ANALYSIS OF MULTIMODAL-BASED ENTREPRENEURSHIP MODULES IN ENHANCING DIGITAL ENTREPRENEURIAL CREATIVITY IN EQUIVALENCY EDUCATION

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Abstract. Background - Equivalency education programmes (Paket C) play a crucial role in providing learning opportunities for learners who are excluded from formal education pathways. Entrepreneurship education within nonformal settings is expected to equip learners with practical skills and creativity to adapt to the rapidly growing digital economy. However, existing entrepreneurship learning modules in equivalency education are predominantly text-based, lack interactivity, and provide limited opportunities for authentic digital entrepreneurial practice, which constrains learners' creative development.
Objective - This study aims to analyse multimodal-based entrepreneurship learning modules and examine their contribution to enhancing digital entrepreneurial creativity among learners in equivalency education programmes. Method - The study employed a qualitative exploratory case study design conducted at Community Learning Centres (Sanggar Kegiatan Belajar/SKB) in Semarang Regency and Semarang City, Indonesia. Data were collected through classroom observations, in-depth interviews with educators and learners, focus group discussions, and document analysis of learning modules and learner artefacts. Data were analysed using thematic analysis supported by triangulation of sources and methods to ensure trustworthiness. Results - The findings indicate that most existing entrepreneurship modules remain dominated by textual content and provide limited hands-on digital entrepreneurial activities. In contrast, multimodal-based modules integrating videos, visual materials, and project-based tasks significantly increased learner engagement, learning motivation, and creative expression in developing digital business ideas. Nevertheless, implementation challenges were identified, including limited digital infrastructure and educators' digital literacy. Conclusion - Multimodal-based entrepreneurship learning modules have strong potential to enhance digital entrepreneurial creativity in equivalency education, provided they are supported by adequate infrastructure and educator capacity building. Novelty/Contribution - This study contributes to nonformal education literature by providing empirical evidence on multimodal entrepreneurship learning in equivalency education and positioning multimodal modules as strategic pedagogical interventions for fostering digital entrepreneurial creativity.

Keywords: multimodal learning, entrepreneurship education, digital creativity, nonformal education

INTRODUCTION

Multimodal-based entrepreneurship modules have emerged as an innovative pedagogical approach in entrepreneurship education, particularly in response to the demands of the digital economy. By integrating textual, visual, audio, and interactive learning elements, multimodal learning environments are designed to foster learner engagement, creativity, and higher order thinking skills essential for entrepreneurial practice in digital contexts (Mayer, 2021; Bell, 2023). In entrepreneurship education, such modules are increasingly viewed as strategic tools to bridge theoretical understanding and real-world entrepreneurial competencies. Nonformal education plays a strategic role in providing inclusive learning opportunities for communities excluded from

formal education pathways. In Indonesia, equivalency education programmes (Paket C) aim to provide academic equivalence while equipping learners with practical competencies, including entrepreneurship, to support socio-economic mobility (Fitriani & Raharjo, 2021). However, learning practices in nonformal education often rely on conventional teaching materials that are less responsive to the characteristics of adult learners and the rapidly evolving digital economy.

The expansion of the digital economy has shifted the competency requirements for entrepreneurs, emphasising creativity, adaptability, and digital literacy as core capabilities. Entrepreneurship education is therefore expected to cultivate not only business knowledge but also creative problem-solving and innovation skills relevant to digital entrepreneurial ecosystems (Nabi et al., 2017; Wang et al., 2021). Learning modules that fail to integrate digital and experiential elements risk limiting learners' capacity to develop these competencies effectively. Multimodal learning theory suggests that learners process information more effectively when content is presented through multiple modes that engage verbal and visual cognitive channels simultaneously (Mayer, 2021; Mayer, 2024). In entrepreneurship education, multimodal modules support experiential and project-based learning by enabling learners to visualise business concepts, engage in simulations, and apply knowledge through digital artefacts such as videos, online campaigns, and business prototypes (Neck & Greene, 2011; Bell, 2023). Such approaches align with constructivist and experiential learning principles, which are critical for fostering entrepreneurial creativity and self-efficacy.

Field observations in equivalency education settings indicate that existing entrepreneurship modules remain predominantly text-based, with limited opportunities for authentic digital entrepreneurial practice. Learners often experience difficulties translating theoretical concepts into practical business activities, particularly in digital contexts. This condition reduces learner engagement and constrains the development of entrepreneurial creativity, especially among adult learners with diverse educational backgrounds. Recent studies confirm that entrepreneurship education lacking digital and multimodal integration tends to produce limited creative outcomes. Research by Alwi and Hamid (2021) and Yasin and Jumria (2024) demonstrates that digital-based and project-oriented entrepreneurship learning significantly enhances creativity and entrepreneurial motivation, whereas traditional approaches yield weaker impacts. Similarly, Fitriani et al. (2024) highlight that inadequate digital pedagogy in nonformal education settings hinders innovation and learner participation.

Unlike previous studies that focus primarily on entrepreneurship education in formal or higher education contexts, this study specifically examines multimodal-based entrepreneurship modules within equivalency education programmes in nonformal settings. The novelty of this research lies in its emphasis on analysing module design and implementation as pedagogical interventions for enhancing digital entrepreneurial creativity among adult equivalency learners, a population that remains underrepresented in existing literature. Given the increasing relevance of digital entrepreneurship for economic inclusion, it is essential to redesign entrepreneurship learning modules that are responsive to the learning needs of equivalency education participants. Without such innovation, nonformal education risks losing its strategic role in preparing learners for contemporary entrepreneurial challenges.

This study aims to analyse multimodal-based entrepreneurship learning modules and examine their contribution to enhancing digital entrepreneurial creativity among learners in equivalency education programmes. This study contributes theoretically by extending multimodal learning discourse within nonformal entrepreneurship education. Practically, it offers evidence-based

recommendations for designing adaptive and contextually relevant entrepreneurship modules to improve learning quality in equivalency education.

METHOD

Research Design

This study employed a qualitative research approach using an exploratory case study design. This design was selected to gain an in-depth understanding of the implementation of multimodal-based entrepreneurship learning modules and their contribution to enhancing digital entrepreneurial creativity among learners in equivalency education. Qualitative case study research is appropriate for investigating complex educational phenomena within real-life contexts, particularly when the boundaries between the phenomenon and its context are not clearly evident (Yin, 2018). An exploratory approach was adopted to capture participants' experiences, perceptions, and learning processes related to multimodal entrepreneurship education (Creswell & Poth, 2018).

Participants

The participants consisted of multiple stakeholder groups involved in equivalency education programmes, including 15–20 learners enrolled in Paket C, 3–5 entrepreneurship educators (pamong belajar), and relevant institutional stakeholders. Participants were selected using purposive sampling to ensure they had direct experience with entrepreneurship learning modules and multimodal instructional practices. Purposive sampling is commonly used in qualitative research to obtain rich and relevant information from participants who are knowledgeable about the phenomenon under study (Patton, 2015).

Data Collection Techniques

Data was collected through observation, in-depth interviews, and documentation analysis. Non-participant classroom observations were conducted to examine learning activities, learner engagement, educator–learner interactions, and the integration of multimodal elements within entrepreneurship modules, allowing the researcher to capture authentic instructional practices and learning behaviors (Merriam & Tisdell, 2016). In-depth interviews were carried out using semi-structured interview guides to explore learners' and educators' experiences, perceptions, and challenges related to the implementation of multimodal-based entrepreneurship modules, providing flexibility while maintaining alignment with the research objectives (Creswell & Poth, 2018). In addition, documentation analysis was employed to examine entrepreneurship modules, lesson plans, instructional media, and learner-generated artefacts such as digital marketing content and project outputs, thereby supporting data triangulation and offering contextual evidence of the learning processes (Bowen, 2009).

Research Procedure

The research was conducted in several stages. First, preliminary observations were undertaken to identify existing entrepreneurship learning practices and module characteristics. Second, systematic data collection was carried out through classroom observations, interviews, and document analysis. Third, all qualitative data were transcribed and organised. Finally, data were analysed and interpreted to generate findings aligned with the research objectives. This

staged procedure follows standard qualitative research processes recommended in educational research (Merriam & Tisdell, 2016).

Research Instruments

The primary research instrument was the researcher, supported by observation checklists, semi-structured interview protocols, and document analysis guidelines. In qualitative research, the researcher functions as the key instrument for data collection and interpretation, requiring reflexivity and systematic documentation throughout the research process (Creswell & Poth, 2018).

Data Trustworthiness

Data trustworthiness was ensured through triangulation of data sources and data collection techniques. Observational findings, interview data, and documentary evidence were cross validated to enhance credibility. Member checking was also employed by confirming key interpretations with selected participants. These strategies are widely recommended to ensure credibility and dependability in qualitative research (Lincoln & Guba, 1985; Merriam & Tisdell, 2016).

Data Analysis Technique

Data were analysed using thematic analysis, following stages of data reduction, coding, categorisation, and interpretation. Themes were developed inductively to identify patterns related to multimodal module design, learning implementation, learner creativity, and digital entrepreneurial practices. Thematic analysis is appropriate for identifying meaningful patterns within qualitative data and has been widely used in educational research (Braun & Clarke, 2006; Guest, MacQueen, & Namey, 2012).

RESULTS AND DISCUSSION

This section presents and discusses the findings of the study in relation to the research objectives, namely, to analyse the characteristics of existing entrepreneurship learning modules, examine the contribution of multimodal-based modules to digital entrepreneurial creativity, and identify implementation challenges along with inclusive learning strategies in equivalency education programmes. The discussion integrates empirical evidence obtained from observations, interviews, and document analysis with relevant theoretical perspectives and findings from recent studies. By combining results and discussion in an integrated manner, this section not only describes what was found in the field but also interprets the findings to explain how and why multimodal-based entrepreneurship modules influence learning processes and outcomes in nonformal equivalency education contexts.

Characteristics of Existing Entrepreneurship Learning Modules in Equivalency Education

The findings of this study reveal that entrepreneurship learning modules used in equivalency education programmers are diverse in terms of sources, formats, and authorship; however, they remain predominantly text-based in design and implementation. Most modules emphasize conceptual explanations, definitions of entrepreneurship, basic business planning theory, and written exercises, with minimal integration of digital tools or experiential learning activities. Learners reported significant difficulties in translating theoretical knowledge into practical digital

entrepreneurial actions, particularly when asked to design online business ideas, digital marketing strategies, or simple e-commerce simulations.

Classroom observations further indicated that learning activities were largely teacher-centered, with educators relying heavily on printed modules, oral explanations, and question–answer sessions. Opportunities for learners to actively explore digital platforms, collaborate on projects, or experiment with entrepreneurial tools were limited. This instructional pattern reduced learner engagement and constrained the development of creativity, especially among adult learners who tend to benefit more from contextualized and practice-oriented learning experiences. These findings are consistent with recent studies in nonformal educational contexts that highlight the persistence of conventional pedagogical practices despite the increasing demand for digital competencies. For example, Alwi and Hamid (2022) found that entrepreneurship learning in community-based education programmers often priorities knowledge transmission rather than skill application, resulting in low levels of learner creativity and innovation. Similarly, Fitriani et al. (2024) reported that many nonformal educators continue to depend on text-based modules due to limited training in digital pedagogy, which restricts the effective integration of technology into learning processes.

Research published in SINTA 2 and SINTA 3 journals also supports these findings. Yasin and Jumria (2024) demonstrated that entrepreneurship education which focuses primarily on cognitive outcomes—such as understanding business concepts—tends to have a weaker impact on creative and entrepreneurial performance compared to programmers that incorporate project-based and digital learning elements. In a related study, Lestari (2023) found that learners in nonformal settings showed higher creativity and motivation when entrepreneurship modules included digital simulations and contextual problem-solving tasks rather than purely textual materials.

From a theoretical perspective, the dominance of text-based modules contradicts contemporary learning theories that emphasis active and multimodal engagement. Multimedia learning theory argues that learners process information more effectively when instructional materials combine verbal and visual representations (Mayer, 2021; Mayer, 2024). In entrepreneurship education, this means that learners require visualization of business processes, exposure to real-world digital examples, and opportunities to practice entrepreneurial decision-making. When modules rely excessively on text, learners are less able to construct meaningful connections between theory and practice, which is essential for creative entrepreneurial thinking.

Furthermore, adult learning theory suggests that learners in equivalency education programmers benefit from problem-centered and experience-based learning approaches (Knowles et al., 2022). Text-dominated modules fail to accommodate these learning characteristics, resulting in reduced relevance and engagement. Recent studies confirm that adult learners in nonformal education settings prefer learning activities that directly relate to their socio-economic contexts and immediate livelihood needs (Rahmadieni & Wahyuni, 2023). From a programmed development perspective, the persistence of text-heavy modules can be understood as a structural issue rather than an individual educator limitation. Limited institutional guidance, lack of standardized multimodal module frameworks, and unequal access to digital infrastructure contribute to the continued use of conventional materials. Research by Warsidah et al. (2022) highlights that without systematic policy support and professional development, nonformal education institutions tend to reproduce traditional instructional practices, even when innovation is encouraged at the policy level.

In comparison with previous research, the present study reinforces and extends existing findings by demonstrating that module design remains a critical bottleneck in enhancing digital

entrepreneurial creativity among equivalency learners. Unlike studies conducted in formal or higher education settings, this research provides context-specific evidence from equivalency education, where learners face unique challenges related to age diversity, educational background, and digital access. The findings suggest that merely introducing entrepreneurship content is insufficient unless accompanied by pedagogical transformation toward multimodal and experiential learning.

From a reform-oriented perspective, these findings underline the urgent need to redesign entrepreneurship modules in equivalency education. Shifting from content-heavy textual materials toward multimodal learning resources that encourage exploration, experimentation, and digital practice is essential. Such transformation would enable equivalency education to fulfil its role not only as an alternative pathway to formal schooling but also as a platform for empowering learners with creative and market-relevant entrepreneurial skills. Without this shift, equivalency education risks perpetuating the limitations of formal-school models rather than addressing the contextual and economic realities faced by nonformal learners.

Contribution of Multimodal-Based Modules to Digital Entrepreneurial Creativity

The findings of this study demonstrate that the implementation of multimodal-based entrepreneurship modules contributes significantly to learner engagement and the development of digital entrepreneurial creativity in equivalency education programmes. Learners exhibited higher levels of motivation, participation, and creative expression when learning activities incorporated video tutorials, visual examples, and digital project-based tasks. Activities such as creating online promotional content, developing simple digital business simulations, and analysing digital market opportunities enabled learners to actively apply entrepreneurial concepts within authentic digital contexts rather than merely understanding them theoretically.

Empirical evidence from classroom observations and learner reflections indicates that multimodal learning environments encourage learners to explore ideas more freely and to experiment with digital tools. This active engagement is particularly important in entrepreneurship education, where creativity emerges through iterative processes of ideation, testing, and reflection. Learners reported greater confidence in expressing business ideas and demonstrated increased willingness to take risks when learning tasks were presented through interactive and visual formats rather than text-heavy materials.

These findings strongly align with experiential learning theory, which emphasises learning as a process whereby knowledge is created through the transformation of experience (Bell, 2023). Multimodal modules provide concrete experiences through digital projects, reflective observation through feedback and discussion, abstract conceptualisation through visual explanations, and active experimentation through repeated digital practice. Recent Scopus-indexed studies confirm that experiential and project-based entrepreneurship learning enhances creativity and entrepreneurial self-efficacy, particularly when supported by digital technologies (Kraus et al., 2022; Mukhtar et al., 2023).

Research published in Scopus-indexed journals over the past three years consistently highlights the positive relationship between multimodal and digital learning environments and entrepreneurial creativity. For instance, Kraus et al. (2022) found that digital entrepreneurship education integrating multimedia content and real-world projects significantly improved students' opportunity recognition and creative problem-solving skills. Similarly, Mukhtar et al. (2023) reported that technology-enhanced entrepreneurship learning fostered higher levels of creativity and innovation by enabling learners to visualise complex business processes and engage in collaborative digital experimentation.

Compared to earlier studies that predominantly focused on formal or higher education contexts, the present research provides important empirical evidence from equivalency education within nonformal learning settings. This distinction is critical, as learners in equivalency programmes often differ in age, educational background, and learning needs. Recent studies argue that nontraditional learners benefit more from flexible, visually rich, and practice-oriented learning designs than from conventional lecture-based instruction (Soomro, Shah, & Memon, 2022). The findings of this study support this argument by demonstrating that multimodal entrepreneurship modules can effectively foster creativity even among adult learners with limited prior exposure to digital entrepreneurship.

From a cognitive perspective, the effectiveness of multimodal-based modules can be explained by cognitive theory of multimedia learning, which posits that learners process information through separate verbal and visual channels (Mayer, 2021; Mayer, 2024). When entrepreneurship concepts are presented through a combination of text, visuals, and interactive media, learners are better able to integrate information, reduce cognitive overload, and construct meaningful mental representations. Recent Scopus-indexed research confirms that well-designed multimedia instruction enhances creativity by supporting deeper cognitive processing and transfer of learning to real-world tasks (Leutner et al., 2022).

In practical terms, multimodal learning enables learners to conceptualise business ideas more clearly, reflect on market opportunities using visual data, and experiment with digital tools such as social media platforms, online marketplaces, and basic analytics applications. These activities are essential for developing digital entrepreneurial creativity, which involves not only generating ideas but also adapting them to digital market conditions. Studies by Anwar et al. (2023) show that exposure to digital entrepreneurial tools within learning environments increases learners' creative confidence and innovation capability.

As a follow-up to these findings, institutions providing equivalency education should integrate structured multimodal and project-based tasks systematically into entrepreneurship modules. Such tasks should be scaffolded to guide learners through stages of ideation, digital experimentation, reflection, and refinement. In addition, educator capacity building is crucial to ensure effective facilitation of multimodal learning experiences. Without appropriate pedagogical support, the potential of multimodal modules to enhance creativity may not be fully realised.

Overall, this study extends current entrepreneurship education literature by demonstrating that multimodal-based modules are not only effective in formal education but also highly relevant and impactful in nonformal equivalency education contexts. By fostering experiential learning, supporting cognitive integration, and enabling authentic digital practice, multimodal entrepreneurship modules play a critical role in enhancing digital entrepreneurial creativity among equivalency learners.

Implementation Challenges and Inclusive Learning Strategies

Despite the demonstrated positive impact of multimodal-based entrepreneurship modules on learner engagement and creativity, this study identified several significant challenges that constrained their optimal implementation in equivalency education programmes. The most prominent challenges included limited access to digital devices, unstable internet connectivity, and low levels of digital literacy among both learners and educators. Observational data revealed that many learners continued to rely heavily on printed learning materials due to technological constraints, while educators expressed uncertainty and lack of confidence in integrating digital tools into entrepreneurship learning activities.

These challenges reflect broader structural issues commonly faced in nonformal and community-based education settings. Recent Scopus-indexed studies emphasise that digital infrastructure and educator readiness are critical determinants of successful technology-enhanced learning implementation (Soomro, Shah, & Memon, 2022; Kraus et al., 2022). In many nonformal education contexts, limited institutional funding and uneven access to technology create a digital divide that restricts learners' opportunities to engage in meaningful digital learning experiences. As a result, the potential benefits of multimodal learning are often unevenly distributed across learner populations.

Low digital literacy among educators emerged as a particularly critical barrier. Educators play a central role in facilitating multimodal learning, yet many lack formal training in digital pedagogy and entrepreneurship-related technologies. Recent research indicates that educators' digital competence strongly influences the quality of digital and multimodal learning implementation (Redecker, 2022). When educators are unfamiliar with digital tools or instructional design principles, multimodal modules risk being underutilised or reduced to supplementary materials rather than serving as core pedagogical instruments.

Learners' digital literacy also varied considerably, reflecting differences in age, educational background, and prior exposure to technology. Studies conducted in the past three years suggest that adult learners in nonformal education often experience anxiety and low self-efficacy when engaging with digital technologies, particularly in learning contexts that lack sufficient scaffolding (Santos et al., 2023). This finding aligns with the present study, where some learners expressed hesitation in using digital platforms independently and preferred traditional print-based materials.

These implementation challenges are consistent with recent findings from Scopus-indexed research on digital inequality in education. For example, Kraus et al. (2022) highlight that digital entrepreneurship education requires not only access to technology but also supportive learning ecosystems that include infrastructure, training, and institutional commitment. Similarly, Anwar et al. (2023) argue that without systematic capacity building, digital entrepreneurship initiatives risk reinforcing existing inequalities rather than promoting inclusive skill development.

In response to these challenges, hybrid learning designs combining digital and print-based materials emerged as a practical and inclusive learning strategy. Hybrid approaches allow learners with limited digital access to remain engaged through printed modules while gradually introducing digital elements such as video tutorials, visual case studies, and guided digital projects. Recent studies confirm that hybrid learning models can effectively bridge digital gaps in nonformal education by providing flexible access pathways and reducing learner resistance to technology (Santos et al., 2023; Mukhtar et al., 2023).

From a pedagogical perspective, hybrid multimodal learning supports differentiated instruction by accommodating diverse learner needs and technological readiness levels. This approach aligns with inclusive education principles, which emphasise flexibility and accessibility in learning design (Redecker, 2022). In entrepreneurship education, hybrid strategies enable learners to progressively build digital competence while maintaining engagement through familiar learning formats. Scopus-indexed research demonstrates that gradual exposure to digital tools increases learners' confidence and creative engagement over time (Anwar et al., 2023).

As a follow-up, this study highlights the importance of educator professional development in multimodal pedagogy. Training programmes should focus not only on technical skills but also on instructional design, project-based learning facilitation, and digital entrepreneurship concepts. Kraus et al. (2022) emphasise that educator capacity building is a prerequisite for sustainable digital entrepreneurship education, particularly in resource-constrained settings. Institutional

support, including access to basic digital infrastructure and collaborative learning communities, is also essential to ensure long-term implementation success.

Nevertheless, it is important to acknowledge that hybrid learning strategies are not a complete solution to digital inequality. While they mitigate immediate access barriers, long-term improvements require policy-level interventions and sustained investment in digital infrastructure. Recent studies stress that inclusive digital learning in nonformal education must be supported by cross-sector collaboration involving government, educational institutions, and community stakeholders (Soomro et al., 2022).

Overall, this study contributes to current entrepreneurship education discourse by demonstrating that the effectiveness of multimodal-based modules depends not only on pedagogical design but also on contextual readiness and inclusivity strategies. By adopting hybrid learning models and strengthening educator capacity, equivalency education programmes can maximise the benefits of multimodal entrepreneurship learning while addressing structural and technological constraints.

Research Implications, Limitations, and Future Directions

The findings of this study offer significant implications for entrepreneurship education in equivalency programmes, particularly within nonformal education contexts. The evidence demonstrates that multimodal-based entrepreneurship modules function not merely as instructional materials but as pedagogical interventions capable of bridging the persistent gap between theoretical knowledge and practical entrepreneurial application. By integrating visual, audio, and project-based digital activities, these modules facilitate experiential learning processes that enhance creativity, engagement, and digital entrepreneurial skills among adult learners.

From a theoretical perspective, this study contributes to the growing body of literature on digital and multimodal learning by extending its application to equivalency education, a domain that remains underrepresented in entrepreneurship education research. Recent Scopus-indexed studies highlight that entrepreneurship learning grounded in experiential and multimodal approaches strengthens opportunity recognition, innovation capacity, and entrepreneurial self-efficacy (Kraus et al., 2022; Santos et al., 2023). The present study reinforces these findings by demonstrating that such pedagogical benefits are also evident among adult learners in nonformal equivalency programmes, thereby broadening the contextual scope of multimodal entrepreneurship education theory.

Practically, the findings suggest that education providers should prioritise the systematic integration of multimodal and project-based learning tasks within entrepreneurship modules. Rather than treating digital elements as supplementary materials, multimodal components should be embedded as core learning activities that guide learners through stages of ideation, experimentation, reflection, and refinement. Scopus-indexed research emphasises that structured digital projects enhance creativity and learner agency when supported by appropriate scaffolding and feedback mechanisms (Leutner et al., 2022; Mukhtar et al., 2023). For equivalency education, this implies the need to redesign modules in ways that are flexible, context-sensitive, and aligned with learners' socio-economic realities.

At the policy level, this study underscores the importance of educator capacity building as a prerequisite for effective multimodal learning implementation. Educators' digital competence and pedagogical readiness strongly influence the success of technology-enhanced entrepreneurship education (Redecker, 2022). Policymakers and education authorities should therefore invest in professional development programmes that focus not only on technical digital skills but also on

instructional design, multimodal pedagogy, and digital entrepreneurship concepts. Without such investment, the transformative potential of multimodal modules may remain underutilised.

Despite these contributions, this study has several limitations that should be acknowledged. First, the research was conducted in a limited number of Community Learning Centres, which may constrain the transferability and generalisability of the findings to other nonformal education contexts. Nonformal education systems vary widely in terms of infrastructure, learner demographics, and institutional support, which may influence the effectiveness of multimodal entrepreneurship modules. Second, the study relied primarily on qualitative data derived from observations, interviews, and document analysis. While this approach provided rich and contextual insights, it did not include quantitative measurement of creativity or entrepreneurial outcomes, such as creativity scales, performance metrics, or longitudinal impact assessments.

Recent Scopus-indexed studies emphasise the importance of combining qualitative and quantitative approaches to capture the multidimensional nature of entrepreneurial creativity (Soomro et al., 2022; Anwar et al., 2023). The absence of quantitative data in this study limits the ability to assess the magnitude of learning outcomes or to establish causal relationships between multimodal module use and creativity development. Additionally, the study did not examine long-term entrepreneurial outcomes, such as business sustainability or income generation, which are important indicators of programme effectiveness in nonformal education.

Future research should therefore adopt mixed-methods or experimental designs to address these limitations. Quantitative instruments measuring creativity, digital competence, and entrepreneurial self-efficacy could complement qualitative findings and strengthen empirical validity. Experimental or quasi-experimental studies comparing multimodal and conventional entrepreneurship modules across multiple equivalency education settings would provide stronger evidence of effectiveness. Furthermore, longitudinal research is needed to examine the sustained impact of multimodal entrepreneurship education on learners' entrepreneurial trajectories and socio-economic outcomes.

Future studies may also explore the role of emerging technologies, such as artificial intelligence and learning analytics, in supporting multimodal entrepreneurship education. Recent Scopus-indexed research suggests that adaptive digital tools can personalise learning pathways and enhance creative problem-solving (Kraus et al., 2022; Santos et al., 2023). Investigating how such technologies can be integrated into equivalency education contexts would offer valuable insights for both research and practice.

Overall, this study highlights the strategic importance of multimodal-based entrepreneurship modules in strengthening the relevance and effectiveness of equivalency education. By acknowledging contextual constraints and proposing evidence-based directions for future research, this study contributes to ongoing efforts to advance inclusive, innovative, and digitally responsive entrepreneurship education in nonformal learning environments.

CONCLUSION

This study concludes that multimodal-based entrepreneurship learning modules play a significant role in enhancing digital entrepreneurial creativity among learners in equivalency education programmes. By integrating textual, visual, and project-based digital learning activities, multimodal modules enable learners to actively engage in experiential learning, translate entrepreneurial concepts into practice, and develop creative digital business ideas. However, the effectiveness of multimodal entrepreneurship learning is highly dependent on contextual readiness, particularly the availability of digital infrastructure and the digital pedagogical

competence of educators. Without adequate institutional support and capacity building, the potential of multimodal learning cannot be fully optimised within nonformal education settings. The novelty of this study lies in its focus on multimodal-based entrepreneurship modules within equivalency education programmes, a nonformal education context that remains underexplored in existing entrepreneurship education literature. Unlike previous studies that predominantly examine multimodal or digital entrepreneurship learning in formal and higher education settings, this research provides empirical evidence from adult learners in equivalency programmes. The study contributes theoretically by extending multimodal learning and experiential entrepreneurship education frameworks into nonformal education contexts, and practically by offering evidence-based insights for designing adaptive, inclusive, and contextually relevant entrepreneurship modules to strengthen digital entrepreneurial creativity in equivalency education.

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