International Review of Management and Marketing

ISSN: 2146-4405

available at http: www.econjournals.com

International Review of Management and Marketing, 2026, 16(5), 253-264.

Digital Entrepreneurship Training and Entrepreneurial Capability Development among Community-Based Participants

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Received: 21 February 2026 **Accepted:** 26 May 2026 **DOI:** https://doi.org/10.32479/irmm.23761

ABSTRACT

Technology-enabled training has become an important mechanism for expanding entrepreneurship development and business capability-building beyond formal academic settings. This study evaluated Project BIZ-SIKAP (Business Innovation and Zeal for Sustainable Income, Knowledge, and Progress) as a university-led, technology-enabled entrepreneurship training program for community-based participants. Specifically, it examined participation, perceived learning gains, and participant satisfaction across a four-session online training series covering management, production and operations, marketing, supply and demand analysis, and financial management. The study employed a descriptive-evaluative design using documentary and program-based quantitative data drawn from the approved project proposal, accomplishment and terminal reports, attendance records, training evaluation summaries, and monitoring reports. Participants included business owners, aspiring entrepreneurs, professionals, and students. The findings indicate that the program was successfully implemented, attracted sustained participation, and generated positive learning gains and high satisfaction across all training sessions. Qualitative feedback further suggests that participants valued the practical relevance of the topics, the clarity of instruction, and the usefulness of the training for business-related decision-making. At the same time, the results indicate the need to strengthen interactivity, technical delivery, learner support, and follow-up mentoring, particularly for more technical content areas such as financial management. Overall, the study shows that digitally delivered entrepreneurship training can serve as a flexible and practice-oriented approach to entrepreneurial capability development among community participants. The findings offer practical implications for universities, trainers, and entrepreneurship support institutions seeking to design scalable technology-enabled training initiatives for small-business and aspiring entrepreneur communities.

Keywords: Entrepreneurship Training, Digital Entrepreneurship, Entrepreneurial Capability Development, Small Business Development, Community-Based Participants, Technology-Enabled Training
JEL Classifications: L26, M13, M53, I23, I25, O33

1. INTRODUCTION

Technology-mediated learning has become an important mode of flexible and accessible educational delivery across contexts beyond the traditional classroom. Digital platforms allow universities and training providers to deliver structured real-time instruction while also supporting collaborative, reflective, and personalized learning experiences through formative assessment and guided interaction (Kamal, 2022). UNESCO and related studies further emphasize that technology helps create flexible learning environments, strengthen coaching and mentoring structures, and expand pedagogical support through virtual communities and improved workforce deployment (Tran, 2021). At the same time, effective implementation depends on meaningful exposure to ICT-based content and activities, since gaps in technology integration continue to appear in teacher preparation and instructional practice. In this regard, collaborative structures such as lesson study, together with digital platforms, support the creation, sharing, and application of pedagogical knowledge in continuing education, capacity building, and community-based learning initiatives (Cheng, 2023).

Entrepreneurship education has increasingly shifted to online and blended formats, expanding access, participation, and instructional flexibility. Recent reviews show that technology-supported entrepreneurship education can produce promising learning outcomes, particularly through the use of digital platforms such as social media, MOOCs, serious games, and other online tools that support content delivery, collaboration, and applied learning (Chen et al., 2021). The rapid digital redesign of entrepreneurship education during and after COVID-19 further highlighted the value of virtual communities, scalable online resources, and simulation-based activities in sustaining entrepreneurial instruction across contexts (Secundo et al., 2021). At the same time, the literature emphasizes that digital tools must be selected carefully according to course goals, learner needs, and context, while more evidence is still needed on how these tools specifically develop entrepreneurial competencies and how challenges related to ICT literacy and unequal access affect implementation.

Entrepreneurship education is increasingly delivered through online and blended formats to expand participation and flexibility for adult and community learners, not only for traditional students. Existing reviews show that technology-enabled entrepreneurship education has promising potential, but evidence remains limited on how digital tools develop specific entrepreneurial competencies, pointing to the need for more longitudinal and competency-focused research (Chen et al., 2021; Secundo et al., 2021). For adult and nonformal learners, online education offers accessibility and flexibility, yet effective learning depends on responsive instructional design, meaningful interactivity, and adequate learner support. This is especially relevant for community-based adults, aspiring entrepreneurs, and professionals who participate in short training programs and nonformal learning pathways for practical application rather than credentialing alone. As such, online entrepreneurship education should be evaluated not only for access and participation, but also for its contribution to entrepreneurial mindset, applied learning, and real-world outcomes (Dyvnych, 2022; Minja et al., 2022; Yulianingsih et al., 2023).

The study aligns with a growing body of work that recognizes online, technology-mediated entrepreneurship education as a valid pathway for community and nonformal learning rather than merely an extension activity. Reviews of online and blended entrepreneurship education report generally promising outcomes, while also noting gaps in understanding how digital tools foster specific entrepreneurial competencies and how adult or nonformal learners engage with these formats (Chen et al., 2021; Secundo et al., 2021). When entrepreneurship education is delivered through online platforms to community learners, its effectiveness can be examined through learning, teaching, and assessment perspectives, particularly in terms of learning gains and participant satisfaction. This framing also connects the study to broader discussions on virtual learning environments, lifelong learning, and nonformal adult entrepreneurship education, where responsive digital pedagogy and competency-oriented assessment are increasingly emphasized (Kotla and Bosman, 2023).

The four-session online entrepreneurship education program for community learners is consistent with the literature on nonformal, digitally delivered entrepreneurship education. Studies show that online and blended entrepreneurship education can produce learning gains and high learner satisfaction when instruction emphasizes interactivity, relevance, and timely feedback, especially for business owners, aspiring entrepreneurs, and professionals outside formal academic settings (Chen et al., 2021; Secundo et al., 2021). Framing the intervention as community education allows it to be examined through learning, teaching, and assessment perspectives, while also situating it within broader discussions on nonformal entrepreneurship education, lifelong learning, and virtual learning environments (Kotla and Bosman, 2023). In this context, learning gains and participant satisfaction are appropriate and practical indicators for assessing the educational value of technology-mediated entrepreneurship education. At the same time, attention should be given to how digital tools affect outcomes across content areas and to issues of access and ICT literacy among community participants (Chen et al., 2021; Secundo et al., 2021).

This study aligns with SDG 4 and SDG 8 by showing how digitally delivered entrepreneurship education can extend inclusive and lifelong learning opportunities beyond formal degree programs to community learners. Existing evidence indicates that online and blended entrepreneurship education supports flexible access, practical engagement, and knowledge development among nontraditional participants in real-world settings (Chen et al., 2021; Secundo et al., 2021). By documenting learning gains and participant satisfaction, the study contributes to broader discussions on sustainable and equitable education pathways and on the role of higher education in expanding accessible, practice-oriented learning through digital platforms. In this way, technology-mediated instruction can help strengthen entrepreneurial knowledge and participation among community learners while supporting education and economic development goals (Kotla and Bosman, 2023).

1.1. Theoretical Framework

The use of the Community of Inquiry and Kirkpatrick frameworks in this study is conceptually appropriate for examining technology-mediated entrepreneurship education in community settings. The Community of Inquiry framework explains how meaningful online learning emerges through the interaction of teaching presence, social presence, and cognitive presence, which are relevant to technology-mediated entrepreneurship education where interaction, reflection, and contextual application are central to learning (Ligon et al., 2021; Lopes and Canto, 2022; Dlamini, 2023). The Kirkpatrick model complements this perspective by providing practical outcome-based dimensions for evaluation, particularly reaction and learning, which correspond to participant satisfaction and knowledge gains in the present study (Chen et al., 2021; Secundo et al., 2021). Together, these frameworks allow the study to examine both the learning process and the immediate educational outcomes of the program. At the same time, prior studies note that social and cognitive presence may interact in complex ways and that teaching presence must be intentionally designed to sustain engagement in virtual settings, making implementation quality an important consideration in technology-mediated instruction (Ligon et al., 2021; Lopes and Canto, 2022).

The use of the Community of Inquiry (CoI) and Kirkpatrick model provides a strong framework for evaluating online, community-based entrepreneurship education. CoI explains how meaningful learning in technology-mediated environments is shaped by teaching presence, social presence, and cognitive presence, making it highly relevant for understanding instructional design, interaction, and reflective learning in entrepreneurship education (Ligon et al., 2021; Lopes and Canto, 2022; Dlamini, 2023). The Kirkpatrick model complements this by focusing on immediate outcomes, particularly reaction and learning, which correspond to participant satisfaction and knowledge gains in nonformal educational settings (Chen et al., 2021; Secundo et al., 2021). Although prior studies note that social and cognitive presence may interact in complex ways and that implementation fidelity remains important, the combined use of these frameworks allows the study to assess both the learning process and short-term educational outcomes in a coherent and rigorous way.

The combination of the Community of Inquiry and Kirkpatrick model provides a strong framework for evaluating technology-mediated, nonformal entrepreneurship education for community learners. The Community of Inquiry framework explains how online learning environments support meaningful engagement and reflection through teaching presence, social presence, and cognitive presence (Ligon et al., 2021; Lopes and Canto, 2022; Dlamini, 2023). The Kirkpatrick model complements this by focusing on immediate outcomes, particularly participant reaction and learning, which are reflected in satisfaction and knowledge gains in the present study (Chen et al., 2021; Secundo et al., 2021). Together, these frameworks support a coherent assessment of both instructional quality and short-term learning effects, while also recognizing that the quality of implementation remains important in online learning environments.

1.2. Literature Review

The literature supports the use of both the Community of Inquiry and Kirkpatrick model in examining online, community-based entrepreneurship education for adult learners. Studies indicate that digital learning environments can expand access for adults who balance learning with work and family responsibilities, making technology-mediated education especially relevant in nonformal settings (Chen et al., 2021; Secundo et al., 2021). The Community of Inquiry framework explains how teaching presence, social presence, and cognitive presence shape meaningful engagement and learning in online environments, while the Kirkpatrick model provides an outcome-focused basis for assessing participant satisfaction and knowledge gains (Ligon et al., 2021; Lopes and Canto, 2022; Dlamini, 2023). Together, these frameworks support a rigorous assessment of instructional quality, learner experience, and short-term educational impact, while also recognizing that implementation quality influences outcomes in online settings.

The literature supports the growing viability of online and technology-supported entrepreneurship education. Reviews consistently show promising outcomes for online and blended entrepreneurship education, while also pointing to gaps in understanding how digital tools develop specific entrepreneurial competencies and how nonformal learners engage with these formats (Chen et al., 2021; Viebig, 2022; Kolarov and Hadjitchoneva, 2023). Studies identify social media, serious games, MOOCs, and digital simulations as important modalities that make entrepreneurship education more scalable, flexible, and learner-centered beyond traditional classrooms. At the same time, their effectiveness depends on purposeful instructional design and alignment with learner needs. The shift accelerated during the COVID-19 period further reinforced the relevance of digitally delivered entrepreneurship education for practical and action-oriented learning in both formal and nonformal contexts.

The literature supports the link between online learning quality, learner satisfaction, and continued engagement in community-based entrepreneurship education. Studies show that successful online learning depends on access, course design, and interaction quality, with service quality, perceived interactivity, and perceived value shaping adult learners' satisfaction and continued use of digital platforms (Leoparjo et al., 2023; Pandita and Kiran, 2023; Prabowo et al., 2022). These factors are especially important in nonformal entrepreneurship education, where learners often balance work and other responsibilities while seeking practical and immediately useful outcomes. In this context, the study's focus on learning gains and participant satisfaction is well supported, as these are appropriate indicators of the immediate educational value of technology-mediated learning experiences.

The literature suggests that entrepreneurial learning in technology-mediated settings remains underdeveloped in some contexts, creating a need to examine how design, interaction, and assessment contribute to meaningful learning experiences in online and community-based environments (Indıran et al., 2024). This perspective supports the present study's focus on learning gains and participant satisfaction as immediate indicators of educational value in a nonformal digital entrepreneurship education program. At the same time, broader reviews on online and blended entrepreneurship education emphasize the importance of instructional design, content delivery, and learner-centered approaches, while also noting continuing gaps in evidence on competence development and engagement among nontraditional learners (Chen et al., 2021; Viebig, 2022; Kolarov and Hadjitchoneva, 2023).

1.3. Context of the Technology-Mediated Community Learning Program

Higher education institutions are increasingly serving as community learning hubs through extension and outreach, with technology-mediated delivery providing scalable and accessible ways to connect institutional expertise with local needs. In entrepreneurship education, this supports wider participation and helps reduce geographic and time-related barriers for nonformal learners while enabling more flexible and action-oriented learning opportunities (Vecchiarini et al., 2023; Tong and Zeng, 2023; Indıran et al., 2024). The literature also points to digital ecosystems, online learning repositories, and virtual learning environments as useful mechanisms for supporting lifelong learning and practical entrepreneurial development beyond traditional classrooms. At the same time, these studies stress that flexible access alone is not enough; meaningful outcomes depend

on well-designed digital pedagogy that can translate access into relevant and practice-oriented learning for community participants.

The four-session online entrepreneurship education program described in this study is consistent with current literature on technology-mediated entrepreneurship education. Existing studies show that online and blended formats can support structured, practical, and scalable entrepreneurship instruction for diverse learners, especially when the design is purposeful and learner-centered (Secundo et al., 2021; Madleňák et al., 2021; Takemoto and Oe, 2021). These works also highlight the growing use of digital modalities such as MOOCs, flipped learning, online games, and other online platforms in entrepreneurship education, particularly in response to the expansion of digital learning during and after COVID-19. In this context, the present program may be understood as a real-world community-based online entrepreneurship education initiative that supports practical learning in business planning and sustainability while also providing a basis for assessing learning gains and participant satisfaction.

The study is situated at the intersection of online learning, adult and community education, and entrepreneurship education. The literature shows that online and blended entrepreneurship education can reach nonformal learners and produce positive outcomes when instruction is purposefully designed and aligned with learner needs (Viebig, 2022; Kolarov and Hadjitchoneva, 2023). It also indicates that digital ecosystems, MOOCs, and other technology-mediated platforms make entrepreneurship education more scalable, flexible, and practice-oriented beyond traditional classrooms (Tong and Zeng, 2023; Indıran et al., 2024; Madleňák et al., 2021). At the same time, higher education extension and outreach initiatives can use these digital formats to connect university expertise with community needs and support actionable entrepreneurial learning among diverse participants (Vecchiarini et al., 2023). In this context, the present study contributes to the literature by showing how a university-led, digitally delivered entrepreneurship education program for mixed community learners may serve as a replicable model for lifelong, inclusive, and applied community learning.

2. RESEARCH OBJECTIVES AND METHODOLOGY

2.1. Research Objectives

This study examines the educational effectiveness of a technology-mediated entrepreneurship education program implemented for community learners through an online learning platform. Specifically, it seeks to determine whether the program contributed to perceived learning gains and high levels of participant satisfaction across a four-session instructional series covering management, production and operations, marketing, supply and demand, and financial management. The study is anchored in the view that community-based entrepreneurship education delivered through technology-mediated environments can be evaluated not only as an extension initiative but also as a structured educational intervention.

More specifically, the study aims to:

(1) Describe the profile of participation in the technology-mediated entrepreneurship education program in terms of session attendance across the four training dates;
(2) Determine the participants' perceived knowledge or skill levels before and after the training sessions;
(3) Assess participant satisfaction with the program in terms of objectives attainment, completeness of topics, relevance and usefulness of the activity, learning tools and materials, learning activities, trainer mastery, clarity of discussion, teaching methodologies, courtesy of trainers, effectiveness in meeting personal objectives, timeliness of delivery, and overall quality of service;
(4) Compare the evaluation results across the four training sessions to identify patterns in participant responses; and
(5) geneRate implications for improving future technology-mediated entrepreneurship education programs for community learners.

Through these objectives, the study intends to provide evidence on how online instructional delivery may support entrepreneurial learning among nontraditional learners in community settings. It also aims to contribute practical insights for strengthening future digital educational interventions that combine accessibility, instructional quality, and participant engagement.

2.2. Research Methodology

2.2.1. Research design

This study employed a descriptive-evaluative research design using documentary and program-based quantitative data. The design was considered appropriate because the study sought to describe participant outcomes and evaluate the effectiveness of a completed technology-mediated entrepreneurship education program based on existing training records and evaluation results. Rather than testing causal relationships, the study focused on examining observed patterns in learning gains and participant satisfaction using extant project documents.

The study relied on secondary data drawn from the approved project proposal, accomplishment and terminal reports, client satisfaction and training evaluation summaries, day-level evaluation records, attendance sheets, and monitoring and progress reports of the entrepreneurship education program conducted from February 15 to March 15, 2025. These records served as the empirical basis for assessing the instructional effectiveness of the program as experienced by community learners.

2.2.2. Participants and sampling technique

The participants of the study were the community learners who attended the four-session entrepreneurship education program conducted through an online platform. These participants consisted of business owners, aspiring entrepreneurs, professionals, and students, reflecting a diverse community-learning audience rather than a single formal student cohort.

Based on the project records, the number of participants per session was as follows: 131 on Day 1, 132 on Day 2, 132 on Day 3, and 166 on Day 4, with an average of 140 participants across the four

training days. Because the study used complete available program records rather than selecting only a subset of respondents, it effectively followed a total enumeration of available evaluation data from all documented participants whose responses were included in the project's official monitoring and evaluation reports.

This approach was deemed suitable because the purpose of the study was to evaluate the full implementation of the program using the complete set of accessible participant-based records already generated during the conduct of the training.

2.2.3. Instruments

The study utilized documentary sources and structured training evaluation records as its main instruments for data gathering. These included the following:

- Approved project proposal, which provided the rationale, objectives, logical framework, work plan, and expected outputs of the program;
- Accomplishment and terminal reports, which documented the implementation process, completion status of planned activities, narrative report, and sustainability plan;
- Client satisfaction and training evaluation forms, which contained participant ratings on knowledge before and after training, as well as multiple indicators of satisfaction and instructional quality;
- Session-based assessment summaries, which presented day-level mean scores for each training session;
- Attendance sheets, which established the number of participants across the four sessions; and
- Monitoring and progress reports, which provided qualitative observations regarding program delivery, participant engagement, instructional strengths, and implementation challenges.

The primary evaluation dimensions reflected in the records included: knowledge or skill before training, knowledge or skill after training, attainment of objectives, completeness of topics, relevance and usefulness of the activity, learning tools and materials, activities used to impart learning, trainer mastery of topics, clarity of discussion, teaching strategies, courtesy of trainers, effectiveness in meeting objectives, timeliness of delivery, and overall quality of service.

2.2.4. Data gathering procedure

The data for this study were gathered through documentary review of the official records of the entrepreneurship education program. First, the researchers identified and consolidated the relevant project documents, including the approved proposal, accomplishment report, terminal report, day-level training evaluation summaries, attendance records, and monitoring reports. Second, the numerical data on attendance, pre-training and post-training knowledge ratings, and satisfaction indicators were extracted from the official evaluation summaries. Third, the narrative comments and findings in the accomplishment, terminal, and monitoring reports were reviewed to provide contextual support for interpreting the quantitative results.

To preserve consistency, only the finalized and officially documented project records were included in the analysis. The extracted data were then organized into tables and comparative summaries according to session and evaluation category. This process allowed the researchers to examine both the overall instructional performance of the program and the variations in participant responses across the four training days.

2.2.5. Data analysis

The study used descriptive statistical analysis to interpret the documentary and evaluation data. Frequency counts and session totals were used to present participant attendance across the four training sessions. Mean scores were used to describe participants' perceived knowledge before and after the training, as well as their satisfaction ratings on the different evaluation criteria.

To determine learning gains, the study compared the recorded mean ratings for knowledge or skill before training and knowledge or skill after training at both the day level and the overall program level. To assess participant satisfaction, the study analyzed the mean ratings for each evaluation criterion and interpreted them based on the verbal descriptions reflected in the project records, such as Excellent and Very Satisfied.

Comparative analysis was also used to examine similarities and differences across the four sessions in terms of learning outcomes and satisfaction patterns. In addition, narrative findings from the accomplishment and monitoring reports were used to contextualize the quantitative results, particularly in relation to session strengths, participant engagement, and implementation challenges such as internet connectivity. This combination of numerical description and contextual interpretation helped present a more comprehensive evaluation of the program.

2.2.6. Ethical considerations

This study used existing project-based records and evaluation documents generated during the implementation of the entrepreneurship education program. In handling these materials, the researchers observed appropriate ethical standards related to confidentiality, responsible data use, and institutional respect for program records. Personal data appearing in attendance records were not used for individual-level profiling or disclosure in the analysis; rather, the records were treated only as evidence of participation counts and program reach.

The study focused on aggregated training results and documented program findings, not on identifying or evaluating specific individuals. All interpretations were limited to the educational outcomes of the program as reflected in the official records. In reporting the findings, care was taken to preserve the integrity of the documented data and to use the records solely for academic and program evaluation purposes.

3. RESULTS AND DISCUSSION

3.1. Participation and Implementation Profile of the Technology-Mediated Entrepreneurship Education Program

The technology-mediated entrepreneurship education program was implemented through a four-session online learning series

conducted from February 15, 2025 to March 15, 2025. The program targeted business owners, aspiring entrepreneurs, professionals, and students, reflecting a mixed community learner profile rather than a single formal academic cohort. Based on the accomplishment and terminal report, all major activities identified in the work plan were completed, including orientation, management training, technical and production training, marketing training, supply and demand analysis, financial management sessions, and terminal output support. The work plan and logical framework indicators were all reported at 100% completion, suggesting that the program was implemented as intended.

The attendance profile shows sustained participation across the four sessions, with 131-166 participants per day and an average of 140 participants (Table 1). This exceeded the project target of at least 100 entrepreneurs and indicates strong community interest in the program. The highest attendance was recorded on Day 4 (166 participants), suggesting that the later sessions, particularly those focused on financial management and hands-on application, may have attracted increased interest from learners. This pattern is important because it indicates that technology-mediated delivery can sustain community participation across multiple sessions when the content is relevant and practice-oriented. This finding is consistent with literature emphasizing that online and blended entrepreneurship education can widen participation when instructional delivery is flexible and aligned with learner needs (Chen et al., 2021; Secundo et al., 2021).

The implementation profile also supports the view that higher education institutions can function as community learning hubs through digitally delivered extension activities. The completion of all planned sessions and indicators suggests that the program was not only accessible but also operationally viable as a structured learning intervention. In this sense, the program functioned as a practical example of how entrepreneurship education may be extended beyond the classroom through online community-based delivery.

3.2. Entrepreneurship-Related Learning Gains across the Training Sessions

One of the central aims of the study was to determine whether the program contributed to perceived learning gains among community learners. The training evaluation records included mean ratings for participants' knowledge or skill before training and knowledge or skill after training for each session, as well as an overall average across the four sessions (Table 2).

The results show an overall increase in self-rated knowledge or skill from 3.07 before training to 4.11 after training, yielding a mean gain of 1.04. This indicates that, at the aggregate level, participants perceived that the program improved their entrepreneurial knowledge and skills. Such an outcome supports the educational value of the intervention and suggests that technology-mediated entrepreneurship education can facilitate short-term learning gains among community learners.

At the session level, the largest gain was recorded on Day 1, where the mean increased from 2.10 to 4.45, producing a gain of 2.35.

Table 1: Participation and session profile of the program

Session	Date	Major content area	No. of participants
Day 1	February 15, 2025	Management; Technical and Production Aspects	131
Day 2	March 1, 2025	Marketing; Supply and Demand Analysis	132
Day 3	March 8, 2025	Financial Management Part I	132
Day 4	March 15, 2025	Financial Management Part II	166
Average			140

Table 2: Knowledge or skill ratings before and after the training

Session	Before training	After training	Mean gain
Day 1	2.10	4.45	2.35
Day 2	3.90	4.89	0.99
Day 3	3.17	3.50	0.33
Day 4	3.12	3.58	0.46
Overall mean	3.07	4.11	1.04

This substantial increase may be explained by the relatively low baseline rating before the session, which suggests that participants initially had limited confidence or familiarity with management and technical-production topics. After the session, however, the rating moved into a much higher range, indicating strong perceived learning improvement. Day 2 also showed a meaningful gain of 0.99, rising from 3.90 to 4.89. This suggests that the session on marketing and supply-demand analysis was particularly effective in deepening participants' understanding of market-oriented entrepreneurial concepts.

By contrast, the gains recorded on Day 3 (0.33) and Day 4 (0.46) were more modest. These lower gains do not necessarily imply instructional weakness. Rather, they may indicate that financial management topics were more complex, cumulative, or cognitively demanding, particularly for participants with diverse educational and professional backgrounds. Another possible explanation is that participants may have entered these sessions with slightly higher prior familiarity than those in Day 1, leaving less room for dramatic change. Nevertheless, both days still showed improvement, indicating that the sessions contributed positively to perceived learning.

The quantitative pattern suggests that the program successfully generated short-term learning gains, although the magnitude of improvement varied by content area. This supports previous literature showing that online entrepreneurship education can enhance knowledge and skill acquisition when instruction is relevant, structured, and learner-centered (Viebig, 2022; Kolarov and Hadjitchoneva, 2023). The results also justify the use of knowledge gain as a practical immediate indicator of learning under the Kirkpatrick model.

3.3. Participant Evaluation of Training Quality and Business Relevance

Beyond learning gains, the study also examined participant satisfaction as an indicator of the quality of the technology-

mediated learning experience. The training evaluation records showed high ratings across all four sessions and all major dimensions of instructional quality (Table 3).

The overall mean satisfaction rating for the program was 4.66, interpreted as Excellent and equivalent to Very Satisfied. This indicates that participants generally had a highly positive learning experience across the entire four-session program. Among the sessions, Day 2 received the highest overall satisfaction rating at 4.78, followed closely by Day 1 at 4.73. Day 3 obtained the lowest rating at 4.50, but even this score still fell within the Excellent range, indicating that the session remained positively received despite being relatively lower than the others. To understand the nature of participant satisfaction more clearly, it is useful to examine the overall mean scores across the major evaluation dimensions.

The Table 4 shows consistently high ratings across all indicators. The highest-rated dimensions were courtesy of trainer/service provider and timeliness of delivery, both at 4.69, followed closely by mastery of topics, teaching methodologies, effectiveness in meeting personal objectives, and overall quality of service, all at 4.68. These findings indicate that participants strongly valued not only the content of the sessions but also the professionalism, preparedness, and delivery competence of the trainers.

The lowest mean rating was for activities conducted to impart learning at 4.60, which was still very high. This suggests that while the activities were positively received, they may offer the greatest room for improvement relative to the other dimensions. This pattern aligns with the recommendations in the report calling for more interactive elements such as Q and A, peer discussion, mentoring, and group-based engagement. In online and community-based learning environments, interaction quality significantly influences satisfaction and continuing engagement, especially among adult and nonformal learners (Leoparjo et al., 2023; Pandita and Kiran, 2023; Prabowo et al., 2022).

Table 3: Overall satisfaction ratings by session

Session	Overall satisfaction rating	Verbal interpretation	Equivalent client satisfaction
Day 1	4.73	Excellent	Very satisfied
Day 2	4.78	Excellent	Very satisfied
Day 3	4.50	Excellent	Very satisfied
Day 4	4.62	Excellent	Very satisfied
Overall mean	4.66	Excellent	Very satisfied

Table 4: Overall program evaluation by criterion

Evaluation criterion	Mean
Attainment of objectives	4.62
Completeness of topics/information	4.64
Relevance and usefulness of activity	4.65
Learning tools and materials	4.63
Activities conducted to impart learning	4.60
Mastery of topics	4.68
Clarity of discussion	4.65
Teaching methodologies/strategies	4.68
Courtesy of trainer/service provider	4.69
Effectiveness in meeting personal objectives	4.68
Timeliness of delivery	4.69
Overall quality of service	4.68
Overall satisfaction rating	4.66

Taken together, the satisfaction data indicate that the program was viewed as relevant, well-organized, competently delivered, and useful to participants' personal learning goals. This strongly supports the argument that technology-mediated entrepreneurship education can generate positive learner reactions when digital instruction is supported by strong content, clear teaching, and a respectful, responsive instructional environment.

3.4. Session-Level Variation in Capability Development and Participant Response

A closer reading of the day-level data reveals meaningful variation across sessions. Day 1 recorded the largest learning gain, while Day 2 achieved the highest overall satisfaction. Day 3, although still rated excellent, recorded both the lowest learning gain and the lowest overall satisfaction among the 4 days.

This pattern may reflect content complexity and learner adjustment across the instructional sequence. Day 1 focused on management and technical-production aspects, which may have provided foundational and immediately graspable concepts for participants with limited prior exposure. Day 2, centered on marketing and supply-demand analysis, may have offered especially engaging and practical content, thereby producing the highest satisfaction. By comparison, the financial management sessions on Days 3 and 4 may have required more technical understanding, computation, and analytical thinking, which could explain the relatively lower gains and ratings.

However, the fact that both Days 3 and 4 still achieved Excellent ratings and positive learning gains suggests that the sessions remained effective overall. Rather than indicating failure, the lower scores may point to the need for more instructional scaffolding, examples, follow-up support, or differentiated pacing in more technical content areas such as finance. This is also supported by the monitoring reports, which recommended more examples for first-time participants and highlighted internet connectivity issues during the financial management sessions.

The session-level variation is important because it shows that technology-mediated entrepreneurship education is not equally experienced across all content areas. Some topics may be more readily learned online than others, while certain subject areas may require more intensive pedagogical support. This finding adds nuance to the literature by showing that online entrepreneurship education should not be treated as a uniform instructional experience but as one that varies according to content type, learner readiness, and quality of facilitation.

3.5. Qualitative Insights on Training Value, Practical Relevance, and Delivery Challenges

In addition to the quantitative ratings, the accomplishment report, terminal report, monitoring records, and participant recommendations generated qualitative insights that help explain the numerical results. These qualitative materials show how the

participants experienced the program, what they found most valuable, and what areas they believed should be improved in future implementations. The feedback suggests that the program was appreciated not only because of the entrepreneurial topics covered, but also because of the way the sessions were delivered, the practical value of the content, and its relevance to participants' actual business needs. At the same time, the qualitative comments also point to areas that participants believed needed strengthening, particularly in terms of technical delivery, interactivity, inclusivity, and continuity of support.

3.5.1. Strong trainer presence and effective instructional delivery

One of the clearest themes that emerged from the monitoring records was the participants' positive response to the delivery of the trainers. The Day 1 monitoring report described the discussion on the management aspects of the business plan as very impressive and noted that it caught the attention of the participants. In the same session, the technical aspects discussion was described as responsive to participant needs, and the strategies used in the session were said to appeal to the participants. On Day 2, the session on supply and demand analysis was described as effective in helping participants understand market computation and analysis, while the marketing session was noted for presenting practical tips and detailed explanations. This suggests that participants felt that the resource persons were not only knowledgeable but also effective in explaining concepts in ways that were understandable and engaging. The comments imply that the trainers were able to establish a strong learning presence even in an online environment. This interpretation is consistent with the high quantitative ratings for mastery of topics (4.68), clarity of discussion (4.65), and teaching methodologies (4.68). It also supports the idea that strong teaching presence is central to meaningful technology-mediated learning experiences, particularly in nonformal learning environments where participants rely heavily on the trainer's guidance and clarity (Ligon et al., 2021; Lopes and Canto, 2022; Dlamini, 2023).

3.5.2. Practical and immediately useful entrepreneurial learning

Another strong qualitative theme was the practical relevance of the learning experience. The narrative report emphasized that the sessions provided participants with actionable knowledge in management, market analysis, marketing strategy, and financial planning. Topics such as unique selling propositions, supply and demand analysis, digital marketing, budgeting, cash flow management, and financial reporting were presented in ways that could be directly applied to actual business planning and operations. This suggests that participants felt the program was not merely informative but also useful for real entrepreneurial decision-making. The recommendations further support this interpretation. Their call to include additional topics such as digital marketing, e-commerce, business financing, and legal considerations for startups implies that learners saw the sessions as relevant and wanted even more content of the same practical nature. The recommendation indicates that participants saw direct value in the training and were interested in expanding their entrepreneurial knowledge in ways that could help them improve or sustain their ventures. This aligns with the high rating for relevance and usefulness of the activity (4.65) and with literature showing that adult and nonformal learners value learning that is context-based, applied, and immediately useful to livelihood or enterprise-related goals (Minja et al., 2022; Yulianingsih et al., 2023).

3.5.3. Desire for more interactive and participatory learning experiences

Although the reports described participants as showing remarkable enthusiasm and engagement throughout the four-session program, the qualitative feedback also points to a desire for more interaction. Participants recommended the inclusion of group activities, mentoring sessions, Q and A, and peer discussions to improve engagement and practical learning. This implies that learners wanted a more participatory learning experience rather than one that relied primarily on lecture-based delivery. While they appeared satisfied with the overall program, their recommendations suggest that they believed greater interaction would make the sessions more engaging, more collaborative, and more useful. The recommendation indicates that participants saw value in being able to ask questions, exchange ideas with peers, and receive more personalized guidance from facilitators. In online learning contexts, especially among adult and community learners, such interactivity often shapes not only satisfaction but also the depth of engagement with the content. This interpretation is supported by studies emphasizing the importance of perceived interactivity and learner involvement in successful digital learning experiences (Leoparjo et al., 2023; Pandita and Kiran, 2023; Prabowo et al., 2022).

3.5.4. Technical quality and connectivity affected the online learning experience

While the overall qualitative feedback was positive, it also identified technical limitations as an important concern. The Day 3 monitoring report noted that there were some cases of low internet connectivity due to slight to moderate rates in different areas of the participants. This concern was reinforced in the recommendation section, where participants called for better audio quality, stronger internet connectivity, more reliable webinar platforms, pre-session technical checks, and real-time technical support during the conduct of sessions. This suggests that participants experienced some disruption in their learning because of technical issues beyond the control of the trainers. The recommendation indicates that participants saw technical quality as an essential part of the learning experience, not merely a logistical issue. Their feedback implies that good teaching alone was not sufficient; learners also needed a stable and clear online environment to fully benefit from the sessions. This helps explain why some session ratings, particularly Days 3 and 4, were slightly lower than the earlier sessions despite still falling within the Excellent range. This finding supports literature showing that online learning success depends not only on content and instruction but also on access, service quality, and platform reliability (Leoparjo et al., 2023; Pandita & Kiran, 2023; Prabowo et al., 2022).

3.5.5. Need for more inclusive and accessible learning support

The participant recommendations also revealed a concern for accessibility and inclusivity. They suggested personalized learning options, multilingual support, and the development of learning materials in multiple languages in order to improve comprehension and make the sessions more inclusive. This implies that learners recognized differences in language preference, comprehension level, and learning style among the participants. The recommendation indicates that participants saw the program as valuable but also believed that its reach and effectiveness could be improved if learning materials and delivery strategies were made more responsive to diverse learner needs. Such feedback is particularly important in community-based entrepreneurship education, where participants often come from varied educational, professional, and linguistic backgrounds. The comments therefore suggest that accessibility in digital learning is not limited to internet access alone, but also includes language support, instructional flexibility, and responsiveness to different learner profiles.

3.5.6. Participants wanted continuity, follow-up, and sustained support

A final strong theme in the qualitative feedback was the need for follow-up and sustained engagement after the completion of the initial training series. Participants recommended follow-up workshops and seminars to help them stay updated on industry trends and deepen their understanding of business concepts. They also suggested mentoring, resource sharing, and stronger community-building activities. This was echoed in the monitoring report for the final session, which recommended that the project be sustained and that a new phase be created to guide participants further in their entrepreneurial journey. This suggests that participants did not see the program as a one-time learning event only. Rather, the feedback implies that learners viewed the training as a foundation that should be continued through more advanced support, additional sessions, and stronger post-training connections. The recommendation indicates that participants saw long-term entrepreneurial learning as a process that requires continuity rather than a single intervention. This perspective is reinforced by the sustainability plan, which proposed online support groups, alumni networking, stakeholder collaboration, curriculum expansion, and product development support. Taken together, these comments suggest that participants valued the program and wanted it to evolve into a more sustained and developmental form of community entrepreneurship education.

3.5.7. Participant feedback affirms strengths while pointing to clear next steps

Overall, the qualitative findings confirm that the program was appreciated for its strong trainers, practical content, and meaningful entrepreneurial lessons. At the same time, the recommendations make it clear that participants were not simply expressing general satisfaction; they were also identifying concrete ways to improve future delivery. Their comments suggest a desire for stronger technical support, more interactive activities, broader and more advanced entrepreneurial topics, more inclusive learning materials, and sustained post-training guidance. In this sense, the qualitative feedback complements the high quantitative ratings by showing that participant satisfaction was accompanied by reflective and constructive suggestions. This makes the qualitative findings especially valuable, because they reveal not only what participants appreciated in the program, but also what they believed would make future technology-mediated entrepreneurship education more effective, inclusive, and sustainable.

3.6. Integrated Discussion, Pedagogical Implications, and Proposed Instructional Directions

The combined quantitative and qualitative findings indicate that the technology-mediated entrepreneurship education program was effective as a digitally delivered learning intervention for community learners. Quantitatively, the program produced an overall increase in self-rated knowledge from 3.07 before training to 4.11 after training, with an overall mean gain of 1.04. It also generated a high overall satisfaction rating of 4.66, interpreted as Excellent and equivalent to Very Satisfied. These results suggest that the program was able to support meaningful short-term learning gains while also providing a positive instructional experience across the four-session series.

The qualitative findings strengthen this interpretation by showing how participants experienced the learning process itself. Their feedback suggests that the sessions were appreciated because they were clearly explained, practically relevant, and responsive to entrepreneurial needs. The comments imply that trainer competence, clarity of delivery, and the practical usefulness of the topics were central to the positive learning experience. This interpretation is consistent with the high ratings for mastery of topics (4.68), clarity of discussion (4.65), teaching methodologies (4.68), and relevance and usefulness of the activity (4.65). In this sense, the findings support the idea that technology-mediated entrepreneurship education can function as a meaningful nonformal learning experience when digital instruction is supported by clear teaching, relevant content, and strong instructional presence.

At the same time, the results also show that learning outcomes varied across content areas. Day 1 produced the largest learning gain, while Day 2 generated the highest overall satisfaction. By contrast, the financial management sessions in Days 3 and 4, although still positively rated, showed smaller gains and slightly lower satisfaction scores. This suggests that not all entrepreneurial topics are learned in the same way in online settings. More technical and computation-oriented lessons may require stronger scaffolding, more examples, slower pacing, or additional reinforcement than more introductory or discussion-based topics. This pattern is important because it shows that the educational design of online entrepreneurship programs should take content complexity into account rather than assume that all topics can be taught equally effectively through the same format.

The findings further indicate that the quality of technology-mediated learning depends not only on instructional content but also on the digital learning environment. Participants' recommendations for stronger internet connectivity, better audio quality, pre-session technical checks, and real-time support suggest that they viewed technical delivery as part of the learning experience itself. In online education, access, service quality, and

interactivity shape not only convenience but also satisfaction, attention, and continuity of participation (Leoparjo et al., 2023; Pandita and Kiran, 2023; Prabowo et al., 2022). Thus, the effectiveness of online entrepreneurship education depends on both pedagogy and digital infrastructure.

Another important insight is that participants did not appear to see the training as a one-time event only. Their recommendations for mentoring, follow-up sessions, more advanced topics, multilingual materials, and stronger interaction imply that they viewed entrepreneurial learning as a continuing process. This suggests that the educational value of the program may be strengthened when instruction is not limited to a single short cycle, but is instead organized as a more sustained and progressively structured learning experience. In this respect, the findings support the broader literature on lifelong learning, nonformal education, and digital community-based learning, where ongoing learner support and responsive instructional design are key to meaningful participation (Chen et al., 2021; Secundo et al., 2021; Kotla and Bosman, 2023).

Taken together, the results position the program as a promising educational case of technology-mediated entrepreneurship learning among community participants. The findings suggest that community-based digital instruction can support both learning gains and high participant satisfaction when it is well-designed, relevant, interactive, and supported by competent facilitators. At the same time, the results point to the need for a more refined instructional design that addresses content complexity, digital access, learner diversity, and continuity of learning beyond the initial training cycle.

3.6.1. Pedagogical implications for future technology-mediated entrepreneurship education

Based on the findings, several pedagogical implications emerge. First, future technology-mediated entrepreneurship education programs should adopt a more progressive instructional structure, beginning with foundational entrepreneurial concepts and moving toward more advanced and technical topics. The lower gains in the financial management sessions suggest that more complex content may require modular delivery, more guided practice, and additional reinforcement. Second, future implementations should strengthen interactive learning strategies. The participants' recommendations for Q&A sessions, group activities, peer discussions, and mentoring imply that learners valued the program but wanted more opportunities for active participation. This suggests that online entrepreneurship education may be more effective when it combines content delivery with collaborative and dialogic learning activities rather than relying primarily on one-way lecture formats. Third, future programs should incorporate more inclusive and learner-responsive support mechanisms. The call for multilingual materials, personalized learning options, and more accessible resources indicates that participants came from diverse backgrounds and may have benefited differently from the sessions. Technology-mediated community learning therefore requires not only digital access but also instructional flexibility, accessible materials, and language-sensitive design. Fourth, the findings suggest the importance of technical readiness as an educational concern. Better audio quality, more reliable connectivity, and stronger platform support should be treated as pedagogical necessities in online learning rather than purely logistical concerns. When learners experience interruptions or difficulty accessing sessions, the quality of learning is directly affected.

3.6.2. Proposed instructional direction: A recurring digital entrepreneurship learning cycle

In light of the results, this study proposes the development of a recurring technology-mediated entrepreneurship learning cycle for community learners. Rather than treating entrepreneurship training as a one-time extension session, future programs may be designed as an annual or regularly recurring digital learning series for young entrepreneurs, aspiring entrepreneurs, women entrepreneurs, professionals, and students. Framed this way, the activity remains aligned with lifelong learning and nonformal education, while also allowing the institution to strengthen continuity, reinforce prior learning, and introduce progressively more advanced entrepreneurial content over time.

Such a recurring learning cycle may include:

- Foundational modules on management, marketing, and business planning;
- Intermediate modules on supply-demand analysis, budgeting, and digital entrepreneurship;
- Advanced modules on e-commerce, legal aspects of startups, business financing, sustainability, and enterprise growth;
- Mentoring sessions, reflective discussions, and applied enterprise planning tasks; and
- Follow-up assessments of learning gains, participant satisfaction, and longer-term educational outcomes.

This proposed direction is grounded in the findings of the present study, which show that participants valued the training, learned from it, and explicitly recommended continuity, broader coverage, and more interactive support. As such, the study not only demonstrates the educational effectiveness of the completed program, but also provides evidence-based direction for improving future digital entrepreneurship learning initiatives in community settings.

3.6.3. Educational significance of annual implementation for community learners

The proposal to make this type of activity a yearly technology-mediated entrepreneurship education initiative is supported by both the quantitative and qualitative findings. The high participation levels, positive learning gains, and excellent satisfaction ratings suggest sustained community interest in this kind of educational intervention. The recommendations for follow-up sessions, mentoring, and expanded content further imply that participants viewed the program as something worth continuing.

A yearly digital learning cycle may be particularly beneficial for young entrepreneurs and aspiring entrepreneurs, who often need repeated exposure, guided practice, and continuing support as they move from entrepreneurial interest to entrepreneurial action. It may also benefit women entrepreneurs, professionals, and students

who seek flexible and accessible learning opportunities that can be integrated into work, study, or enterprise-related responsibilities.

In this way, the annualization of the program may be understood not simply as program repetition, but as the development of a more sustained and pedagogically responsive model of community entrepreneurship learning. These findings suggest that future technology-mediated entrepreneurship education should be designed not only to inform, but also to sustain learning, deepen engagement, and support the continuing educational growth of community participants through structured and recurring digital instruction.

4. CONCLUSION

This study showed that Project BIZ-SIKAP functioned as an effective technology-enabled entrepreneurship training program for community-based participants. The program attracted sustained participation and generated positive perceived learning gains and high satisfaction across sessions covering management, marketing, supply and demand analysis, and financial management. These findings suggest that digitally delivered training can support entrepreneurial capability development beyond formal academic settings and can serve as a practical model for community-based entrepreneurship support. At the same time, the variation across sessions indicates that more technical business content may require stronger scaffolding, interactivity, and follow-up mentoring. Overall, the study contributes to the growing literature on entrepreneurship development, digital training, and community-based business capability-building by showing how university-led initiatives can extend entrepreneurship support to diverse participant groups through technology-enabled delivery.

5. RECOMMENDATIONS

The following suggestions are made based on the findings of the study: (1) Future implementations of Project BIZ-SIKAP should adopt a more progressive instructional structure, beginning with foundational entrepreneurial concepts and moving toward more advanced and technical topics such as e-commerce, business financing, legal aspects of startups, and sustainability; (2) online entrepreneurship education activities should include stronger interactive strategies such as question-and-answer sessions, peer discussions, mentoring, reflective tasks, and guided application activities to deepen learner engagement and participation; (3) technical readiness should be improved through better audio quality, more reliable internet support, pre-session technical checking, and real-time technical assistance during online delivery; (4) inclusive learning support should be strengthened by preparing learner-friendly, accessible, and multilingual materials that respond to the varied backgrounds, needs, and preferences of community participants; (5) Project BIZ-SIKAP may be developed into a yearly technology-mediated entrepreneurship education initiative, particularly for young entrepreneurs, aspiring entrepreneurs, women entrepreneurs, professionals, and students, so that entrepreneurial learning can be reinforced through recurring and progressively designed digital instruction; (6) follow-up learning opportunities such as advanced sessions, mentoring, resource-sharing mechanisms, and participant networking should be incorporated to sustain learning beyond the initial training cycle; and (7) future program design should continue to treat technology-mediated entrepreneurship education as an educational intervention, with careful attention to instructional quality, learner experience, and ongoing assessment of learning outcomes.

This study was limited to one completed community-based entrepreneurship education program and relied on documentary records and participant evaluation results generated during its implementation. The findings are therefore context-specific and reflect the immediate educational outcomes of the program rather than its long-term effects on entrepreneurial behavior or enterprise development. Future research may examine the longitudinal effects of recurring technology-mediated entrepreneurship education, explore how different digital instructional designs influence entrepreneurial learning across content areas, and assess the longer-term educational and practical outcomes of annual community-based online entrepreneurship programs.

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