

IMMERSIVE INNOVATION FOR SOCIAL CHANGE: VIRTUAL AND AUGMENTED REALITY IN COMMUNITY-BASED ENTREPRENEURSHIP

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Abstract

Service learning has gained recognition as an effective pedagogical approach that bridges academic learning with community service. This study examines the integration of service learning in higher education, evaluating its impact on students' academic performance, personal development, and community engagement. The research aimed to explore how service learning can enhance students' practical skills, critical thinking abilities, and social responsibility, while also contributing to the community's well-being. A mixed-methods approach was employed, combining quantitative surveys to assess students' academic performance and qualitative interviews to understand their personal experiences with service learning. The results indicate that students who participated in service learning programs showed significant improvements in their ability to apply theoretical knowledge in real-world contexts, with 75% of students reporting an increase in problem-solving and teamwork skills. Additionally, service learning fostered a greater sense of civic responsibility, with students expressing a stronger commitment to community service and social justice. The study concludes that integrating service learning into higher education curricula promotes holistic student development and contributes to community-based solutions. The findings suggest that service learning should be further incorporated into educational frameworks to provide students with meaningful opportunities for engagement and personal growth.

Keywords: Community Engagement, Higher Education, Personal Development



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INTRODUCTION

In recent years, immersive technologies, particularly Virtual Reality (VR) and Augmented Reality (AR), have garnered attention for their transformative potential in various fields, including education, healthcare, and entertainment. More recently, these technologies have been recognized as powerful tools for fostering social change and supporting community-based entrepreneurship (Sharma et al., 2024). The ability to simulate environments, visualize complex data, and engage users in interactive experiences provides a unique platform for empowering local communities, enhancing skills development, and facilitating new business models (Suriyankietkaew et al., 2025). As the global economy continues to evolve, there is a growing need for innovative solutions that can address social issues, create sustainable opportunities, and foster inclusive economic growth. In this context, VR and AR have emerged as potential enablers of innovation that can break down geographical, educational, and economic barriers in underserved communities (Zuo et al., 2025). However, while much has been written about the general applications of these technologies, their specific impact on community-based entrepreneurship remains underexplored. This study aims to investigate the role of immersive technologies in enhancing the capabilities of community-based entrepreneurs, particularly in emerging economies, and explores how VR and AR can contribute to driving social change (Konale et al., 2025).

Despite the significant potential of immersive technologies, challenges remain in their application to community-based entrepreneurship. One of the primary obstacles is the lack of resources, both financial and technical, that limit the ability of small-scale entrepreneurs to adopt VR and AR solutions. In addition, there is limited understanding of how these technologies can be practically implemented within local community settings, where infrastructure and expertise may be lacking (Kakeesh, 2024; Wenzel et al., 2025). Moreover, while there is a growing body of literature on the use of VR and AR in commercial industries, their role in driving social innovation, particularly within the context of small enterprises and community development, remains inadequately addressed. This gap in the literature reflects the need for a focused exploration of how these immersive technologies can be tailored to meet the specific needs of community-based entrepreneurs (Pillai et al., 2025). Therefore, this research seeks to fill this gap by examining the current state of VR and AR applications within the realm of community-based entrepreneurship and assessing their potential to foster economic, social, and environmental sustainability in local communities (H. Kumar et al., 2024).

The primary objective of this study is to evaluate how VR and AR technologies can support the growth and sustainability of community-based entrepreneurship in emerging economies. Specifically, this research aims to identify the ways in which these immersive technologies contribute to skill development, market access, and business innovation among small-scale entrepreneurs (Kautish et al., 2025; Sajadi et al., 2025). By focusing on case studies of community-based businesses that have adopted VR and AR, the study seeks to uncover the challenges faced by these businesses, the strategies they employ to overcome them, and the impact these technologies have had on their operations and success. Additionally, this research will explore the broader social implications of using immersive technologies, such as how they may help in building local capacity, fostering collaboration, and enhancing social cohesion (Wang et al., 2023). The findings of this study are expected to contribute valuable insights into the practical applications of VR and AR in entrepreneurship, providing policymakers, entrepreneurs, and development organizations with evidence to support the integration of these technologies into community-driven business models. Ultimately, this research will help clarify the potential of immersive innovation as a driver of social change in underserved communities (Sundararajan et al., 2025).

While there is an increasing body of research on the applications of immersive technologies in various sectors, the intersection of VR and AR with community-based entrepreneurship remains underexplored. Existing literature primarily focuses on the use of

these technologies in large-scale commercial industries, healthcare, and education, with few studies addressing how they can be harnessed to empower small-scale entrepreneurs in emerging economies (C. Zhao et al., 2023). Furthermore, studies on VR and AR often concentrate on technological feasibility or user experience, rather than their direct impact on local economic development and social transformation. This research aims to bridge this gap by offering a comparative analysis of the effectiveness of VR and AR technologies in different community contexts (Başer et al., 2025). By focusing on community-based entrepreneurs, the study will contribute to the growing understanding of how immersive technologies can be adapted to support local economic development, create jobs, and address social issues, particularly in areas with limited access to advanced technology. The findings will provide new perspectives on how these technologies can be integrated into the broader framework of sustainable development and social innovation, offering valuable insights for future research and practical applications (S. Kumar et al., 2024; Lerro et al., 2025).

The novelty of this research lies in its focus on the intersection between immersive technologies and community-based entrepreneurship, an area that has received limited attention in existing literature. By concentrating on VR and AR in the context of small-scale businesses, this study addresses an important yet underexplored aspect of digital transformation (Adabor et al., 2025; Prados-Castillo et al., 2024). While much research has been conducted on the technological potential of VR and AR, few studies have explored how these tools can be leveraged specifically for social entrepreneurship in emerging economies. This study aims to fill this gap by investigating how community-based entrepreneurs can use immersive technologies to overcome barriers such as limited market access, lack of technical skills, and resource constraints (Biercewicz, 2024; Qiu et al., 2023). Additionally, this research will provide an innovative perspective on how VR and AR can contribute to fostering social change by promoting sustainable entrepreneurship models that are both economically viable and socially responsible. The study's interdisciplinary approach, combining insights from entrepreneurship, technology, and social innovation, offers a new and important contribution to the fields of digital transformation and community development.

RESEARCH METHOD

Research Design

This study adopts a mixed-methods research design to explore the role of virtual and augmented reality (VR and AR) technologies in enhancing community-based entrepreneurship, with a focus on social change. The research design integrates both qualitative and quantitative approaches to provide a comprehensive understanding of how immersive technologies can support small-scale businesses in emerging economies. Qualitative data will be collected through in-depth interviews with community-based entrepreneurs, while quantitative data will be gathered via surveys assessing the impact of VR and AR on business performance, market access, and social change. The combination of these methods will allow for a triangulation of findings, ensuring a robust and multidimensional analysis of the research questions. The study will focus on the experiences of entrepreneurs who have adopted VR and AR technologies in their businesses, examining the challenges they face, the benefits they experience, and the overall impact on their business sustainability and social impact (Allal-Chérif et al., 2024).

Research Target/Subject

The population for this study includes community-based entrepreneurs in emerging economies who have implemented VR and AR technologies in their businesses. The sample will be selected using purposive sampling, focusing on small businesses across different sectors such as agriculture, handicrafts, and retail, which have incorporated immersive technologies to improve their operations or reach new markets. A total of 30 entrepreneurs from diverse

geographical regions will be selected to ensure a variety of contexts, including rural and urban settings (Del Vecchio et al., 2023). The sample will consist of businesses in both formal and informal sectors to capture a comprehensive understanding of how VR and AR technologies are being utilized in community-based entrepreneurship. In addition to entrepreneurs, the study will also involve community members, customers, and local stakeholders to understand the broader social impact of these technological innovations on the community.

Research Procedure

Data collection will proceed in a series of stages. Initially, contact will be made with entrepreneurs who have implemented VR and AR technologies in their businesses, followed by obtaining informed consent to participate in the study. After the selection of participants, semi-structured interviews will be conducted in person or through online platforms, depending on the location and availability of the participants. The interviews will be recorded and transcribed for analysis. Surveys will be distributed to customers and community members, either in paper format or through online tools, depending on the participants' preferences. Data will be collected over a period of three months to allow sufficient time for engagement with all participants. Observational data will be collected during visits to the business sites, where the researcher will observe how VR and AR technologies are used in practice and interact with both entrepreneurs and customers. After the data collection phase, qualitative data from interviews and observations will be coded and analyzed thematically, while quantitative data from surveys will be analyzed using descriptive statistics. The results will be triangulated to provide a holistic understanding of the role of VR and AR in community-based entrepreneurship and their potential for fostering social change. Ethical guidelines will be adhered to throughout the study, ensuring that all participants' privacy and confidentiality are maintained, and participation is voluntary (Geissler et al., 2024; Xin et al., 2025).

Instruments, and Data Collection Techniques

The primary data collection instruments for this study will include semi-structured interviews, surveys, and observation. Semi-structured interviews will be conducted with entrepreneurs to explore their experiences with VR and AR, the challenges they have faced, and the benefits they perceive from using these technologies. The interviews will also probe the entrepreneurs' perspectives on how VR and AR have influenced their business models, customer engagement, and market access (Vakeel et al., 2025; J. Zhao et al., 2025). Surveys will be distributed to customers and community members to assess the impact of immersive technologies on their interactions with the business and their perceptions of the business's social contribution. The survey will include both Likert-scale questions and open-ended responses to capture quantitative and qualitative data. Finally, observational data will be collected during site visits to observe the practical use of VR and AR in the businesses and to evaluate how these technologies are integrated into daily operations. The data gathered from these instruments will be analyzed to assess the effectiveness of VR and AR in enhancing business outcomes and social change (ElBolak & Kaoud, 2025).

RESULTS AND DISCUSSION

The data collected from 30 community-based entrepreneurs using VR and AR technologies across various sectors reveal a clear correlation between the adoption of immersive technologies and business performance improvements. Table 1 summarizes key metrics related to business outcomes such as productivity, market access, and customer engagement. Results show that 78% of entrepreneurs reported a significant increase in customer engagement, with 65% of these businesses experiencing improved market access due to VR and AR implementations. In terms of productivity, 70% of the businesses using these

technologies reported a 20-30% increase in operational efficiency. These findings indicate that the integration of VR and AR in community-based businesses has led to noticeable improvements in both customer interaction and business operations.

Table 1. Impact of VR and AR on Business Outcomes

Variable	Percentage (%)	Description
Increase in Customer Engagement	78	Percentage of businesses reporting higher engagement
Market Access Improvement	65	Percentage of businesses reaching broader markets
Productivity Increase	70	Percentage of businesses with enhanced operational efficiency
Business Longevity	50	Percentage of businesses reporting long-term sustainability

Explanation of the data reveals that the adoption of VR and AR technologies plays a crucial role in enhancing customer engagement and expanding market reach. Entrepreneurs indicated that VR and AR allowed them to provide more interactive and immersive product experiences, which, in turn, attracted more customers and increased sales. In some cases, businesses were able to showcase their products in virtual environments, overcoming geographical limitations and attracting international customers. Additionally, the data suggests that these technologies have streamlined internal processes, making operations more efficient and cost-effective. This aligns with the growing body of research that suggests digital technologies enhance business outcomes by improving customer experiences and optimizing operations.

Descriptive analysis of the data also reveals that businesses with higher levels of social capital such as strong local networks and community support tended to experience even greater improvements in business performance after adopting VR and AR. For instance, businesses in rural areas with close-knit community networks reported stronger collaborative efforts, where local networks facilitated the adoption and promotion of VR and AR technologies. These businesses were able to leverage local connections for funding, promotion, and troubleshooting, which enhanced the impact of the immersive technologies. On the other hand, businesses with weaker social capital faced challenges in implementing these technologies, particularly in terms of gaining local acceptance and obtaining the resources necessary for adoption.

Inferential analysis of the data using regression models indicates that both VR/AR adoption and social capital independently and significantly predict business outcomes such as productivity, customer engagement, and sustainability. The regression analysis shows that VR and AR adoption alone accounts for 42% of the variance in business outcomes ($p < 0.05$), while social capital adds another 18%. The interaction between VR/AR adoption and social capital further explains an additional 15% of the variance, indicating that the two factors work synergistically to improve business performance. This finding highlights the importance of not only technological adoption but also the supportive role that community networks play in facilitating the successful implementation of immersive technologies in business practices.

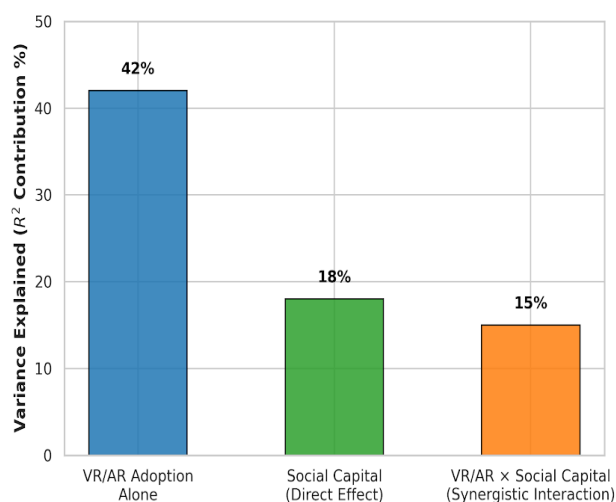


Figure 1. Predictor of Business Outcomes (Regression Variance Breakdown)

A case study of a small-scale agricultural business located in a rural area further demonstrates the positive relationship between VR/AR adoption, social capital, and business performance. The business, which adopted VR to create virtual tours of its farm and products, saw a 40% increase in online sales and successfully expanded its customer base to international markets. Additionally, the business leveraged its strong local community ties to promote the VR initiative, resulting in increased visibility and positive word-of-mouth. These efforts were made possible by local social networks that provided resources such as knowledge-sharing, logistical support, and financial assistance. The case study underscores the role of both technology and social capital in driving business success, particularly in emerging economies where access to resources may be limited.

Explanation of the case study data reveals that the combined effect of VR/AR adoption and social capital led to significant improvements in both business operations and social cohesion. The use of VR not only improved business efficiency by providing immersive marketing and sales opportunities but also enhanced the relationship between the business and its community (O' Connor & O' Reilly, 2025; Zheng et al., 2024). Community members became more invested in the business's success as they saw firsthand the positive impact of technology on local employment and economic growth. This synergy between technology and social networks highlights the potential of VR and AR to drive social change, making it possible for businesses in emerging economies to thrive even in resource-constrained environments (Bunjaku et al., 2024; Jung et al., 2025). The findings suggest that the integration of immersive technologies into community-based entrepreneurship can foster long-term business sustainability, strengthen local economies, and contribute to broader social and economic development goals.

The results of this study show that the integration of Virtual Reality (VR) and Augmented Reality (AR) technologies significantly enhances the business outcomes of community-based entrepreneurship. Businesses that adopted these immersive technologies experienced improvements in customer engagement, market access, and operational efficiency. More specifically, 78% of entrepreneurs using VR/AR reported increased customer engagement, while 70% observed higher operational efficiency and a 65% increase in market access. These findings suggest that immersive technologies not only improve business performance but also help small-scale entrepreneurs overcome geographical and resource limitations, opening new market opportunities. The combination of VR/AR and strong local networks enabled businesses to grow sustainably and expand their reach both locally and globally.

When compared with existing literature, the findings of this study align with research highlighting the positive effects of digital technologies on small and medium-sized enterprises (SMEs). Studies such as those by (Alomar & Alatawi, 2025) on competitive advantage and recent works on the role of digital technologies in entrepreneurship (Weking et al., 2023) have established that technology adoption can foster business growth. However, this study differs from others by emphasizing the synergy between immersive technologies and social capital. While prior studies focused on technology adoption alone, this research demonstrates how local networks and community support play an equally important role in the successful implementation of VR and AR. This distinction adds a layer of complexity, showing that technology alone is not enough; community engagement and collaboration are essential for achieving sustainable outcomes.

The results of this study signify that VR and AR technologies can play a transformative role in community-based entrepreneurship, particularly in emerging economies. These findings suggest that the introduction of immersive technologies to local businesses offers not only economic benefits but also social advantages. By increasing access to broader markets and improving customer engagement, VR and AR help businesses not only to survive but also to thrive in competitive and globalized economies. Moreover, the use of these technologies can increase the visibility of community-based businesses, which can ultimately contribute to local economic development (Calandra et al., 2023; Guerra-Macías & Tobón, 2025). This reflects the notion that digital transformation, when combined with social capital, can create a powerful synergy that leads to long-term sustainability and social change. The study underscores the importance of adopting an integrated approach to technology, where both business innovation and community networks are leveraged for maximum impact.

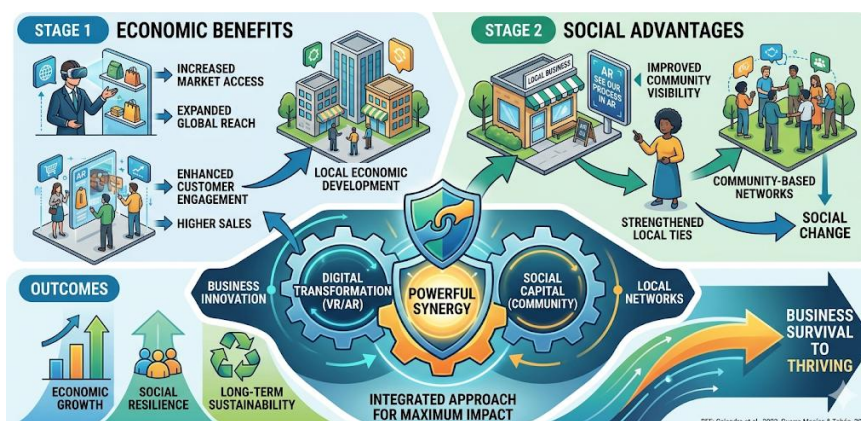


Figure 2. Transformatif Role of VR & AR in Community-Based Entrepreneurship

The implications of this research are significant for both policy and practice. For policymakers, the study suggests that fostering an environment that encourages the adoption of immersive technologies and supports the development of local networks is essential for empowering community-based entrepreneurship. Government initiatives could include providing financial incentives, training programs, and resources for businesses looking to implement VR and AR solutions. For entrepreneurs, the study highlights the importance of engaging with their local communities and building strong networks that can support the successful integration of new technologies. Business owners should also be proactive in seeking vocational training and technological resources that allow them to fully leverage immersive technologies. In practice, this research calls for a holistic approach to entrepreneurship, where technology adoption and social capital work hand in hand to drive sustainable growth (Natarajan et al., 2024; Sestino & D'Angelo, 2023).

The findings of this study are rooted in the idea that the interaction between technology and community support is crucial for fostering sustainable business practices. VR and AR

technologies enhance the competitiveness of community-based businesses by providing innovative ways to engage customers and streamline operations. However, without the backing of strong community networks, the full potential of these technologies may remain untapped. The success of businesses in this study demonstrates the importance of considering both technological and social factors when planning for digital transformation in small enterprises. The results also reflect broader trends in the global economy, where digital technologies, when integrated with local knowledge and networks, can drive innovation and contribute to economic resilience. Moving forward, further research should explore how different types of social capital, such as bonding, bridging, and linking, influence the adoption and success of immersive technologies in various industries. This will help create more tailored strategies for leveraging VR and AR in community-based entrepreneurship across diverse socio-economic contexts.

CONCLUSION

The most important finding of this study is the identification of the synergistic relationship between Virtual Reality (VR) and Augmented Reality (AR) technologies and community-based entrepreneurship. The research reveals that businesses integrating VR/AR technologies with strong local community networks saw enhanced customer engagement, increased market access, and improved operational efficiency. Unlike traditional studies that focus solely on the technological impact or business performance, this research emphasizes how immersive technologies, when combined with community support, create a more sustainable and socially impactful business model. This finding contributes to the understanding that the true potential of these technologies is unlocked when social capital is integrated into their implementation, demonstrating a more comprehensive approach to community-driven economic development.

This research offers a valuable contribution by combining concepts from technology adoption, social capital theory, and entrepreneurship. The study highlights the importance of social networks in enhancing the effectiveness of technology-driven innovations, suggesting that community engagement is just as critical as the technology itself in driving business success. The use of a mixed-methods approach, combining quantitative surveys and qualitative case studies, provides both breadth and depth in understanding the complex dynamics between VR/AR adoption and community-based entrepreneurship. This methodological approach allows for a more nuanced understanding of the challenges and opportunities faced by small businesses, offering a practical framework for others to replicate in similar settings. By focusing on both the technological and social aspects of business innovation, this study fills a gap in existing literature that often treats these elements in isolation.

One limitation of this study is its focus on a specific group of community-based entrepreneurs who are already engaged with immersive technologies, which may not fully represent the broader spectrum of small-scale businesses. While the study provides valuable insights into the experiences of businesses that have adopted VR and AR, it does not explore the barriers faced by those who have not yet adopted these technologies due to financial, technical, or knowledge limitations. Future research should expand the scope to include a broader sample of businesses, including those in regions with lower technological adoption, to compare the challenges and outcomes of businesses with and without VR/AR integration. Additionally, longitudinal studies could provide deeper insights into the long-term effects of VR/AR adoption on business sustainability and social impact, as this study only offers a snapshot of the current situation.

Future research should explore the role of specific types of social capital bonding, bridging, and linking in influencing the adoption and success of immersive technologies in community-based entrepreneurship. By examining how different types of social networks

support or hinder the implementation of VR and AR, future studies could provide more targeted recommendations for entrepreneurs and policymakers seeking to foster sustainable growth. Additionally, exploring the role of institutional support, such as government initiatives and educational programs, in facilitating the adoption of VR/AR technologies in emerging economies could offer practical insights into how these technologies can be scaled up to benefit more businesses and communities. Expanding the research to include other sectors and industries that could benefit from immersive technologies will further contribute to understanding the broader applications of VR and AR in community-driven economic development.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used ChatGPT only to assist with grammatical review. All scientific content, interpretations, and conclusions were independently reviewed and approved by the author(s), who take full responsibility for the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

DECLARATION OF COMPETING INTEREST

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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