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Effect of Virtual Reality (VR) Aided Training on Employee Skill Retention: Empirical Evidence from Service Sector Employees at Tech Mahindra

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ABSTRACT

The present study empirically investigates the effect of Virtual Reality (VR) aided training on employee skill retention within the service sector, with specific reference to Tech Mahindra, a leading global IT services organization. Grounded in experiential learning theory and the constructivist pedagogical framework, this research adopts a quantitative methodology utilizing a structured questionnaire administered to a purposive sample of 100 employees who had prior exposure to VR training programs. Statistical tools including frequency analysis, descriptive statistics, Pearson correlation, and simple linear regression were employed to analyze the data. The findings reveal a statistically significant positive correlation ($r = 0.72$, $p < 0.05$) between VR aided training and employee skill retention. The regression model further establishes that VR training accounts for 65% of the variance in skill retention ($R^2 = 0.65$, $\beta = 0.81$, $p = 0.00$), thereby confirming a strong causal relationship. The study also reports high levels of employee satisfaction (80%), enhanced practical engagement, and significant improvements in task confidence, problem-solving capacity, and reduction in retraining requirements. The paper concludes with strategic recommendations for human resource practitioners and organizational learning specialists to optimize VR-based training ecosystems in contemporary service sector environments.

Keywords: *Virtual Reality Training, Employee Skill Retention, Service Sector, Experiential Learning, Human Resource Development, Tech Mahindra, Immersive Technology*

1. INTRODUCTION

The contemporary service sector operates within an environment characterized by accelerating technological disruption, heightened competitive intensity, and evolving workforce competency demands. Within this landscape, organizational learning and development have emerged as strategic imperatives rather than peripheral functions. The traditional paradigm of classroom-based and on-the-job training, while foundational, has increasingly demonstrated

limitations in terms of scalability, engagement, risk-free practice, and long-term knowledge retention. These inadequacies have catalyzed a global search for innovative, technology-mediated training solutions capable of bridging the gap between theoretical instruction and applied competency.

Virtual Reality (VR) technology, once confined to the domains of entertainment and aerospace simulation, has undergone transformative maturation and is now being systematically integrated into organizational training ecosystems. VR-aided training leverages immersive, three-dimensional digital environments to simulate real-world scenarios, enabling employees to engage in experiential learning with an unprecedented degree of realism and interactivity. This capacity to replicate complex, high-stakes operational contexts within a controlled, consequence-free environment represents a paradigm shift in how organizations conceptualize and deliver workforce development programs.

Employee skill retention — defined as the sustained ability of individuals to recall, apply, and transfer acquired competencies over extended periods — constitutes a critical determinant of training Return on Investment (ROI) and organizational performance sustainability. Conventional training methodologies have persistently struggled to achieve durable retention outcomes, primarily due to passive instructional delivery, insufficient contextual embedding, and limited opportunity for repeated practice. VR-aided training, by engaging multiple sensory modalities and facilitating active, scenario-based learning, addresses these structural deficiencies in a compelling manner.

This paper presents the findings of an empirical study conducted at Tech Mahindra, a globally recognized IT and business process outsourcing organization headquartered in Pune, India. The research investigates the relationship between VR-aided training adoption and employee skill retention outcomes, thereby contributing to the growing body of literature on technology-enhanced learning in service sector organizations. The study further examines employee perceptions, satisfaction levels, and practical training application, providing a holistic understanding of VR training's organizational value proposition.

2. REVIEW OF LITERATURE

The academic discourse on VR-aided training and its impact on learning outcomes has expanded considerably over the past decade, with empirical contributions spanning diverse industrial and educational contexts. A synthesis of recent literature reveals consistent convergence around the superior efficacy of immersive training modalities compared to their traditional counterparts.

Pitura (2025) demonstrated that the integration of VR with AI-assisted simulations significantly enhanced content knowledge application and pedagogical adaptability among EFL pre-service teachers, reinforcing constructivist learning principles through experiential immersion. Complementing this, Nofal (2025) established that AI-enhanced interview simulations within metaverse environments elevated communication competence and adaptive reasoning, underscoring the scalability of immersive systems in workforce development contexts.

In the medical education domain, Hammouda (2025) reported that VR-based anatomy training substantially improved spatial understanding and cognitive assimilation compared to conventional instruction, while Hussain (2024) demonstrated that conversational AI-VR integration enhanced hazard recognition and safety compliance among construction workers, particularly addressing linguistic and educational barriers. Kleygrewe (2024) found that VR training elicited comparable or superior behavioral responses in police officers relative to real-life training, citing cost-efficiency and repeatability as decisive advantages.

From a vocational training perspective, Mulders (2024) confirmed that a VR vehicle painting simulator improved technical proficiency and reduced material wastage, while Radhakrishnan (2024) established that haptic feedback integration significantly enhanced motor precision and user engagement in VR training environments. Leung (2022) conducted a longitudinal study demonstrating that VR game-based training improved hospitality employees' performance, customer service skills, and knowledge retention over time — a finding directly relevant to service sector contexts such as Tech Mahindra.

Xie (2024) applied the UTAUT2 model to reveal that perceived usefulness, facilitating conditions, hedonic motivation, and habit significantly influenced VR training adoption among pre-service teachers, offering

important insights for technology acceptance in organizational settings. Xu (2024) advanced the discourse by employing physiological metrics to confirm that VR environments improved attention, retention, and hazard awareness across demographically heterogeneous workforces. Collectively, this body of evidence establishes a robust theoretical and empirical foundation for the present study's investigation of VR training's impact on employee skill retention in the service sector.

3. THEORETICAL FRAMEWORK

The present study is anchored within two complementary theoretical frameworks that provide conceptual scaffolding for understanding the relationship between VR-aided training and employee skill retention.

3.1 Kolb's Experiential Learning Theory

Kolb's (1984) Experiential Learning Theory posits that knowledge is created through the transformation of experience, with effective learning occurring through a cyclical process encompassing concrete experience, reflective observation, abstract conceptualization, and active experimentation. VR training environments are uniquely positioned to facilitate all four stages of this cycle simultaneously — providing concrete immersive experiences, enabling immediate reflective feedback, supporting conceptual understanding through realistic scenario simulation, and facilitating active experimentation without real-world risk consequences. This theoretical alignment explains why VR training consistently demonstrates superior retention outcomes compared to passive instructional methods.

3.2 Cognitive Load Theory

Sweller's (1988) Cognitive Load Theory distinguishes between intrinsic, extraneous, and germane cognitive load in learning environments. VR-aided training optimizes germane cognitive load — the mental effort devoted to schema formation and learning — by reducing extraneous load through intuitive interface design and contextual embedding. The multi-sensory engagement characteristic of VR environments facilitates deeper encoding of information, thereby enhancing long-term memory consolidation and skill retention. The immersive nature of VR reduces the cognitive distance between training context and real-world application, further reinforcing transfer of learning.

4. RESEARCH METHODOLOGY

4.1 Research Design

The study adopted a descriptive-quantitative research design to systematically investigate the relationship between VR-aided training and employee skill retention. This approach was selected for its capacity to provide objective, replicable measurements and to enable statistical inference from sample data to the broader organizational population.

4.2 Data Collection

Primary data were collected through a structured questionnaire comprising closed-ended questions, Likert-scale items (five-point scale: Strongly Agree to Strongly Disagree), and multiple-choice questions. The instrument was designed to capture employee perceptions, satisfaction levels, skill application frequency, and the perceived impact of VR training on retention and performance. Secondary data were obtained from peer-reviewed journals, industry reports, and organizational publications to support theoretical contextualization.

4.3 Sampling

A purposive sampling approach was employed to ensure that only employees with direct exposure to VR-aided training programs were included in the study sample. This technique guaranteed the relevance and ecological validity of the data. The final sample comprised 100 respondents drawn from the workforce of Tech Mahindra, representing diverse functional areas including technical operations, customer service, soft skills training, and safety compliance. The sample included employees from the 21–45 age range, with postgraduate qualifications predominating (significant

proportion), ensuring analytical sophistication in self-reporting.

4.4 Statistical Tools

Data were analyzed using frequency analysis and descriptive statistics to characterize the sample and training patterns; Pearson correlation analysis to examine the strength and direction of the relationship between VR training and skill retention; and simple linear regression to establish the predictive power of VR training on retention outcomes. All analyses were conducted at a 95% confidence level ($p < 0.05$).

5. RESULTS AND DISCUSSION

5.1 VR Training Participation and Purpose

The analysis revealed that 75% of respondents actively participated in VR training, with 40% engaging frequently and 35% occasionally. This high participation rate reflects strong institutional commitment to VR training adoption at Tech Mahindra and ensures that respondent perceptions are grounded in substantive experiential exposure. Regarding training purpose, 45% of respondents identified skill development as their primary motivation, followed by performance improvement (30%) and knowledge enhancement (20%), with only 5% citing compliance requirements. This purposeful orientation toward competency enhancement rather than mere regulatory compliance suggests an organizationally embedded culture of voluntary learning.

Training Purpose	Frequency	Percentage
Skill Development	45	45%
Performance Improvement	30	30%
Knowledge Enhancement	20	20%
Compliance Requirement	5	5%
Total	100	100%

Table 1: Primary Purpose for Attending VR Training

5.2 Effectiveness, Engagement, and Satisfaction

The effectiveness analysis produced compelling findings: 80% of respondents rated VR training as effective or highly effective compared to traditional methods, with only 10% expressing unfavorable assessments. This overwhelming endorsement is corroborated by engagement metrics — 65% agreed that VR training was more engaging than conventional approaches, with the immersive environment demonstrably increasing learner participation and intrinsic motivation. These findings align with Chan (2023) and Leung (2022), who reported that gamified and immersive VR environments significantly elevated learner engagement in organizational training contexts.

Satisfaction analysis further validated VR training's perceived value: 80% of respondents reported being satisfied or very satisfied with VR training programs. This satisfaction manifested across multiple dimensions — 80% agreed that VR training provided realistic learning experiences, 78% reported increased confidence in task performance, and 75% found the systems easy to use. Notably, the identified challenges — technical issues (35%), lack of familiarity (25%), and motion sickness (20%) — represent implementation-level barriers rather than fundamental limitations of the training modality itself.

Dimension	Agreement Rate	Key Insight
VR Training Effectiveness	80%	Superior to traditional methods
Enhanced Engagement	65%	Higher learner interest & participation
Overall Satisfaction	80%	Positive acceptance organizational-wide
Realistic Learning Experience	80%	High-fidelity scenario simulation
Task Confidence Improvement	78%	Reduced performance anxiety
Ease of Use	75%	Accessible interface design

Table 2: Summary of Key Training Effectiveness Dimensions

5.3 Skill Retention Outcomes

The skill retention analysis constitutes the central empirical contribution of this study. A remarkable 80% of respondents agreed or strongly agreed that VR training enhanced their skill retention over time, with 80% concurring that it reduced the need for repeated training sessions. Practical skill application data reinforced these perceptions: 75% of respondents reported applying VR-learned skills either always (40%) or often (35%) in their daily work, indicating strong transfer of learning from the simulated training environment to real-world operational contexts.

Performance enhancement outcomes were equally significant: 80% agreed that VR training improved task efficiency, and 80% reported enhanced problem-solving capabilities. The ability to simulate complex, context-rich scenarios appears to have cultivated higher-order cognitive skills including analytical reasoning, situational judgment, and adaptive decision-making — competencies that are particularly critical in the dynamic service delivery environment characteristic of organizations like Tech Mahindra.

5.4 Hypothesis Testing

5.4.1 Correlation Analysis

To examine the nature of the relationship between VR-aided training and employee skill retention, Pearson's correlation coefficient was computed. The results established a strong positive correlation ($r = 0.72$) between the two variables, statistically significant at $p < 0.05$. This finding unequivocally demonstrates that greater exposure to and engagement with VR training is systematically associated with higher levels of skill retention among employees. The magnitude of the correlation coefficient ($r > 0.70$) is classified as a strong effect in social science research, lending substantial empirical weight to the proposition that VR training meaningfully contributes to retention outcomes.

Variable	VR Training	Skill Retention
VR Training	1.00	—
Skill Retention	0.72*	1.00

Table 3: Correlation Matrix — VR Training and Skill Retention (*Significant at $p < 0.05$)

5.4.2 Regression Analysis

To determine the predictive and causal significance of VR training on skill retention, simple linear regression analysis was performed with VR training as the independent variable and employee skill retention as the dependent variable. The regression model yielded a beta coefficient of 0.81 ($t = 6.45$, $p = 0.00$), indicating that VR training exerted a strong, statistically significant positive effect on skill retention. The model's explanatory power was substantial, with an R-squared value of 0.65 confirming that 65% of the variance in employee skill retention was attributable to VR training adoption. The F-statistic of 41.28 ($p < 0.05$) validated the overall model fit.

Path	Beta (β)	t-Value	p-Value	R ²	F-Statistic
VR Training → Skill Retention	0.81	6.45	0.000	0.65	41.28*

Table 4: Regression Analysis Results (*Significant at $p < 0.05$)

On the basis of these results, the null hypothesis (H_0 : VR aided training does not have a significant impact on employee skill retention at Tech Mahindra) is firmly rejected, and the alternative hypothesis (H_a : VR aided training has a significant positive impact on employee skill retention at Tech Mahindra) is accepted. These findings are consistent with and extend the empirical conclusions of Mulders (2024), Sudiarno (2024), and Leung (2022), who independently documented significant retention and performance improvements attributable to VR training interventions.

6. DISCUSSION

The empirical findings of this study contribute substantively to both the theoretical and applied dimensions of VR-aided training research. The identification of a strong positive correlation ($r = 0.72$) and significant predictive relationship ($\beta = 0.81$, $R^2 = 0.65$) between VR training and employee skill retention provides robust quantitative support for the growing consensus in the literature regarding the superiority of immersive training modalities over conventional approaches.

From a theoretical standpoint, these results validate the applicability of Kolb's Experiential Learning Theory in digital training contexts. The VR environment's capacity to simultaneously engage all four stages of the experiential learning cycle — concrete experience, reflective observation, abstract conceptualization, and active experimentation — appears to create conditions uniquely conducive to deep learning and durable memory encoding. The practical manifestation of this theoretical alignment is evident in the finding that 75% of employees consistently apply VR-learned skills in their daily work, demonstrating meaningful transfer of learning from simulation to practice.

The finding that 80% of respondents perceived VR training as reducing the need for repeated training sessions carries significant strategic implications. In the context of large-scale organizations like Tech Mahindra, where continuous workforce upskilling constitutes a major operational expense, the capacity to achieve durable skill acquisition through a single, high-quality VR training intervention represents a compelling economic advantage. This aligns with Kleygrewe's (2024) observation that the repeatability and cost-efficiency of VR simulations constitute decisive advantages over traditional training frameworks.

The challenges identified by respondents — technical issues (35%), lack of familiarity (25%), and motion sickness (20%) — merit careful consideration by organizational learning and development practitioners. While these barriers do not undermine the fundamental effectiveness of VR training, they represent implementation-phase friction that can constrain adoption rates and user experience quality. Addressing these challenges through infrastructure investment, orientation programs, and hardware optimization is likely to yield further improvements in training outcomes beyond those already documented.

It is also noteworthy that 45% of employees attended VR training primarily for skill development purposes, suggesting a self-directed, intrinsically motivated orientation toward learning — a characteristic associated with higher retention outcomes in the andragogical literature. This finding implies that VR training at Tech Mahindra has successfully cultivated a culture of proactive competency development, which is itself a strategic asset in an industry characterized by rapid technological change.

7. KEY FINDINGS

- A majority of respondents were male employees within the 26–35 age group, representing an engaged, technologically familiar demographic.
- 75% of respondents actively participated in VR training, with skill development (45%) and performance

improvement (30%) as primary motivations.

- Technical training modules accounted for 40% of VR training usage, followed by soft skills (25%), safety (20%), and customer service (15%).
- 80% of respondents rated VR training as effective or highly effective compared to traditional methods.
- 80% expressed satisfaction with VR training programs, with 45% reporting very high satisfaction levels.
- 80% agreed that VR training enhanced skill retention over time, reducing the need for repeated training sessions.
- 75% of respondents consistently applied VR-learned skills in their work, demonstrating strong transfer of learning outcomes.
- Pearson correlation analysis confirmed a strong positive relationship between VR training and skill retention ($r = 0.72$, $p < 0.05$).
- Regression analysis established that VR training significantly predicts skill retention ($\beta = 0.81$, $R^2 = 0.65$, $p = 0.00$), explaining 65% of variance.
- Technical issues (35%) and lack of familiarity (25%) were identified as primary implementation challenges requiring organizational attention.

8. RECOMMENDATIONS

Based on the empirical findings, the following evidence-based recommendations are advanced for human resource managers, organizational learning specialists, and senior management at Tech Mahindra and comparable service sector organizations:

- **Invest in Robust Technical Infrastructure:** The 35% rate of technical difficulty reported by respondents indicates a systemic need for infrastructure upgrades, including high-performance VR hardware, reliable network connectivity, and proactive technical support protocols during training sessions.
- **Implement Structured Orientation Programs:** Prior to VR training deployment, comprehensive orientation and familiarization sessions should be conducted to reduce the cognitive and behavioral barriers associated with technology unfamiliarity, thereby accelerating the adoption curve.
- **Expand VR Training Across Functional Domains:** Current deployment is concentrated in technical training (40%). Strategic expansion into customer experience management, leadership development, and cross-functional collaboration modules would maximize the technology's organizational value.
- **Establish Continuous Feedback Mechanisms:** Real-time and post-session feedback systems should be institutionalized to enable iterative improvement of VR training content, interface design, and instructional sequencing.
- **Adopt a Blended Learning Architecture:** VR training should be integrated within a broader blended learning ecosystem that combines immersive simulation with classroom instruction, e-learning modules, and mentoring, leveraging the complementary strengths of each modality.
- **Customize Training by Role and Competency Level:** Personalized VR training pathways aligned with individual employee roles, performance gaps, and career trajectories would enhance training relevance and maximize retention impact.
- **Conduct Periodic Longitudinal Outcome Evaluations:** Systematic post-training assessments at 30, 90, and 180-day intervals would enable evidence-based measurement of long-term retention and provide data-driven justification for continued VR training investment.
- **Address Motion Sickness Through Hardware Optimization:** Organizations should explore advanced VR headsets with higher refresh rates and optimized tracking systems to mitigate the motion sickness experienced by 20%

of respondents, thereby broadening the training's inclusivity.

9. CONCLUSION

This study provides comprehensive empirical evidence that Virtual Reality aided training exerts a significant, positive, and measurable impact on employee skill retention within the service sector. Conducted at Tech Mahindra with a purposively selected sample of 100 VR-trained employees, the research employed a rigorous quantitative methodology to establish both the correlational and predictive dimensions of this relationship.

The findings demonstrate that VR training is not merely a technologically impressive novelty, but a pedagogically substantive intervention capable of transforming how service sector organizations develop, retain, and deploy human capital. The high satisfaction rates (80%), strong practical skill application (75%), and the identification of VR training as a driver of enhanced task efficiency, problem-solving capability, confidence, and reduced retraining requirements collectively paint a picture of transformative training impact.

The regression model's confirmation that VR training accounts for 65% of the variance in skill retention outcomes establishes this technology as a primary determinant of training effectiveness, not merely a supplementary tool. For organizations operating in technology-intensive, customer-centric service environments — where the speed and durability of skill acquisition directly influence service quality and competitive positioning — this finding has profound strategic implications.

As VR technology continues to evolve — incorporating artificial intelligence, haptic feedback, spatial audio, and real-time biometric monitoring — its capacity to deliver increasingly personalized and physiologically immersive training experiences will only deepen. Organizations that proactively embed VR into their learning and development strategy today are positioning themselves to sustain a durable competitive advantage through superior human capital development. The present study contributes to this trajectory by providing robust empirical grounding for the organizational adoption of VR-aided training as a cornerstone of contemporary human resource development practice.

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