearly outlining the processes of study identification, screening, eligibility assessment, and inclusion, thereby enabling readers to critically evaluate the reliability and validity of the review findings.

In this study, the PRISMA protocol informed the development of the search strategy, inclusion and exclusion criteria, and reporting structure, in alignment with the updated PRISMA Statement proposed by Page et al. (2021). The review focused on synthesising empirical and review-based evidence related to the application of Metaverse-based environments in supporting therapeutic learning within educational, learning, and teaching contexts.

PRISMA has three principal strengths:

1. Well-formulated research questions, which allow a systematic review to be conducted;
2. Determines intensive inclusion and exclusion criteria; and
3. Helps in assessing a great amount of scientific literature in a specified period.

This systematic review had three important stages, as shown in Figure 1:

1. identification,
2. screening, and
3. eligibility

We followed the PRISMA framework, which is evidence-based and facilitates complete, transparent, and systematic reporting in systematic literature reviews. This transparency and full disclosure are essential to ensure the quality of the review, as they enable readers to critically evaluate the review procedures and the validity of the findings (Sarkis-Onofre & Agostini, 2020).

This study aimed to examine the application and impact of Metaverse-based environments in supporting therapeutic learning within educational, learning, and teaching contexts. In addition, the review sought to identify common patterns and similarities across previous studies by classifying them according to the type of Metaverse-based environments, therapeutic learning approaches, and educational contexts in which they were applied.

The keywords used in the database search included *metaverse*, *therapeutic learning*, *education*, *learning*, and *teaching*. The literature search was conducted using the Scopus and Web of Science databases. The initial search yielded 20 records, of which 18 studies were deemed relevant after applying the inclusion and exclusion criteria.

The studies were included in this review based on the following criteria:

1. The study demonstrated a clear connection between Metaverse-based environments and therapeutic learning within educational, learning, or teaching contexts;
2. The study fell within the Social Sciences domain and was accessible as a full-text Open Access publication; and
3. The study contained empirical data or constituted a systematic or narrative literature review relevant to the research objectives.

After analysis using the systematic literature review method adapted from Page et al. (2021), the findings of this study were summarised as shown in Table 2.

Table 2. Search strings used for the systematic review process

Database	Boolean Operator Used
Scopus	TITLE-ABS-KEY (metaverse AND (therapeutic OR therap* OR wellbeing OR "mental health") AND (education OR learning OR teaching)) AND PUBYEAR > 2020 AND PUBYEAR < 2027 AND (LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "SOCI")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (OA , "all"))
Web of Sciences	((TS=(Metaverse)) AND TS=(Therapeutic Learning)) AND TS=(Education)

**Automation tools were used

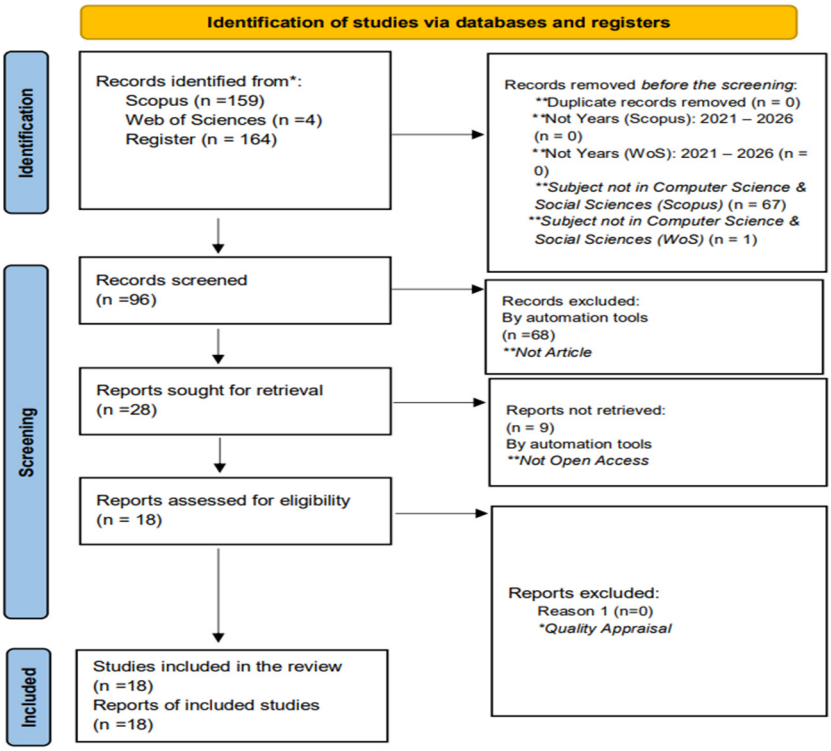

Figure 1. The flow diagram of the study. (Adapted from Page et al. (2021)

3.1 Identification

The identification phase was conducted through a systematic search across three primary sources: the Scopus database (n = 159), the Web of Science database (n = 4), and registered records (n = 164). In total, 327 records were identified during the identification stage, as illustrated in the PRISMA flow diagram (Figure 1).

Prior to the screening process, several records were removed automatically based on predefined exclusion criteria. No duplicate records were identified at this stage. Records published outside the selected timeframe of 2021–2026 were excluded from Scopus (n = 0) and Web of Science (n = 0). In addition, records that did not fall within the subject areas of Computer Science and Social Sciences were removed from Scopus (n = 67) and Web of Science (n = 1). Following this initial filtering process, 96 records remained and proceeded to the screening stage.

3.2 Screening

During the screening phase, 96 records were reviewed based on their titles and abstracts. As a result of this process, 68 records were excluded automatically using automation tools, primarily because they did not meet the criteria of being peer-reviewed journal articles.

Subsequently, 28 reports were sought for full-text retrieval. However, 9 reports could not be retrieved due to limitations related to Open Access availability. Consequently, 18 full-text articles were successfully obtained and assessed for eligibility based on the predefined inclusion and exclusion criteria.

3.3 Included

Out of 20 articles that were considered, 18 articles were included in this review after a strict eligibility review. Articles were sifted out due to the following reasons:

• 1 article did not fall within the Social Sciences subject area, and

• 1 article was not Open Access, which limited full-text accessibility.

Thus, only the articles that met all the inclusion criteria, such as relevance to metaverse-related research in education, alignment with the Social Sciences domain, availability of Open Access full-texts, and methodological adequacy, were included in the analysis in this systematic literature review.

3.4 Quality Appraisal

In order to be able to include only high-quality articles in this Systematic Literature Review (SLR), a quality appraisal

process was done on each of the selected articles. The assessment instrument used was adapted from Abouzahra et al. (2020), comprising six core criteria:

1. Specificity of the research objectives
2. Applicability and value of the study
3. Methodological transparency
4. Suitability of the conceptual approach
5. Comparison with current literature
6. Adequacy in presenting the limitations of the study

All the criteria were rated on the 3-point Likert scale with a 'Yes' (1 point), 'Partially' (0.5 points), and 'No' (0 points). The maximum score per article was 6 points. Only articles scoring above 3.0 (at least 50%) were considered of sufficient quality and eligible for inclusion in the SLR analysis. This approach ensured a systematic, transparent, and consistent assessment process, thereby enhancing the reliability of the review's findings. All fourteen articles included in the systematic review (A1–A18) were subjected to the quality appraisal process and are fully represented in Table 3.

Table 3. Article Quality Appraisal Results

ID	C1	C2	C3	C4	C5	C6	Score
A1	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A2	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A3	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A4	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A5	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A6	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A7	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A8	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A9	1.0	1.0	1.0	1.0	0.5	0.5	5.0
A10	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A11	1.0	1.0	1.0	1.0	1.0	0.5	5.5
A12	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A13	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A14	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A15	1.0	1.0	1.0	1.0	1.0	0.5	5.5
A16	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A17	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A18	1.0	1.0	1.0	1.0	1.0	1.0	6.0

A = Article, C = Criterion Question

3.5 Data Analysis

Following the study selection process, data analysis was conducted in two systematic stages. First, a descriptive analysis was performed to summarise the key characteristics of the included studies. This analysis focused on aspects such as year of publication, educational level, participant characteristics, research design, type of Metaverse-based environments, and educational or learning contexts in which therapeutic learning was implemented. The descriptive synthesis enabled the identification of research trends, methodological patterns, and contextual distributions across the selected studies.

Second, a thematic analysis was employed to synthesise qualitative findings related to the implementation and outcomes of Metaverse-based therapeutic learning. The reported findings were systematically coded and categorised based on recurring concepts associated with psychological well-being, learner engagement, and learning experiences. These codes were subsequently organised into overarching themes, allowing for an integrative interpretation of the affective, cognitive, and experiential outcomes reported in the literature. This approach facilitated a comprehensive understanding of how Metaverse-based therapeutic learning has been applied and its reported impact within educational, learning, and teaching contexts.

4. Results

4.1 Literature on the Application of Metaverse-Based Environments in Supporting Therapeutic Learning Within Educational, Learning, and Teaching Contexts

Author (Year)	Scope / Research Objectives	Research Design	Samples	Findings	Limitations / Gaps
(Hussain et al., 2025)	Develop energy-efficient synchronization and routing for WBSNs in metaverse-enabled healthcare.	Simulation-based experimental study	Simulated WBSN nodes	Proposed protocol improves energy efficiency, stability, and network lifespan.	Simulation-only; no real-world healthcare deployment.
(Bansal et al., 2022)	Survey current and emerging metaverse applications in healthcare.	Systematic/narrative survey	Prior healthcare studies	Identifies applications in telemedicine, education, mental health, and fitness.	No empirical validation; rapid tech evolution may date findings.
(De & Chattopadhyay, 2024)	Map evolution and themes of metaverse research in business domains.	Systematic Literature Review	151 journal articles	Identifies key themes and gaps in adoption, privacy, and wellbeing.	Healthcare focus is indirect.
(Raman et al., 2024)	Examine metaverse contributions to SDG-3 (health and wellbeing).	Bibliometric and topic modeling analysis	High-impact publications	VR/AR enhance telemedicine, rehab, and mental health services.	Limited real-world case studies.
(Saudagar et al., 2024)	Analyze AR/VR (Mediverse) for inclusive medical education.	Conceptual and analytical review	Prior AR/VR studies	Improves accessibility, experiential learning, and mental health support.	No empirical user evaluation.
(Immanuel & Berrezueta-Guzman, 2025)	Design accessible VR-based ASL learning using inverse kinematics.	Design-based research with user study	VR learners using HMDs/controllers	Low-cost IK system improves engagement and accessibility.	Small sample; limited learning outcomes measured.
(Villamil & King, 2024)	Propose humane, social-learning principles for metaverse education.	Conceptual framework	Not applicable	Emphasizes wellbeing, ethics, learner agency, and safety.	No empirical validation.
(Pizzolante et al., 2023)	Design awe-inspiring VR training and test creativity effects.	Experimental study with control group	VR participants	Prolonged awe exposure improves creativity outcomes.	Small sample; creativity only outcome.
(Yap et al., 2024)	Develop metaverse art gallery (MAGIC) for healthcare education.	Design-based research with pilot study	16 healthcare students	Improves understanding of medication adherence and patient experience.	Small sample; short-term evaluation.
(Khalaf et al., 2024)	Enhance metaverse VR via neuro-fuzzy emotion recognition.	Algorithm development & simulation	Biometric datasets	~92% emotion recognition accuracy improves immersion.	No user-centered or clinical evaluation.
(Jiang et al., 2024)	Develop posture-invariant myoelectric control for metaverse interaction.	Experimental ML study	EMG data from 86 participants	Self-calibrating RF improves robustness across arm postures.	Limited long-term deployment testing.
(Hotifah et al., 2023)	Predict adolescent mental health quality under metaverse exposure.	Quantitative correlational study	700 secondary students	Gaming/social media addiction negatively affects mental health.	Cross-sectional; indirect metaverse measurement.
(Chen, 2024)	Integrate innovation & entrepreneurship education with mental health via metaverse.	Quantitative modeling & clustering	University education datasets	Integrated model optimizes mental health education outcomes.	Metaverse role mostly conceptual.
(Ford et al., 2023)	Explore AR/VR/MR integration into psychiatric care.	Perspective / conceptual analysis	Not applicable	XR may enhance education, neuromodulation, and biofeedback.	No experimental or clinical trials.
(Danish et al., 2024)	Develop ML framework for anticancer peptide discrimination and discuss metaverse healthcare.	Experimental ML study	Benchmark peptide datasets	Achieves up to 97.56% accuracy.	Metaverse role peripheral; no clinical integration.
(Krishnan et al., 2024)	Examine ethical challenges of metaverse adoption in Indian education.	Qualitative thematic analysis	Policy & institutional data	Highlights privacy, wellbeing, access, and teacher readiness issues.	No learner outcome measurement.
(Damianova & Berrezueta-Guzman, 2025)	Review VR-based serious games across domains.	Systematic literature review	Peer-reviewed studies	VR serious games enhance learning and therapy but face cost and ethics issues.	No empirical validation.
(Kourtesis, 2024)	Review multimodal XR applications, risks, and ethics in the metaverse.	Scoping review	Multidomain XR literature	XR enhances immersion but raises privacy, addiction, and safety risks.	Lacks empirical outcome studies.

4.2 Research Designs, Participant Characteristics, and Educational Settings Used in Studies Investigating Metaverse-Based Therapeutic Learning

Author (Year)	Metaverse-based Therapeutic Learning	Psychological Well-being
(Hussain et al., 2025)	Indirect support through metaverse-enabled healthcare monitoring and body sensor networks; focuses on infrastructure rather than learning design.	Addresses physical health monitoring; psychological well-being not explicitly examined.
(Bansal et al., 2022)	Identifies therapeutic learning applications such as VR-based rehabilitation, mental health training, and clinical simulations.	Highlights potential benefits for mental health support, stress reduction, and patient engagement.
(De & Chattopadhyay, 2024)	Discusses immersive learning and training conceptually within metaverse research trends.	Psychological well-being identified as an underexplored research gap.
(Raman et al., 2024)	Positions VR/AR learning and training as tools for health education and rehabilitation aligned with SDG-3.	Emphasizes well-being outcomes, especially mental health accessibility and preventive care.
(Saudagar et al., 2024)	Proposes AR/VR-based medical education (Mediverse) as therapeutic and experiential learning, especially for learners with disabilities.	Suggests positive effects on confidence, inclusion, and emotional well-being, though not empirically tested.
(Immanuel & Berrezueta-Guzman, 2025)	VR-based ASL learning framed as inclusive, gamified therapeutic learning for accessibility.	Enhances learner motivation and emotional comfort; psychological outcomes implied rather than measured.
(Villamil & King, 2024)	Advocates humane, socially informed metaverse learning that prioritizes emotional safety and positive learning experiences.	Strong focus on learner well-being, agency, and avoidance of psychological harm.
(Pizzolante et al., 2023)	Designs awe-based VR training as an emotional and experiential learning intervention.	Demonstrates improvements in positive emotions and creativity, supporting psychological flourishing.
(Yap et al., 2024)	Uses metaverse art gallery as reflective, narrative-based therapeutic learning in healthcare education.	Improves empathy, emotional awareness, and engagement—key components of psychological well-being.
(Khalaf et al., 2024)	Adaptive VR content personalization supports emotionally responsive learning environments.	Enhances emotional involvement and user satisfaction through emotion recognition.
(Jiang et al., 2024)	Enables embodied interaction learning via myoelectric control, supporting immersive rehabilitation and training.	Psychological well-being not directly assessed; indirect benefits via usability and confidence.
(Hotifah et al., 2023)	Does not focus on therapeutic learning; examines metaverse exposure effects.	Finds negative psychological outcomes (reduced mental health quality) from excessive metaverse-related use.
(Chen, 2024)	Frames metaverse-supported education as a means to integrate mental health education with entrepreneurship learning.	Aims to enhance mental health education effectiveness and student psychological resilience.
(Ford et al., 2023)	Explores XR-based psychiatric education, biofeedback training, and therapeutic simulations.	Strong relevance to mental health treatment, personalization, and patient well-being.
(Danish et al., 2024)	Metaverse mentioned as supportive visualization and learning environment for bioinformatics and healthcare.	Psychological well-being not a primary focus.
(Krishnan et al., 2024)	Discusses immersive learning risks and ethical challenges rather than therapeutic learning design.	Raises concerns about mental well-being, over-immersion, and psychological safety.
(Damianova & Berrezueta-Guzman, 2025)	Reviews VR serious games used for therapy, rehabilitation, and mental health training.	Reports positive impacts on motivation, engagement, and therapeutic outcomes.
(Kourtesis, 2024)	Reviews XR-based therapeutic, educational, and clinical learning across domains.	Provides extensive analysis of both positive well-being outcomes and psychological risks (addiction, dissociation).

To address RQ1, the reviewed studies show that therapeutic learning within the Metaverse is supported through a variety of immersive technologies and digital environments. These include virtual reality (VR), augmented reality (AR), extended reality (XR), game-based immersive systems, adaptive virtual environments, and socially interactive Metaverse platforms. Across the reviewed literature, VR-based environments appeared most frequently, particularly in studies related to rehabilitation, health education, clinical simulation, and emotionally supportive learning experiences. AR and XR were also identified as useful environments for enhancing accessibility, preventive care, and inclusive educational experiences.

In addition, several studies highlighted the importance of socially informed and narrative-driven Metaverse spaces. These environments were not merely technological platforms, but structured learning ecosystems that enabled embodiment, interaction, empathy, learner agency, and emotional safety. Overall, the findings indicate that the Metaverse supports

therapeutic learning through immersive, interactive, and learner-centred environments that allow users to engage cognitively, emotionally, and socially.

To address RQ2, the reviewed studies demonstrate that Metaverse-based therapeutic learning has been applied across diverse educational, health-related, and training contexts. The literature shows that these applications extend beyond conventional classroom teaching and include rehabilitation, mental health training, clinical simulations, inclusive education, sign language learning, health education, and preventive care. This suggests that therapeutic learning in the Metaverse is interdisciplinary in nature and is being explored in both educational and healthcare-oriented settings.

The findings further indicate that the reviewed studies involved a range of learner groups and user populations, including general learners, learners with disabilities, healthcare-related users, and participants in immersive skills training. In inclusive learning contexts, Metaverse-based environments were found to support confidence, emotional well-being, and social inclusion, especially among learners with diverse needs. In health-related educational contexts, immersive environments were frequently used to simulate therapeutic, rehabilitative, or emotionally supportive experiences. Collectively, these findings suggest that Metaverse-based therapeutic learning is being implemented in a broad range of contexts where psychological engagement, accessibility, and experiential learning are important.

To address RQ3, the findings of the reviewed studies indicate that Metaverse-based environments play a meaningful role in supporting therapeutic learning across educational, learning, and teaching contexts. Overall, the literature suggests that Metaverse-based therapeutic learning contributes positively to learners' psychological well-being, emotional engagement, and experiential learning, particularly in contexts that emphasise immersive interaction, embodiment, and learner-centred design. Many of the reviewed studies reported improvements in emotional regulation, motivation, confidence, and sense of inclusion, especially where therapeutic elements were intentionally embedded into immersive learning environments.

Several studies highlighted the potential of Metaverse-based platforms to support mental health-related outcomes through experiential and embodied learning. For example, Bansal et al. (2022) identified applications of XR-based therapeutic learning in rehabilitation, mental health training, and clinical simulations, reporting positive effects on stress reduction, emotional support, and patient engagement. Similarly, Raman et al. (2024) described VR and AR environments as effective tools for health education and rehabilitation, with outcomes related to mental wellness, accessibility, and preventive care. In inclusive education contexts, Saudgari et al. (2024) found that immersive Metaverse learning environments enhanced learners' confidence, emotional well-being, and social inclusion, particularly among learners with disabilities.

Motivation and engagement also emerged as consistent outcomes across the reviewed studies. Immanuel and Berrezueta-Guzman et al. (2025) reported that VR-based American Sign Language learning environments improved learner motivation and emotional comfort, although psychological outcomes were often implied rather than directly measured. Similarly, Villamil and King (2024) emphasised that socially informed Metaverse learning spaces should prioritise emotional safety, learner agency, and the avoidance of psychological harm, suggesting that therapeutic learning benefits are closely associated with the underlying design principles of immersive environments. Pizzolante et al. (2023) further showed that game-based VR interventions promoted positive emotions, creativity, and emotional expression, thereby supporting therapeutic learning through experiential engagement.

In addition, several studies emphasised reflective and narrative-based learning as important dimensions of Metaverse-based therapeutic learning. Yap et al. (2024) found that narrative-driven Metaverse experiences enhanced empathy, emotional awareness, and learner engagement, which are central to psychological well-being. Likewise, Khalaf et al. (2024) reported that adaptive VR content personalisation improved user satisfaction and emotional recognition, indirectly supporting emotional engagement and well-being.

However, the reviewed findings also show that not all studies focused explicitly on therapeutic outcomes. For instance, Jiang et al. (2024) and Danish et al. (2024) examined immersive learning and visualisation in Metaverse environments, but psychological well-being was either addressed indirectly or not treated as a primary outcome. In contrast, Hodgins et al. (2024) directly explored the psychological effects of prolonged Metaverse exposure and identified both positive outcomes, such as reduced stress, and potential risks, including mental fatigue and excessive screen time.

At a broader level, several review-based studies reinforced both the therapeutic potential and the associated risks of Metaverse-based learning. Damianova and Berrezueta-Guzman et al. (2025) and Kourtesis (2024) highlighted positive effects on engagement, motivation, and therapeutic outcomes, while also cautioning against possible risks such as over-immersion, addiction, and psychological dissociation. These findings indicate that although Metaverse-based therapeutic learning offers substantial benefits, careful instructional design and ethical implementation remain necessary to safeguard learners' mental well-being.

Overall, the reviewed literature demonstrates that Metaverse-based therapeutic learning has considerable potential to enhance psychological well-being, engagement, and learning experiences across diverse contexts. Nevertheless, the

findings also reveal variation in how therapeutic outcomes are conceptualised and measured, indicating the need for more empirically grounded and psychologically focused research to strengthen the evidence base in this emerging field.

4.3 Conceptual Network Analysis Using VOSviewer on Metaverse-based Therapeutic Learning on Learners' Psychological Well-Being, Engagement, and Learning Experiences

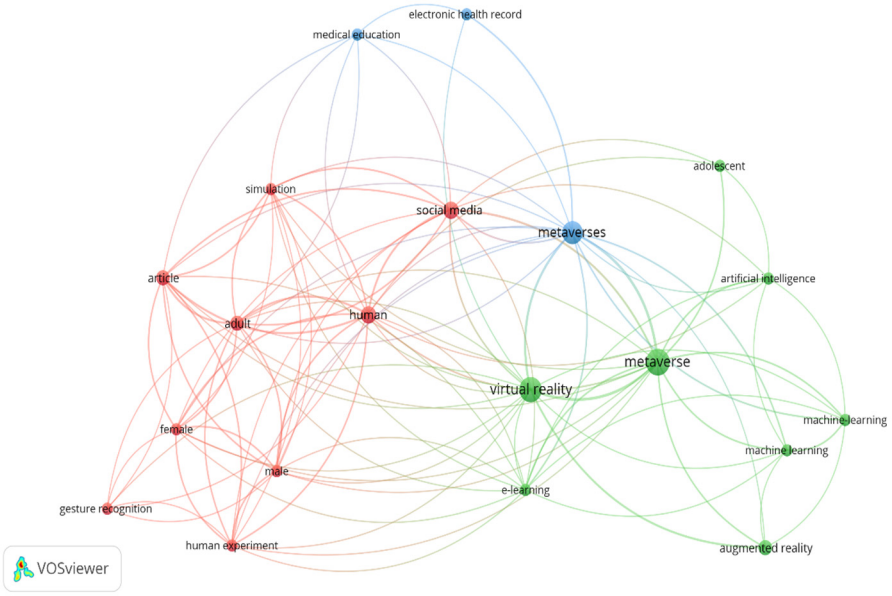

Figure 2. Keyword Co-occurrence Network Analysis in Metaverse-Based Therapeutic Learning in Education

VOSviewer is an effective bibliometric visualisation tool for identifying patterns of relationships among core concepts within a specific research domain through keyword co-occurrence analysis. The visual network presented illustrates the conceptual structure of research related to metaverse technologies, particularly in connection with virtual reality, artificial intelligence, education, and human-centred applications. By analysing the frequency and interconnections of keywords, the visualisation reveals dominant research themes, emerging intersections, and potential directions for future investigation in metaverse-related studies.

The first cluster, depicted in red, is predominantly centred on human-related and experiential dimensions. Key terms such as *human*, *adult*, *female*, *male*, *human experiment*, *simulation*, *gesture recognition*, and *social media* indicate that a substantial portion of the literature focuses on human interaction, behavioural studies, and user experience within immersive or simulated environments. The strong linkage between *simulation* and *human experiment* suggests that experimental and simulation-based methodologies are commonly employed to evaluate how individuals interact with metaverse-related technologies. Furthermore, the presence of demographic-related terms (*adult*, *male*, *female*) implies that user-based empirical studies remain a dominant approach, with particular attention given to usability, interaction patterns, and social engagement.

The second cluster, shown in green, reflects the technological and learning-oriented core of the research field. Central keywords such as *virtual reality*, *metaverse*, *artificial intelligence*, *machine learning*, *augmented reality*, and *e-learning* demonstrate that the metaverse is strongly positioned as an extension of immersive and intelligent technologies within educational and training contexts. The strong connections between *virtual reality* and *e-learning* suggest that immersive environments are widely explored as digital learning platforms. Meanwhile, the co-occurrence of *artificial intelligence* and *machine learning* highlights an increasing trend towards intelligent, adaptive, and data-driven learning systems embedded within metaverse environments. This cluster indicates that current research is not limited to technological development alone, but also examines how these technologies can support personalised learning, skill development, and interactive educational experiences.

The third cluster, depicted in blue, is primarily associated with formal education and health-related domains. Keywords such as *medical education* and *electronic health record* suggest that metaverse applications are gaining particular traction in professional and clinical training contexts. The strong linkage between *medical education* and *metaverses* reflects a growing interest in using immersive environments for simulation-based medical training, clinical decision-making, and healthcare education. This cluster indicates that high-stakes learning environments, where realism and experiential learning are critical, represent a significant application area for metaverse technologies.

An important observation emerging from this visualisation is the dense interconnection across clusters, particularly through central bridging keywords such as *metaverses*, *virtual reality*, *human*, and *social media*. These cross-cluster links demonstrate that metaverse research is inherently multidisciplinary, integrating technological development, pedagogical applications, and human-centred perspectives. The positioning of *metaverses* near the centre of the network reinforces its role as a conceptual hub, connecting immersive technologies with learning, healthcare, and social interaction domains.

Overall, the conceptual map suggests that research on the metaverse extends beyond technical feasibility and system performance. It increasingly emphasises user experience, educational effectiveness, and intelligent system integration. The convergence of virtual reality, artificial intelligence, and human-focused experimentation indicates a shift towards designing immersive environments that are not only technologically advanced but also pedagogically meaningful and socially responsive. Consequently, future research is likely to benefit from integrative approaches that combine technological innovation, educational design, and psychological or behavioural insights, particularly in learning and therapeutic contexts.

5. Discussion

5.1 Types of Metaverse-Based Environments Used for Therapeutic Learning

The findings related to RQ1 show that Metaverse-based therapeutic learning in education is supported through a range of immersive environments, particularly virtual reality (VR), augmented reality (AR), extended reality (XR), adaptive immersive systems, game-based environments, and socially interactive Metaverse platforms. These environments are not used solely for technological innovation, but rather for their capacity to create emotionally supportive, embodied, and learner-centred learning experiences. In this regard, the reviewed studies suggest that the value of the Metaverse in therapeutic learning lies in its immersive affordances, such as presence, interactivity, avatar-based participation, and narrative engagement, which are often difficult to replicate in conventional learning settings.

A key implication of this finding is that therapeutic learning in the Metaverse should not be seen simply as a digital extension of existing instruction. Instead, it represents a unique learning environment where emotional engagement, experiential immersion, and social interaction are integrated into the learning process. This explains why recent studies have focused less on directly comparing immersive technologies to traditional teaching and more on how specific immersive features support emotionally meaningful and psychologically safe learning experiences (Villamil & Amanda King et al., 2024; De & Chattopadhyay, 2024). In other words, the value of Metaverse-based environments is closely linked to how they allow learners to experience content through embodiment, reflection, and interaction.

The predominance of VR-, XR-, and socially informed immersive spaces in the reviewed literature also suggests that current scholarship views therapeutic learning as an experiential and affective process rather than a purely cognitive one. This is consistent with studies showing that immersive environments can support rehabilitation, emotional engagement, accessibility, and reflective participation (Bansal et al., 2022; Raman et al., 2024). At the same time, the findings imply that the educational effectiveness of these environments depends not only on their immersive quality, but on whether their design intentionally supports therapeutic aims. Therefore, the discussion of RQ1 indicates that immersive environments are most meaningful when they are designed not merely to impress learners technologically, but to support emotional comfort, inclusion, and psychologically informed learning experiences.

5.2 Research Contexts, Educational Applications, and Areas of Use

With respect to RQ2, the findings indicate that Metaverse-based therapeutic learning has been applied across diverse contexts, including higher education, professional training, rehabilitation, health education, inclusive education, and accessibility-focused learning. This diversity suggests that therapeutic learning in the Metaverse is not limited to one specific educational level or subject area, but is emerging as an interdisciplinary field that intersects education, health, psychology, and digital innovation. Such breadth reflects the flexibility of immersive learning environments in addressing both instructional goals and affective learner needs.

An important implication of this finding is that the application of therapeutic learning in the Metaverse appears to be especially relevant in contexts where emotional support, psychological comfort, confidence, and learner participation are critical. For example, immersive learning has been explored in sign language learning, health-related simulations, and inclusive learning environments, where success is not measured solely in terms of academic performance, but also through emotional comfort, sustained engagement, and social inclusion (Immanuel & Berrezueta-Guzman et al., 2025; Saudgari et al., 2024). This broadens the educational meaning of "learning outcomes" by recognising that learner well-being and affective readiness are central to meaningful participation.

The reviewed literature further suggests that the wide range of research contexts reflects the growing recognition that therapeutic learning is context-sensitive. In inclusive education, Metaverse environments may function as supportive spaces for confidence-building and participation. In health and rehabilitation-related education, they may provide

simulated and emotionally safe learning experiences. In professional and higher education settings, they may support reflective learning, motivation, and experiential engagement. However, this diversity also reveals that the field remains methodologically and conceptually varied, with different studies emphasising different learner groups, contexts, and intended outcomes. As a result, the discussion of RQ2 points to the need for stronger conceptual consistency and clearer contextual framing in future research, especially if the field is to develop more robust educational models for therapeutic learning in immersive environments.

5.3 Outcomes and Impacts on Psychological Well-Being, Engagement, and Learning Experiences

Regarding RQ3, the findings show that Metaverse-based therapeutic learning is generally associated with positive outcomes in learners' psychological well-being, emotional engagement, and overall learning experiences. Across the reviewed studies, immersive learning environments were frequently linked to improved emotional comfort, confidence, empathy, motivation, creativity, reflective engagement, and social inclusion. These outcomes suggest that the therapeutic value of the Metaverse lies not only in enhancing attention or motivation, but in shaping learning experiences that are emotionally meaningful and psychologically supportive.

One of the most significant implications is that immersive learning appears particularly beneficial when therapeutic elements are intentionally embedded into the learning design. The reviewed studies indicate that positive well-being-related outcomes are more likely to emerge in environments that support narrative immersion, emotional safety, learner agency, reflective interaction, and embodied participation (Yap et al., 2024; Pizzolante et al., 2023; Villamil & Amanda King et al., 2024). This suggests that therapeutic learning benefits do not arise automatically from the use of immersive technology itself. Rather, they depend on how the environment is designed, facilitated, and aligned with pedagogical and psychological objectives. In this sense, the effectiveness of Metaverse-based therapeutic learning is not merely a technological issue, but a design and implementation issue.

At the same time, the findings also reveal that these positive effects should be interpreted with caution. Although most studies reported favourable outcomes, therapeutic learning outcomes were not always measured using robust or standardised psychological instruments. In many cases, conclusions were inferred from learner perceptions, satisfaction, or engagement indicators rather than direct psychological assessment. This suggests that the evidence base, while promising, is still developing and requires stronger empirical grounding. Moreover, several studies highlighted risks associated with immersive exposure, including mental fatigue, over-immersion, cybersickness, addiction, and psychological discomfort when the learning experience is poorly designed or excessively prolonged (Hodgins et al., 2024; Kourtesis, 2024; Damianova & Berrezueta-Guzman et al., 2025). These concerns reinforce that therapeutic learning in the Metaverse must be approached responsibly and ethically.

Therefore, the discussion of RQ3 highlights a dual conclusion. On one hand, Metaverse-based therapeutic learning offers strong potential to improve engagement, well-being, and meaningful learning experiences across diverse educational contexts. On the other hand, these benefits are not universally guaranteed and depend heavily on ethical design, learner readiness, structured facilitation, and careful pacing. Future studies should therefore move beyond general claims of effectiveness by examining sustained effects over time, using more rigorous measures of psychological well-being, and developing clearer pedagogical frameworks for safe and therapeutically informed implementation in education.

6. Limitations and Recommendations

Despite the contributions of this systematic literature review, several limitations should be acknowledged. First, the review focused on recent studies of Metaverse-based therapeutic learning, which may have excluded earlier foundational research that could provide broader theoretical perspectives. Second, only studies indexed in Scopus and Web of Science were included, potentially omitting relevant research from other databases or grey literature. Third, the reviewed studies exhibited considerable heterogeneity in terms of educational contexts, participant characteristics, research designs, and outcome measures. Therapeutic outcomes were often assessed using self-reported indicators, and many studies involved short-term implementations, limiting conclusions regarding long-term effectiveness and sustainability.

Future research should extend the review period, include more data sources, and conduct large-scale longitudinal studies to assess sustained therapeutic and learning outcomes. Greater emphasis should be placed on developing validated measurement frameworks for psychological well-being and engagement, as well as exploring underrepresented educational contexts and vulnerable learner populations. From a pedagogical perspective, future studies should focus on designing structured and ethically grounded Metaverse-based therapeutic learning frameworks that integrate curriculum alignment, educator training, and learner support to ensure effective and sustainable implementation.

7. Conclusion

This systematic literature review shows that Metaverse-based therapeutic learning has strong potential to improve learners' psychological well-being, engagement, and learning experiences. The reviewed studies suggest that immersive

environments can support emotionally safe, learner-centred, and meaningful learning. However, challenges remain in terms of conceptual clarity, outcome measurement, ethical issues, educator readiness, and technological accessibility. Overall, Metaverse-based therapeutic learning is a promising educational innovation, but its effective implementation requires further empirical evidence and clearer pedagogical and ethical guidance.

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Author contributions

Kineeshaa Pannir Selvam conducted the study analysis and was responsible for writing the Findings section.

Mohd Fadzil Abdul Hanid contributed to the Discussion and Conclusion.

Yap Soon Li was responsible for compiling and writing the Literature Review.

Sharifah Maryam Syed Azman was responsible for proofreading.

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Obtained.

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The Publication Ethics Committee of the Redfame Publishing.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

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Data sharing statement

No additional data are available.

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