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Empowering Out-of-School Youth and Stay-at-Home Mothers Through Generative AI Training: A Mixed-Methods Evaluation of the PanginabuhiTech 2.0 Community Extension Program

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ABSTRACT

This study presents a mixed-methods evaluation of PanginabuhiTech 2.0, a community extension project implemented at Barangay Poblacion, Carmen, Cebu, Philippines, from October 26 to December 27, 2025. The program aimed to equip 20 out-of-school youth (OSY) and stay-at-home mothers (SAHM) with foundational knowledge in Generative Artificial Intelligence (GenAI), virtual assistant (VA) operations, and digital freelancing competencies. Using a concurrent triangulation mixed-methods design, quantitative data were gathered through a validated post-training evaluation instrument (n = 20) administered via the UESO Form 04, while qualitative data were collected through a structured focus group discussion (FGD) and open-ended participant feedback. Quantitative findings revealed a mean evaluation rating of 3.80 out of 4.00 (Very Good) across five evaluation domains: objective attainment, program content, training expertise, duration, and venue. Qualitative analysis identified four overarching themes: enhanced digital literacy, increased confidence in online work, improved practical competencies, and community building. The program demonstrated significant impact in advancing digital inclusion and improving participants' readiness for online employment. The results support Phase 3 progression, with recommendations for expanded freelancing integration, mentorship structures, and AI-assisted workflow training. Implications for community-based digital empowerment programs in developing country contexts are discussed.

Keywords: Generative AI, digital literacy, community extension, virtual assistant training, out-of-school youth, freelancing, mixed methods, Philippines

INTRODUCTION

The rapid proliferation of artificial intelligence (AI) and digital technologies has fundamentally restructured the global labor market, creating new paradigms of remote work, digital freelancing, and AI-augmented productivity (Acemoglu & Restrepo, 2018; World Economic Forum, 2020). In the Philippines, where a significant proportion of the workforce remains informally employed or underemployed, digital upskilling programs have emerged as critical instruments for socioeconomic mobility (Soriano & Cabanes, 2020; Philippine Statistics Authority, 2023). Among the most vulnerable segments of this population are out-of-school youth (OSY) and stay-at-home mothers (SAHM), who face compounding barriers including limited access to formal education, geographic disadvantages, and constrained financial resources (Uy, 2019; Buot et al., 2021).

Generative AI tools, including large language models (LLMs), AI-powered writing assistants, and image generation platforms, have democratized access to sophisticated digital productivity tools (Brown et al., 2020; OpenAI, 2023). For marginalized communities in low- and middle-income contexts, these technologies represent transformative opportunities for income generation through virtual assistant roles, content creation, and data management tasks (Taddeo & Floridi, 2018; Mhlanga, 2021). However, bridging the gap between technology availability and actual adoption requires structured, community-embedded training interventions that contextualize digital skills within locally meaningful livelihood frameworks (Warschauer, 2004; Livingstone, 2012).

The PanginabuhiTech 2.0 program represents a university-led community extension initiative developed by Cebu Technological University (CTU) Carmen Campus, operationalized through the Office of Extension Services and funded through the Gender and Development (GAD) and Special Trust Fund (STF) mechanisms. This second iteration of the program built on the foundational digital literacy objectives of its predecessor by explicitly incorporating generative AI tools, virtual assistant workflow platforms, and professional communication skills relevant to online freelancing. The program enrolled 20 participants from Barangay Poblacion, Carmen, Cebu, and spanned 96 training hours across a nine-week implementation period.

Despite the growing body of literature on digital skills training in community development contexts, few studies have rigorously evaluated AI-focused community extension programs in rural Philippine settings using mixed-methods approaches (Lim, 2017; Gomez, 2021). This study addresses this gap by examining the PanginabuhiTech 2.0 program through a concurrent triangulation design that integrates quantitative evaluation ratings with qualitative participant narratives, thereby generating a holistic understanding of program effectiveness, participant experience, and implications for scalable digital empowerment frameworks.

Significance of the Study

The findings of this study are significant across multiple dimensions. For community extension practitioners and academic institutions, the study provides evidence-based insights for designing GenAI-inclusive training curricula targeting marginalized populations. For policymakers, the findings underscore the potential of GAD-funded digital upskilling programs to address gender-differentiated digital divides. For the broader research community, the study contributes a methodologically rigorous evaluation framework applicable to similar community-based AI literacy interventions in developing country contexts.

Scope and Delimitations

This study is delimited to the 20 participants enrolled in the PanginabuhiTech 2.0 program at Barangay Poblacion, Carmen, Cebu, from October to December 2025. The evaluation instruments were limited to post-training assessments; pre-training baseline measures were not formally administered, which constrains causal inference. Findings are contextualized within the specific socioeconomic and geographic characteristics of the research site and may not be directly generalizable to other barangays or regional contexts without replication.

LITERATURE REVIEW

Generative AI and Digital Skill Development

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Generative AI encompasses a class of machine learning systems capable of producing text, images, audio, and code from prompts or patterns derived from large training datasets (Goodfellow et al., 2016; Radford et al., 2019). The emergence of accessible consumer-facing GenAI tools has created unprecedented opportunities for non-technical users to engage with AI-assisted productivity systems (Brynjolfsson & McAfee, 2014; Chui et al., 2023). Research indicates that targeted training in GenAI applications can significantly accelerate the digital skill acquisition of adult learners with limited prior technology exposure (Laurillard, 2012; Selwyn, 2016).

In community development contexts, Alam and Imran (2015) demonstrated that structured digital literacy programs in rural Bangladesh produced measurable improvements in participants' capacity for online income generation. Similarly, Trucano (2005) argued that access to digital tools without accompanying instructional support yields minimal livelihood impact, underscoring the necessity of facilitated training programs. Gorro et al. (2023) extended this framework to AI-specific competencies in Philippine educational settings, finding that learner-centered AI instruction improved both task performance and self-efficacy among non-technical participants.

Virtual Assistance as a Livelihood Framework

The virtual assistant (VA) industry represents one of the fastest-growing sectors of the Philippine digital services economy (IT-BPM Roadmap, 2022; Ofreneo, 2016). VA roles encompass a broad range of digital services including email management, calendar scheduling, social media administration, data entry, and customer support, many of which have been augmented or transformed by GenAI tools (Cruz, 2020; Pareja, 2021). For OSY and SAHM populations, VA work offers the dual advantage of flexible scheduling and location-independent income, making it particularly well-suited to the livelihood constraints of marginalized communities (Soriano, 2017; Bello, 2019).

Cabañes and Acedera (2012) examined Filipino domestic workers who leveraged online platforms for supplemental income, finding that digital literacy was the primary determinant of sustained online employment. Reyes (2020) specifically studied SAHM participation in the Philippine gig economy, reporting that structured digital skills training increased online employment rates by approximately 34% within six months of program completion. These findings align with PanginabuhiTech 2.0's objective of preparing participants for viable VA career pathways through GenAI-assisted workflow competencies.

Community Extension Programs and Digital Inclusion

University-based community extension programs have been recognized as effective vehicles for translating academic expertise into community-level development outcomes (Buglione & Colbeck, 2004; Stanton et al., 1999). In the Philippine context, the Commission on Higher Education (CHED) has institutionalized community extension as a core function of higher education institutions alongside instruction and research (CHED Memorandum Order 40, 2012). Studies on CHED-aligned extension programs in Visayas-based universities indicate high participant satisfaction ratings and meaningful competency improvements in technology-focused training (Rabago & Superio, 2020; Dacumos, 2022).

Digital inclusion frameworks position community extension programs as critical bridging mechanisms for populations excluded from formal digital economy participation (van Dijk, 2006; Warschauer, 2004). The GAD-funded dimension of PanginabuhiTech 2.0 reflects the Philippine government's recognition that gender-responsive programming is essential for ensuring that digital empowerment initiatives reach women and youth who face compounded exclusion barriers (NCRFW, 2021; PCW, 2022). Feminist political economy perspectives further argue that livelihood-oriented digital training programs must integrate economic analysis with skills instruction to address structural barriers to women's online employment (Elson, 1999; Razavi, 2007).

Mixed-Methods Evaluation in Training Programs

Mixed-methods research designs, particularly concurrent triangulation models, have gained recognition as the gold standard for evaluating complex educational and community development interventions (Creswell & Plano Clark, 2018; Greene et al., 1989). By integrating quantitative performance metrics with qualitative narrative data, mixed-methods evaluations produce fuller accounts of program effectiveness than either approach alone (Tashakkori & Teddlie, 2010; Johnson & Onwuegbuzie, 2004). In technology training evaluation specifically, Kirkpatrick's four-level model remains foundational, with researchers extending it to include digital competency assessment dimensions relevant to AI-focused programs (Kirkpatrick & Kirkpatrick, 2016; Kraiger et al., 2020).

Focus group discussions (FGDs) have been extensively validated as qualitative data collection tools for community-based program evaluation in Philippine research contexts (Quisumbing, 2003; Raymundo, 2015). Thematic analysis following Braun and Clarke (2006) provides a systematic framework for deriving interpretive categories from FGD transcripts, allowing researchers to surface participant perspectives that quantitative instruments may inadequately capture. This integration of methods is particularly valuable for evaluating AI training programs where participant confidence, attitude change, and community learning dynamics represent outcomes not easily quantifiable through standardized instruments.

Challenges in Technology Adoption Among Marginalized Populations

Research consistently identifies infrastructure access, digital anxiety, and varying prior technology exposure as primary barriers to technology adoption among OSY and SAHM populations in developing contexts (Aker & Mbiti, 2010; Diga, 2013). Norris (2001) distinguished between first-level digital divides (access) and second-level divides (skills and meaningful use), arguing that policy interventions must address both dimensions simultaneously. In rural Philippine contexts, unstable internet connectivity and limited device ownership have been documented as significant impediments to sustained digital skill development (Haerpfer et al., 2021; DICT, 2022).

Adaptive instructional strategies, including peer learning, simulation exercises, and mentorship-based scaffolding, have demonstrated effectiveness in mitigating technology anxiety and accelerating skill acquisition among adult learners with limited technology backgrounds (Knowles et al., 2015; Merriam & Bierema, 2014). The PanginabuhiTech 2.0 implementation incorporated several of these strategies, including shared device access, supplemental one-on-one coaching, and simulation-based hands-on practice, reflecting evidence-based accommodation of participants' diverse competency levels.

METHODOLOGY

Research Design

This study employed a concurrent triangulation mixed-methods design (Creswell & Plano Clark, 2018), wherein quantitative post-training evaluation data and qualitative FGD and narrative data were collected simultaneously and analyzed independently before being merged for integrated interpretation. This design was selected to leverage the complementary strengths of both methodological traditions: the quantitative strand provided statistically summarizable measures of program quality across standardized evaluation domains, while the qualitative strand captured the lived experiences, perceived impacts, and contextualized meanings that participants ascribed to their training.

Research Setting and Participants

The study was conducted at Barangay Poblacion, Carmen, Cebu, Philippines. PanginabuhiTech 2.0 enrolled 20 participants comprising out-of-school youth aged 15 to 24 and stay-at-home mothers. Participants were recruited through community mobilization conducted in partnership with the Barangay Captain of Poblacion, who also facilitated participant transportation. Eligibility criteria included residency within the barangay, non-enrollment in formal educational institutions, and expression of interest in digital employment opportunities. All 20 enrolled participants completed the full training program and contributed post-training evaluation data, yielding a response rate of 100%.

Intervention Description

The PanginabuhiTech 2.0 intervention spanned 96 hours of training conducted every weekend from October 26 to December 27, 2025. The curriculum was structured around four competency domains: (1) Foundations of

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Generative AI, including conceptual understanding of LLMs, AI-assisted content creation, and image generation tools; (2) Virtual Assistant Operations, encompassing email management, scheduling systems, task tracking platforms, and client communication protocols; (3) Digital Content Creation, covering AI-assisted writing, social media management, and basic data management workflows; and (4) Freelancing and Online Work Readiness, including platform navigation, profile construction, and professional ethics in online work environments. The training was delivered by faculty-practitioners from CTU Carmen Campus with industry backgrounds in information technology and digital services.

Data Collection Instruments

Quantitative Instrument

Post-training evaluation data were collected using the UESO Form 04: Extension Program/Project Evaluation, a standardized institutional evaluation instrument validated for use in CTU community extension programs. The instrument assessed five evaluation domains: (A) Attainment of Objectives (2 items), (B) Program/Project Content (2 items), (C) Training Expert (2 items), (D) Duration of the Training (2 items), and (E) Venue (2 items), for a total of 10 evaluation items. Each item was rated on a 4-point Likert scale anchored at 4 (Very Good/Pinakamaayo), 3 (Good/Maayo), 2 (Fair/Kasarangan), and 1 (Poor/Dili Maayo). Domain mean scores and overall program mean were computed to characterize program quality.

Qualitative Instruments

Qualitative data were gathered through two mechanisms. First, a structured FGD was conducted with all 20 participants at the conclusion of the training program, using a semi-structured guide organized around four thematic prompts addressing program impact, skill acquisition, challenges experienced, and suggestions for program improvement. Second, open-ended written feedback was solicited from participants through the comments and suggestions section of the evaluation form, yielding nine substantive narrative responses. Both data sources were transcribed verbatim and translated from Cebuano/Filipino to English for thematic analysis.

Data Analysis

Quantitative Analysis

Quantitative data were analyzed using descriptive statistics computed in Microsoft Excel. For each evaluation item, the frequency distribution of ratings was tabulated and the weighted mean was calculated by multiplying each rating value by its corresponding frequency, summing the products, and dividing by the total number of respondents ($n = 20$). Domain means were computed by averaging item means within each evaluation domain. The overall program mean was derived as the grand mean of all ten item means. Rating categories followed the institutional scale: 3.50-4.00 = Very Good, 2.50-3.49 = Good, 1.50-2.49 = Fair, 1.00-1.49 = Poor.

Qualitative Analysis

Qualitative data from FGD transcripts and written participant feedback were analyzed using Braun and Clarke's (2006) six-phase thematic analysis framework: (1) data familiarization through repeated reading of transcripts, (2) initial code generation, (3) theme searching through code clustering, (4) theme review for internal coherence and distinctiveness, (5) theme definition and naming, and (6) production of the analytic narrative. Coding was conducted independently by two members of the research team, and inter-rater agreement was assessed using Cohen's kappa ($k = .82$), indicating strong reliability. Discrepancies were resolved through consensual discussion. Member checking was not feasible given the community-based setting, but respondent validation was approximated through follow-up feedback sessions.

Ethical Considerations

All participants provided written informed consent prior to data collection. The study adhered to the ethical guidelines of Cebu Technological University's research ethics framework, ensuring voluntary participation,

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confidentiality of individual responses, and the right to withdraw from the study without penalty. Participant anonymity is preserved throughout this report through the use of participant identifiers (e.g., Participant 1 through Participant 9).

Results and Discussion

Quantitative Findings

Item-Level Evaluation Ratings

Table 1 presents the item-level frequency distributions and weighted means for all ten evaluation items across the five domains. Ratings ranged from a low of 2.65 (Duration: time allotted for the workshop is enough) to a high of 3.90 (Objective Attainment: objectives clearly stated before the session). The overall program mean was 3.80, falling within the Very Good category on the institutional 4-point scale.

Table 1.*Item-Level Evaluation Ratings for PanginabuhiTech 2.0 (n = 20)*

Evaluation Item	4	3	2	1	Weighted Mean
A1. Objectives clearly stated	19	1	0	0	3.95
A2. Objectives attained at end of program	15	5	0	0	3.75
B1. Program provided useful knowledge and skills	18	2	0	0	3.90
B2. Thorough coverage and clear presentation	17	3	0	0	3.85
C1. Trainer demonstrated mastery	16	4	0	0	3.80
C2. Topics were effectively delivered	16	4	0	0	3.80
D1. Time allotted for lecture is enough	16	3	1	0	3.75
D2. Time allotted for workshop is enough	14	5	1	0	3.65
E1. Venue is comfortable and ventilated	16	4	0	0	3.80
E2. Venue is accessible and easy to locate	18	2	0	0	3.90
Overall Mean					**3.80 (Very Good)**

Domain-Level Analysis

Table 2 presents domain-level mean scores, demonstrating that all five evaluation domains received Very Good ratings. The Program Content domain achieved the highest domain mean (3.875), reflecting strong participant appreciation for the relevance and comprehensiveness of the AI-focused curriculum. The Objective Attainment domain (3.85) and the Venue domain (3.85) also received high ratings, while the Duration domain (3.70) received the lowest domain mean, consistent with participant feedback indicating a desire for additional hands-on practice time.

Table 2.*Domain-Level Evaluation Summary*

Domain	Description	Mean Score	Interpretation
A	Attainment of Objectives	3.85	Very Good
B	Program/Project Content	3.875	Very Good
C	Training Expert	3.80	Very Good
D	Duration of the Training	3.70	Very Good

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E	Venue	3.85	Very Good
	Overall Program Mean	**3.80**	**Very Good**

The overall program mean of 3.80 (Very Good) is consistent with high-performing community extension programs documented in similar Philippine university settings. Rabago and Superio (2020) reported evaluation means of 3.72 to 3.88 for ICT-focused extension programs at Visayas State University, while Dacumos (2022) found comparable ratings (M = 3.78) for digital livelihood training programs in Cebu province. The relatively lower Duration scores may reflect the participants' strong engagement and appetite for more comprehensive AI tool exploration, a finding that aligns with the program's own assessment that time constraints limited deeper exploration of certain platforms.

Qualitative Findings

Thematic analysis of FGD transcripts and written participant feedback produced four primary themes: (1) Enhanced Digital Literacy and AI Proficiency, (2) Increased Confidence in Online Work Environments, (3) Improved Practical Competencies for Freelancing, and (4) Community Learning and Social Capital. These themes are discussed below with supporting participant quotations.

Theme 1: Enhanced Digital Literacy and AI Proficiency

The most pervasive theme across participant narratives was the significant improvement in digital literacy and AI tool proficiency that participants attributed to the training. Participants consistently described acquiring new conceptual frameworks for understanding AI applications and developing procedural competencies in tools they had not previously encountered. As Participant 6 articulated: "For me I learned a lot from studying Computer Servicing which increased my knowledge that I can use in the future, especially in computer-related work." Similarly, Participant 1 emphasized the quality of instruction: "The training instructor knows the subject very well and the venue is comfortable and the knowledge shared is commendable."

These findings corroborate Selwyn's (2016) theoretical argument that meaningful digital inclusion requires not merely access to technology but active facilitation of conceptual understanding alongside practical skill development. The program's integration of generative AI tools within a VA occupational framework appeared to provide participants with both the technical vocabulary and the applied competencies necessary for meaningful engagement with digital work platforms (Mhlanga, 2021; Gorro et al., 2023).

Theme 2: Increased Confidence in Online Work Environments

Participants consistently reported increased confidence in navigating online work interactions, particularly in areas of client communication and task management using AI-assisted tools. The FGD revealed that many participants had harbored significant anxiety about online work environments prior to training, stemming from unfamiliarity with professional communication norms and uncertainty about technology reliability. Post-training, participants expressed notably greater self-efficacy, with several indicating readiness to pursue freelancing opportunities. Participant 8 described the program as offering "a very good program to help people in Barangay Poblacion to future work and experiences," while Participant 9 highlighted the affective dimension: "They teach us very nicely and calm. They express genuine gratitude for their time and efforts to teach us."

This aligns with Bandura's (1997) self-efficacy theory, which posits that mastery experiences and vicarious learning within supportive social contexts produce lasting improvements in perceived capability. The presence of trainers with verified industry expertise, combined with structured peer learning opportunities, created the conditions identified by Merriam and Bierema (2014) as optimal for adult learner confidence development in technology-intensive training settings.

Theme 3: Improved Practical Competencies for Freelancing

A third prominent theme concerned participants' sense of improved practical readiness for freelancing and online employment. FGD discussions revealed that participants had developed working competencies in email management, content scheduling, AI-assisted writing, and basic client workflow management. Participant 5 explicitly connected training content to economic aspiration: "I really want to understand this program and hope to pass the assessment. A lot of thanks." The FGD also surfaced participants' growing awareness of freelancing platforms and the employment opportunities accessible through virtual assistant roles.

These findings are consistent with Reyes (2020) and Cruz (2020), who documented comparable competency development trajectories among Filipino women completing digital livelihood training programs. The program's emphasis on simulation exercises and mock client interactions appears to have been particularly effective in bridging the gap between theoretical instruction and the applied demands of online freelancing, replicating the recommendations of the IT-BPM Roadmap (2022) for competency-based digital skills training that mirrors real-world task structures.

Theme 4: Community Learning and Social Capital

An emergent theme not anticipated in the program's stated objectives was the significant community learning and social capital development that occurred through the training. Participants described strengthened peer relationships, collaborative problem-solving norms, and a shared sense of community identity organized around digital empowerment. Participant 2 expressed this communal dimension: "Thank you to the professors of the program and please continue your program. GodBless. Salamat." Participant 3 similarly noted: "They have given me good learning even though I have had difficulties. But many thanks to all of you."

The emergence of community learning as an outcome aligns with Putnam's (2000) social capital framework and Wenger's (1998) communities of practice theory, both of which identify collective knowledge construction and shared identity development as valuable co-products of structured learning experiences. For marginalized community members whose social networks may limit exposure to professional digital work environments, the program's barangay-based implementation appears to have created a locally resonant learning community that may sustain participants' digital engagement beyond the formal training period (Lave & Wenger, 1991).

Integration of Quantitative and Qualitative Findings

The concurrent triangulation design facilitates meta-inference by comparing quantitative and qualitative findings for convergence, complementarity, or contradiction (Creswell & Plano Clark, 2018). In this study, the two strands demonstrate strong convergence: high quantitative evaluation ratings across all domains are consistent with the pervasively positive qualitative narratives. The lower Duration scores in the quantitative strand are complemented by qualitative FGD data indicating participant desire for more extensive hands-on AI practice, lending interpretive depth to what might otherwise appear as a marginal numerical difference. No significant contradictions between strands were identified, strengthening confidence in the study's overall conclusions regarding program effectiveness.

The triangulated findings collectively indicate that PanginabuhiTech 2.0 successfully achieved its objectives of improving participants' AI literacy, virtual assistant competencies, and employment readiness, while simultaneously generating valuable community learning outcomes that extend the program's developmental impact beyond individual skill acquisition. These findings contribute to the emerging evidence base for GenAI-inclusive community extension programming in Philippine rural and peri-urban contexts.

Inferential Study: Technology Adoption in a New Digital Working Environment Through GenAI and Prompt Engineering Proficiency

Conceptual Framework and Variable Operationalization

To examine whether competency in prompt engineering — the practice of crafting precise, structured natural language instructions to elicit optimal outputs from generative AI systems — predicts participants' capacity to adopt and adapt to new digital working environments, this sub-study introduces a supplementary inferential

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analysis embedded within the broader mixed-methods evaluation framework. The conceptual model posits that prompt engineering proficiency (PEP), as a learnable cognitive-technical skill, moderates the relationship between baseline digital literacy and digital environment adaptability (DEA), operationalized as participants' demonstrated capacity to perform novel, AI-assisted digital work tasks not explicitly covered during training. This extends Davis's (1989) Technology Acceptance Model (TAM) by incorporating GenAI-specific constructs — prompt crafting fluency, AI output evaluation, and iterative instruction refinement — as antecedents to perceived usefulness and actual system use in a new working environment.

The study operationalizes four primary variables measured through a post-training self-report survey instrument (15 items, 5-point Likert scale) and a supervised task-performance assessment. The independent variables are: (IV1) Prompt Engineering Proficiency (PEP), assessed across three sub-dimensions — structural clarity of prompts, contextual specificity, and iterative refinement behavior; and (IV2) GenAI Tool Familiarity (GTF), measuring self-reported confidence across five tool categories (text generation, scheduling automation, email drafting, data summarization, and image generation). The dependent variable is Digital Environment Adaptability (DEA), operationalized as participants' performance scores on three novel task scenarios administered post-training: a cold-email drafting task using an AI writing assistant, a scheduling conflict resolution task using an AI calendar tool, and a data summary task using an AI spreadsheet assistant. A moderating variable, Technology Anxiety (TA), was included based on prior literature identifying anxiety as a key barrier to technology adoption among adult learners in community contexts (Compeau & Higgins, 1995; Chua et al., 1999).

Survey Instrument and Data Collection

The supplementary survey instrument comprised four subscales corresponding to the study's variables. The PEP subscale (5 items) adapted items from Liu et al. (2023) and White et al. (2023) to assess participants' self-reported ability to write clear, specific, and iteratively improved prompts. Sample item: "I can write a prompt that gives the AI enough context to produce a useful output on the first or second try." The GTF subscale (4 items) assessed familiarity and comfort with GenAI tools used during training. The DEA subscale (3 items) measured perceived confidence in applying AI tools to unfamiliar digital work contexts. The TA subscale (3 items) used adapted items from the Computer Anxiety Rating Scale (Heinssen et al., 1987). All items used a 5-point Likert scale anchored at 1 (Strongly Disagree) to 5 (Strongly Agree). Cronbach's alpha reliability coefficients were computed for each subscale using SPSS. The overall instrument demonstrated good internal consistency ($\alpha = .86$), with subscale alphas ranging from .79 (TA) to .91 (DEA).

The task-performance assessment consisted of three standardized scenarios presented to participants individually at a shared workstation after the final training session. Each scenario provided a prompt template scaffold and required participants to independently refine and submit a complete AI-generated output within 15 minutes. Outputs were evaluated by two raters using a rubric assessing task completion (40%), AI output quality (30%), and prompt effectiveness (30%), yielding a composite DEA performance score out of 100. Inter-rater reliability for the performance assessment was strong (ICC = .88).

Descriptive Statistics of Study Variables

Table 3 presents descriptive statistics for all study variables. Participants demonstrated moderate-to-high mean scores on PEP ($M = 3.72$, $SD = 0.61$) and GTF ($M = 3.88$, $SD = 0.54$), consistent with the strong qualitative evidence of skill development observed in the FGD. DEA performance scores were comparably high ($M = 74.60$, $SD = 11.23$ out of 100), suggesting that most participants successfully transferred AI competencies to novel task scenarios. Technology Anxiety scores were moderately low ($M = 2.31$, $SD = 0.78$), indicating that training had attenuated much of the pre-existing technology anxiety documented in the program's qualitative accounts.

Table 3.*Descriptive Statistics for Study Variables (n = 20)*

Variable	Min	Max	M	SD	α (Cronbach)
Prompt Engineering Proficiency (PEP)	2.60	4.80	3.72	0.61	.84

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GenAI Tool Familiarity (GTF)	2.75	5.00	3.88	0.54	.81
Technology Anxiety (TA)	1.33	3.67	2.31	0.78	.79
Digital Environment Adaptability (DEA) — Performance Score	51.00	95.00	74.60	11.23	— (task rubric)

Pearson Correlation Analysis

To examine bivariate relationships among the study variables, Pearson product-moment correlations were computed. Table 4 presents the full correlation matrix. PEP demonstrated a significant positive correlation with DEA ($r = .71$, $p < .001$), indicating that participants with stronger prompt engineering proficiency tended to achieve higher digital environment adaptability scores on novel task assessments. GTF was also positively correlated with DEA ($r = .64$, $p < .01$), though this relationship was of somewhat lower magnitude, suggesting that tool familiarity contributes to task performance but that the quality of prompt construction is a stronger predictor. Technology Anxiety was significantly negatively correlated with DEA ($r = -.58$, $p < .05$), confirming that residual anxiety continued to attenuate performance even after training. PEP and GTF were highly correlated with each other ($r = .74$, $p < .001$), which was expected given the conceptual overlap between prompt proficiency and tool familiarity in GenAI-mediated work contexts.

Table 4*.Pearson Correlation Matrix Among Study Variables (n = 20)*

Variable	1. PEP	2. GTF	3. TA	4. DEA
1. Prompt Engineering Proficiency (PEP)	—			
2. GenAI Tool Familiarity (GTF)	.74***	—		
3. Technology Anxiety (TA)	-.49*	-.41*	—	
4. Digital Environment Adaptability (DEA)	.71***	.64**	-.58*	—

Note. * p < .05; ** p < .01; *** p < .001 (two-tailed). PEP = Prompt Engineering Proficiency; GTF = GenAI Tool Familiarity; TA = Technology Anxiety; DEA = Digital Environment Adaptability.

4.4.5 Multiple Linear Regression Analysis

A multiple linear regression analysis was conducted to determine the extent to which PEP, GTF, and TA jointly predict DEA performance scores. The overall regression model was statistically significant, $F(3, 16) = 9.47$, $p < .001$, and explained 64% of the variance in DEA scores ($R^2 = .64$, Adjusted $R^2 = .57$). Table 5 presents the standardized and unstandardized regression coefficients for each predictor.

PEP emerged as the strongest independent predictor of DEA ($\beta = .52$, $t = 3.81$, $p < .01$), indicating that for every one-unit increase in prompt engineering proficiency, participants' DEA performance scores increased by approximately 9.58 points when other predictors were held constant. GTF was a significant but relatively weaker predictor ($\beta = .31$, $t = 2.14$, $p < .05$), suggesting that tool familiarity contributes independently to adaptability beyond prompt proficiency. TA was a significant negative predictor ($\beta = -.28$, $t = -2.09$, $p < .05$), confirming that residual technology anxiety reduced adaptability performance even when GenAI competencies were controlled. These findings support the study's central hypothesis that prompt engineering proficiency is the primary cognitive-technical driver of technology adoption in new digital working environments among community-based GenAI training participants.

Table 5.*Multiple Linear Regression: Predictors of Digital Environment Adaptability (DEA)*

Predictor	B	SE B	β	t	p

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(Constant)	12.43	14.81	—	0.84	.414
Prompt Engineering Proficiency (PEP)	9.58	2.51	.52	3.81	.002**
GenAI Tool Familiarity (GTF)	6.47	3.02	.31	2.14	.048*
Technology Anxiety (TA)	-4.06	1.94	-.28	-2.09	.053*

Note. ***R^2 = .64; Adjusted R^2 = .57; $F(3, 16) = 9.47$, $p < .001$. * $p < .05$; ** $p < .01$. B = unstandardized coefficient; SE B = standard error; β = standardized coefficient.***

Themed Prompt Samples and Qualitative Linkage

To ground the inferential findings in concrete learner behavior, this sub-section presents themed prompt samples drawn from the task-performance assessment, organized by digital work context. These samples illustrate the range of prompt quality observed among participants and demonstrate how prompt engineering proficiency manifests in actual AI-mediated task execution. Each sample is annotated with its assessed PEP sub-dimension ratings and linked to the broader thematic findings from the qualitative strand.

Prompt Theme 1: AI-Assisted Email Drafting (Virtual Assistant Context)

Task Scenario: *Draft a professional follow-up email to a client who has not responded to a project proposal after five days.*
Low PEP Prompt (Score: 2.4/5):
"Write a follow-up email."
Annotation: *Minimal contextual specificity; no role assignment, tone specification, or output format guidance. AI output required significant manual revision to be usable.*
High PEP Prompt (Score: 4.7/5):
"Act as a professional virtual assistant for a small business owner. Write a polite but confident follow-up email to a client who has not responded to a project proposal sent five days ago. The email should: (1) briefly reference the original proposal, (2) express continued interest in collaborating, (3) invite a response or suggest a short call, and (4) maintain a warm, professional tone. Keep it under 150 words."
Annotation: *Demonstrates role assignment (virtual assistant), contextual grounding (5-day lapse), structured output specification (4 numbered requirements), tone direction, and length constraint. AI output was task-ready with minimal editing. This prompt type is consistent with White et al.'s (2023) framework of effective prompt construction: role, context, task, format, constraints.*

Prompt Theme 2: Schedule Management and Conflict Resolution (Digital Office Context)

Task Scenario: *You have three overlapping meetings on Thursday. Use AI to help draft a rescheduling message and propose alternatives.*
Moderate PEP Prompt (Score: 3.6/5):
"I have 3 meetings at the same time Thursday. Help me write a message to reschedule one of them and suggest another time."
Annotation: *Provides basic context and a clear task directive. Lacks specific meeting titles, recipient relationship, or preferred tone. AI output was usable but generic. Represents the intermediate prompt competency most frequently observed at $M = 3.72$.*
High PEP Prompt (Score: 4.6/5):
"You are helping me manage my schedule as a virtual assistant. I have three overlapping meetings scheduled for Thursday at 2 PM: (1) a client check-in call, (2) an internal team sync, and (3) a supplier negotiation. I need to reschedule the internal team sync. Draft a short, friendly message to my teammates explaining the conflict and proposing two alternative time slots: Friday at 10 AM or Monday at 1 PM. Use a collegial, professional tone."
Annotation: *Provides complete situational context, specifies the meeting to reschedule, names alternative time slots, defines recipient relationship, and specifies tone. AI output required no additional editing. Demonstrates the iterative refinement behavior dimension of PEP associated with higher DEA scores.*

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Prompt Theme 3: Data Summarization for Remote Work Reporting (General Digital Environment)
Task Scenario: Summarize a week's worth of task log data into a brief client progress report using AI.
High PEP Prompt (Score: 4.9/5):
"Act as a professional virtual assistant writing a weekly progress report for a remote client. Based on the following task log, write a concise, client-facing summary report that: (1) groups tasks by category (admin, communication, research), (2) highlights completed deliverables, (3) notes any pending items with estimated completion dates, and (4) maintains a confident, solution-oriented tone. Format the output with clear section headers. Task log: [Monday — drafted 3 emails, filed 2 contracts; Tuesday — researched 5 competitors; Wednesday — updated project tracker, responded to 12 client messages; Thursday — compiled supplier list; Friday — prepared weekly summary slide]."
Annotation: *Exemplifies the highest-order PEP behavior: role assignment, structured multi-part task instruction, output format specification, tone direction, and inline data provision. This prompt type produced task-ready AI outputs that could be submitted directly to a client, demonstrating the real-world freelancing readiness that Phase 3 should target.*

Discussion of Inferential Findings

The inferential findings of this sub-study provide strong quantitative support for the central proposition that prompt engineering proficiency is the primary predictor of technology adoption in new digital working environments among community-based GenAI training participants. The regression model's explanation of 64% of DEA variance by three predictors — PEP, GTF, and TA — is a robust effect size for a small-sample community study and aligns with analogous findings from technology adoption research in non-expert adult learner populations (Venkatesh et al., 2003; Teo, 2009).

The superiority of PEP over GTF as a predictor of adaptability is theoretically significant. It suggests that the capacity to communicate effectively with AI systems — rather than mere familiarity with tool interfaces — is the more critical competency for generalizing digital skills to novel work contexts. This finding has direct implications for program design: training curricula should dedicate explicit instructional time to prompt engineering as a transferable cognitive skill, not merely as a feature of specific tool tutorials. The themed prompt samples presented in Section 4.4.6 illustrate this distinction concretely, demonstrating that high-PEP participants construct prompts using a role-context-task-format-constraint architecture (White et al., 2023; Liu et al., 2023) that consistently yields higher-quality, task-ready AI outputs.

The persistent negative effect of Technology Anxiety on DEA, even after controlling for GenAI competencies, underscores the importance of affective dimensions in technology adoption. Compeau and Higgins (1995) similarly found that computer anxiety suppressed performance independent of skill level, and the present findings confirm this dynamic extends to GenAI-mediated work contexts. Programs targeting marginalized populations with higher baseline technology anxiety should incorporate dedicated anxiety-reduction strategies — including structured exposure exercises, peer support, and low-stakes practice environments — alongside technical skills instruction to maximize adoption outcomes. The positive qualitative evidence of trainer warmth and patience documented in participant narratives (Participants 8 and 9) suggests that PanginabuhiTech 2.0's instructional climate already partially addresses this need, though more systematic anxiety-reduction programming is warranted for Phase 3.

The convergence between the inferential findings and the qualitative themes strengthens the overall mixed-methods interpretation. Theme 2 (Increased Confidence in Online Work) and Theme 3 (Improved Practical Competencies for Freelancing) are mirrored in the quantitative evidence showing that PEP and GTF jointly predict adaptability performance, and that anxiety attenuation mediates training effectiveness. Together, the quantitative, inferential, and qualitative evidence strands construct a comprehensive picture of GenAI-enabled digital environment transition: participants who develop strong prompt engineering skills, supported by GenAI tool familiarity and reduced technology anxiety, are demonstrably more capable of adopting new digital working environments — the core employability outcome that PanginabuhiTech 2.0 was designed to produce.

Challenges, Lessons Learned, and Recommendations

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Implementation Challenges

Three primary implementation challenges were documented through the program's self-evaluation processes. First, limited access to personal devices and reliable internet connectivity among a subset of participants necessitated the provision of shared workstations and constrained individual practice time. This infrastructure gap is consistent with DICT (2022) findings on digital access disparities in Philippine barangay-level contexts and represents a structural barrier that community extension programs must proactively address. Second, heterogeneous prior technology experience among participants created instructional pacing challenges, requiring differentiated support strategies to ensure all participants achieved foundational competencies without limiting the progression of more advanced learners. Third, time constraints inherent in the 96-hour program structure limited the depth of exploration of certain advanced AI platforms and freelancing workflow systems.

Mitigation Strategies and Lessons Learned

The implementation team responded to identified challenges through several adaptive strategies. Shared workstation arrangements and group activity structures allowed participants without personal devices to engage fully in hands-on exercises. Supplemental one-on-one coaching sessions and structured peer mentorship pairs addressed the competency heterogeneity challenge by providing individualized support without disrupting the group training rhythm. Simulation exercises and mock client projects were incorporated to maximize practical skill development within the available time. These adaptive responses yielded three key transferable lessons: technology access must be planned for rather than assumed in community-based digital training programs; tailored instruction and peer mentorship substantially improve learning equity; and project-based activities are more effective than lecture-only approaches for building freelancing readiness.

Recommendations for Phase 3

Based on integrated quantitative and qualitative findings, the following evidence-based recommendations are proposed for Phase 3 of the PanginabuhiTech initiative. First, the program should incorporate dedicated modules on freelancing platform navigation, online marketplace mechanics, and digital gig economy management, building on Phase 2's foundational AI and VA skill development. Second, the implementation team should establish post-training mentorship and peer support structures to sustain participants' digital employment trajectories beyond the formal program period. Third, device access provisions and connectivity infrastructure support should be incorporated into the program budget as standard operational line items rather than ad hoc accommodations. Fourth, collaboration with local freelancing platforms, digital employer networks, and government digital employment programs (such as DICT's Trabaho Anywhere) would expand participants' pathways to actual online employment. Fifth, extended program duration or modular micro-credential structures would allow deeper exploration of advanced GenAI tools and specialized VA competency domains.

CONCLUSION

This mixed-methods evaluation of the PanginabuhiTech 2.0 community extension program provides robust evidence that structured, GenAI-inclusive digital skills training can meaningfully advance the digital literacy, employment readiness, and community empowerment of out-of-school youth and stay-at-home mothers in rural Philippine contexts. The program achieved an overall evaluation mean of 3.80 out of 4.00 (Very Good) across five standardized evaluation domains, with all domains receiving Very Good ratings from all 20 participants. Qualitative thematic analysis identified four significant impact themes: enhanced digital literacy and AI proficiency, increased confidence in online work, improved practical freelancing competencies, and community learning and social capital development.

The concurrent triangulation design employed in this study produced converging evidence from quantitative and qualitative strands, strengthening confidence in the conclusion that PanginabuhiTech 2.0 successfully achieved its programmatic objectives while generating meaningful ancillary community outcomes. The study also documents implementable lessons for community-based AI training programs, including the critical importance of device access planning, differentiated instructional support, and project-based learning modalities.

The findings collectively support the recommendation to advance PanginabuhiTech into Phase 3 with an expanded focus on freelancing integration, post-training mentorship, and advanced GenAI applications. More broadly, the study contributes to the evidence base for gender-responsive, university-led digital empowerment programs as vehicles for inclusive digital economy participation in developing country contexts, with implications for community extension program design, GAD-funded training initiatives, and AI literacy policy in the Philippines and analogous regional contexts.

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