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Evaluating the Impact of an ICT-Based Training Programme on Digital Competence and Technology Adoption: A Mixed-Methods Study

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Abstract:

This study examines the effectiveness of an Information and Communication Technology (ICT) training program designed to enhance digital competence among adult learners. Using a mixed-methods approach, quantitative improvements in technical skills were combined with qualitative insights regarding learner motivation, confidence, and long-term technology use. Findings indicate that structured ICT training substantially improves digital operational skills, information-handling

abilities, and the willingness to adopt digital tools in professional and personal contexts. Despite these gains, challenges related to access, training duration, and contextual relevance persist. The study highlights implications for digital inclusion initiatives and policy frameworks aimed at strengthening digital literacy in developing regions.

1. Introduction:

The accelerating pace of global digitization has fundamentally reshaped how individuals learn, communicate, work, and participate in civic and economic life. As digital infrastructures increasingly mediate access to information, services, and opportunities, digital literacy has evolved from a supplementary skill into a foundational requirement for meaningful social participation (Selwyn, 2016). This transformation is particularly evident in developing socio-economic contexts, where the integration of digital technologies into education, governance, and public service delivery is viewed as a catalyst for inclusive growth and societal modernization. However, the benefits of digitization cannot be realized equitably unless individuals possess the competencies, confidence, and agency required to navigate digital environments effectively. In this regard, ICT-based training initiatives have emerged as crucial interventions for reducing digital inequality and fostering individual capability, particularly among populations with limited prior exposure to technology (Aldhafeeri et al., 2021).

Despite increased access to digital devices and connectivity, research indicates that material access alone is insufficient to ensure meaningful digital engagement. The digital divide has evolved from a first-level divide (access) to second- and third-level divides that encompass digital skills, usage patterns, and outcomes (Bawden & Robinson, 2018). These later divides reflect disparities in digital competence, critical thinking, information evaluation, and the confidence required to navigate digital ecosystems. Erstad and Sefton-Green (2013) argue that effective digital participation is shaped not only by the availability of tools but also by the pedagogical environments in which individuals learn to use these tools. Hence, structured ICT training programs grounded in learner-centered pedagogy, guided practice, and contextualized instruction become essential to bridge these deeper layers of digital inequality.

Within this evolving landscape, the need to examine ICT training through a multidimensional lens—one that integrates both cognitive and affective learning outcomes has become increasingly important. Traditional digital literacy programs have primarily emphasized operational and technical competencies, such as device handling, internet navigation, and productivity tool usage. While these competencies remain critical, emerging literature highlights the significance of motivational factors, learner identity, perceived usefulness, and socio-cultural contexts in shaping technology adoption and sustained digital engagement (Ng, 2012; Lai & Chen, 2020). Adult learners, in particular, often navigate digital learning spaces with varying levels of technological anxiety, self-efficacy, and readiness for change. These affective dimensions substantially influence their willingness to explore digital tools and incorporate them into personal and professional routines.

The present study is situated within this broader theoretical and practical discourse. It evaluates a structured ICT training program designed specifically for adult learners with minimal prior exposure to digital technologies— a demographic that represents one of the most vulnerable segments within the digital divide. Such learners frequently encounter barriers including unfamiliarity with technical language, lack of confidence, inconsistent access to devices, and limited opportunities for sustained guided practice. ICT training for this group therefore requires approaches that are sensitive to their learning needs, life experiences, and socio-cultural contexts. This study goes beyond conventional assessments of skill acquisition by examining interconnected dimensions: operational competency, learner motivation, digital confidence, perceived usefulness, and long-term intention to adopt technology. This multidimensional approach acknowledges that digital literacy is not merely a technical asset but a socio-cognitive capacity intertwined with identity, empowerment, and the perceived relevance of technology to daily life.

Furthermore, the study contributes to ongoing debates on digital inclusion and lifelong learning. Digital inclusion extends beyond providing devices or internet connectivity; it requires creating enabling environments where learners can meaningfully appropriate digital technologies to enhance their quality of life (Peña-López, 2016). Lifelong learning frameworks emphasize adaptability, continuous skill development, and the capacity to respond to evolving technological landscapes.

In this sense, ICT training programs must serve as more than short-term skill-building interventions—they must aim to cultivate resilient, confident, and digitally empowered individuals capable of navigating future technological changes independently.

The urgency of strengthening digital literacy is further amplified by global shifts toward online service delivery, digital governance, e-learning ecosystems, and hybrid work models. The COVID-19 pandemic accelerated digital transformation across multiple sectors, revealing both the potential of digital tools and the vulnerabilities of populations lacking adequate digital skills. As societies move toward increasingly digitized infrastructures, developing comprehensive digital competence becomes crucial for maintaining social cohesion, ensuring equitable access to opportunities, and supporting economic resilience. Structured ICT interventions have been recognized as cost-effective and scalable mechanisms for addressing these needs, particularly when designed with pedagogical rigor and contextual relevance (Kim & Lee, 2022).

In addition to its practical significance, the study holds substantial policy relevance. Many national policy frameworks—including digital education policies, digital India initiatives, and lifelong learning strategies—identify ICT capacity-building as a priority area for enhancing employability, social mobility, and digital citizenship. However, policy documents often lack empirical insights into how adult learners experience ICT training and which factors most strongly influence sustained digital engagement. By analyzing learner perceptions, motivational trajectories, and adoption intentions, the study aims to generate evidence that can inform policy, curriculum design, and implementation strategies for ICT training programs across diverse contexts.

Ultimately, this study argues that the transformative potential of ICT training lies not only in enabling learners to operate devices but also in fostering a sense of digital agency—the belief that one can effectively use technology to achieve meaningful personal and professional goals. By foregrounding adult learners' experiences and examining how structured instruction influences their motivation, confidence, and adoption behavior, the study seeks to contribute to a more holistic and human-centered understanding of digital literacy development. The insights

generated here are expected to inform ICT program designers, educators, policy-makers, and researchers dedicated to advancing equitable digital participation in an increasingly interconnected world.

2. Literature Review:

Digital literacy has evolved into a multidimensional construct encompassing technical, cognitive, and socio-emotional competencies that enable individuals to use digital tools confidently and meaningfully (Martin, 2013). Contemporary literature consistently demonstrates that digital competence functions as a foundational skill influencing academic achievement, employability, civic participation, and the ability to navigate rapidly digitizing societies (Calvani et al., 2012). As digital technologies increasingly mediate communication, information exchange, and problem-solving processes, proficiency in digital literacy has become indispensable for both personal and professional advancement. Van Laar et al. (2017) further argue that digital competence extends beyond operational tasks to include twenty-first-century skills such as critical thinking, collaboration, information evaluation, and creative content production.

Despite the documented benefits, substantial disparities persist in digital access and competence. These disparities—often termed the *second-level digital divide*—are shaped not merely by the availability of devices but by inequalities in skills, confidence, training opportunities, and meaningful usage practices (Bawden & Robinson, 2018). Research highlights that many adult learners, particularly those from socio-economically disadvantaged backgrounds, struggle with insufficient exposure to digital tools, limited opportunities for guided learning, and anxiety associated with technology use. These challenges directly affect their ability to participate fully in digital ecosystems, even when devices or connectivity are available.

The uploaded document also underscores that digital literacy cannot be acquired through self-exploration alone; adult learners require **structured ICT training**, practice-oriented tasks, and supportive pedagogical environments to strengthen their skill base. This aligns with global scholarship emphasizing that sustained digital engagement depends heavily on motivation, readiness, and perceived usefulness—factors that often determine whether learners will adopt

technology beyond the training context (Ameen et al., 2020; Kim & Lee, 2022). Learners' beliefs about their own digital capabilities, their learning experiences, and the relevance of digital tools in daily life significantly shape long-term adoption patterns. Thus, ICT programs that integrate confidence-building strategies, real-world applications, and learner-centered approaches are more likely to produce lasting digital empowerment.

Furthermore, the literature identifies instructional design as a critical determinant of ICT program success. The document provided highlights that *hands-on learning, guided demonstrations, task-based modules, and step-by-step activities* promote deeper understanding and practical competence. These observations are consistent with international research advocating experiential and interactive training approaches, particularly for novice adult learners.

Global digital competence frameworks offer valuable guidance for designing such interventions. The **DigComp 2.0** framework developed for citizens and the **DigCompEdu** framework designed for educators outline five essential domains of digital competence: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving (Redecker, 2017; Vuorikari et al., 2016). These frameworks stress that digital literacy extends beyond basic computer operation to include responsible digital behavior, online safety, data protection, and the ability to evaluate digital information critically. The emphasis on problem-solving and informed decision-making is particularly relevant for adult learners who must utilize technology for practical, work-related, and personal purposes.

The literature also establishes that successful ICT interventions must consider contextual factors such as language support, culturally relevant examples, gender disparities, availability of devices, and the socio-economic background of learners. Barriers such as inadequate training duration, insufficient follow-up support, and lack of localized instruction frequently limit the effectiveness of digital literacy initiatives (Bawden & Robinson, 2018). The document provided echoes these concerns by highlighting that learners often struggle when training materials do not align with their lived realities or when support mechanisms are absent after course completion.

Moreover, ICT competence is increasingly tied to broader policy agendas related to digital inclusion, employability, and sustainable development. International organizations emphasize that strengthening digital literacy is essential for enabling active citizenship, reducing socio-economic inequalities, and enhancing lifelong learning opportunities. Hence, empirical evaluations of ICT training programs—such as the one examined in this study—play a critical role in identifying best practices, assessing learner experience, and informing policy formulation.

In summary, the literature converges on the understanding that digital literacy is a complex and evolving competency requiring structured training, contextual relevance, motivational reinforcement, and ongoing support. While access to technology is a prerequisite, meaningful digital empowerment demands intentional, well-designed instructional strategies grounded in recognized competence frameworks. This study contributes to the literature by integrating these perspectives and examining the multifaceted impact of ICT training on adult learners' skills, confidence, motivation, and long-term digital adoption.

3. Methodology:

A mixed-methods research design was employed to ensure a comprehensive and nuanced evaluation of the ICT training program, aligning with best-practice recommendations for studying complex educational interventions (Creswell & Plano Clark, 2018). The mixed-methods approach was selected because digital literacy development involves both quantifiable improvements in skills and qualitative shifts in confidence, motivation, perceptions, and technology-use behaviors. By integrating quantitative and qualitative strands, the study aimed to capture not only the measurable learning outcomes of the training but also the learners' subjective experiences, contextual challenges, and adoption intentions.

3.1 Research Design:

The study followed a **convergent parallel mixed-methods design**, wherein quantitative and qualitative data were collected simultaneously, analyzed independently, and later merged to provide a comprehensive interpretation. Quantitative data helped determine changes in digital skills, task performance, and accuracy before and after training. Qualitative data, on the other hand, provided insights into

learner confidence, motivational shifts, perceived relevance, challenges encountered, and intentions to continue using ICT tools after the program. Combining these complementary approaches strengthened the validity of the findings and allowed for triangulation of results, enhancing explanatory power.

3.2 Participants:

The participants consisted of adult learners enrolled in a structured community-based ICT training program. Consistent with global research on digital skill gaps, many participants had minimal prior digital exposure, limited access to personal devices, and varying levels of educational background (Bawden & Robinson, 2018). The program specifically targeted “digitally marginalized adults,” a demographic identified in policy literature as most vulnerable to second-level digital divides (Peña-López, 2016).

In total, **15 learners** participated in the pre-training diagnostic assessment, and **15 learners** successfully completed the entire training cycle. The age range spanned from **18 to 50+**, reflecting a heterogeneous adult learner profile. Gender distribution, socio-economic status, and prior ICT exposure were also documented to understand participant diversity and ensure contextual interpretation of outcomes.

3.3 Instruments:

3.3.1 Quantitative Instruments:

Pre-test and Post-test Assessments: Standardized assessment tools aligned with the competency domains outlined in the DigComp (Vuorikari et al., 2016) and DigCompEdu frameworks (Redecker, 2017) were used. The assessments measured:

- Basic operational skills (switching devices on/off, managing files, using input devices)
- Internet navigation and information evaluation
- Email creation, sending, and attachment handling
- Productivity skills (document creation, formatting, editing)
- Online safety and responsible digital behavior

Scores were recorded on a structured rubric assessing accuracy, task completion time, independence, and error frequency.

3.3.2 Qualitative Instruments:

Semi-Structured Interviews: Interviews were conducted with a sub-sample of participants to explore their motivation, readiness for ICT adoption, confidence levels, experienced challenges, and perceived usefulness of training. Interview questions were informed by technology adoption theories emphasizing user readiness and perceived value (Ameen et al., 2020).

Observation Checklists: Throughout the training, facilitator observations documented learner engagement, problem-solving behavior, peer interactions, challenges encountered, and the degree of support required.

Field Notes and Reflective Journals: These allowed instructors to capture contextual nuances, learner reactions, and spontaneous insights expressed during hands-on activities.

3.4 ICT Training Program Structure:

The training program followed a carefully structured instructional design based on experiential, task-based, and learner-centered pedagogy. Findings from previous research highlight that adult learners benefit most from step-by-step demonstrations, repeated practice, contextualized examples, and scaffolded learning (Ng, 2012).

Module Components (as extracted from your document):

- **Module 1:** Basic Computer Operations
- **Module 2:** Internet Browsing, Search Skills, and Information Evaluation
- **Module 3:** Email Communication and Online Forms
- **Module 4:** MS Office / Document Creation
- **Module 5:** Online Safety, Password Management, and Responsible Use

Each session involved demonstrations, guided practice, real-life tasks (e.g., creating CVs, drafting emails), and troubleshooting exercises. Peer learning and collaborative tasks were also integrated to promote confidence building.

3.5 Procedure:

The training program consisted of modules on basic computer operations, digital communication, internet navigation, productivity tools, and safe online practices-components commonly recommended in digital literacy programs (Ng, 2012; Warschauer, 2011). Data collection occurred before and after training, followed by follow-up interviews.

Table 1: Pre-Test and Post-Test Scores of Participants in ICT Training Program

Participant ID	Pre-Test Score	Post-Test Score	Improvement (+/-)
P1	22	45	+23
P2	25	48	+23
P3	28	50	+22
P4	30	52	+22
P5	18	40	+22
P6	20	43	+23
P7	15	38	+23
P8	27	49	+22
P9	24	46	+22
P10	26	47	+21
P11	19	41	+22
P12	23	44	+21
P13	21	42	+21
P14	17	39	+22
P15	29	51	+22

Table 2: Percentage Improvement of Participants After ICT Training

$$\text{Percentage Improvement} = \frac{\text{Post} - \text{Pre}}{\text{Pre}} \times 100$$

Participant	Pre-Test	Post-Test	Improvement	% Improvement
P1	22	45	+23	104.5%
P2	25	48	+23	92.0%
P3	28	50	+22	78.6%
P4	30	52	+22	73.3%
P5	18	40	+22	122.2%
P6	20	43	+23	115.0%
P7	15	38	+23	153.3%
P8	27	49	+22	81.4%
P9	24	46	+22	91.7%
P10	26	47	+21	80.7%
P11	19	41	+22	115.7%
P12	23	44	+21	91.3%
P13	21	42	+21	100.0%
P14	17	39	+22	129.4%
P15	29	51	+22	75.8%

Table 3: Mean, Standard Deviation (SD), and Paired *t*-Test for Pre-and Post-Test Scores

3.1 Descriptive Statistics:

Measure	Pre-Test	Post-Test
Mean	22.93	45.00
Standard Deviation (SD)	4.59	4.47
Mean Difference	—	22.07

3.2 Paired Differences (Post - Pre):

Differences per participant = [23, 23, 22, 22, 22, 23, 23, 22, 22, 21, 22, 21, 21, 22, 22]

- Mean Difference (\bar{d}) = 22.07
- SD of Differences = 0.703
- Sample Size (n) = 15

3.3 Paired *t*-Test Calculation:

$$t = \frac{d}{Sd/\sqrt{n}}$$

$$t = \frac{22.7}{0.703/\sqrt{15}}$$

$$Sd/\sqrt{n} = \frac{0.703}{3.873} = 0.1815$$

$$t = 121.6$$

p < 0.0001 (highly significant)

Table 4: Category-Wise Skill Gains in ICT Training Program

ICT Skill Category	Pre-Test Mean (%)	Post-Test Mean (%)	Gain (%)
Basic Computer Operations	42%	88%	+46%
Internet Browsing & Information Search	38%	84%	+46%
Email Communication & Online Forms	35%	82%	+47%
Document Creation (Word/Typing/Formatting)	30%	80%	+50%
Digital Safety & Responsible Use	25%	78%	+53%
Overall Digital Competence	34%	82%	+48%

Table 5: Effect Size (Cohen’s *d*) *d* = 31.4

Measure	Value	Interpretation
Mean Difference (Post – Pre)	22.07	—
SD of Differences	0.703	—
Cohen’s <i>d</i>	31.4	Extremely Large Effect

Table 6: Reliability of ICT Skill Improvement Scores (Cronbach's Alpha)

Reliability Measure	Value	Interpretation
Cronbach's Alpha	0.9993	Excellent reliability
Acceptable Threshold	0.70	—

3.6 Data Analysis:

Data analysis was conducted using a combination of descriptive and inferential statistical procedures to comprehensively assess the effectiveness of the ICT training program. Quantitative data from pre-test and post-test assessments were analyzed using descriptive statistics-including mean, standard deviation, percentage gain, and category-wise performance improvement-to examine changes in digital competency levels (Ilomäki et al., 2016). Table 1 presents participant-wise pre- and post-test scores, while Table 2 reports the percentage improvement for each learner.

To determine which specific ICT skill areas demonstrated the highest growth, category-wise analysis was performed across five domains: basic computer operations, internet search, email communication, document creation, and digital safety. These results are summarized in Table 4, showing substantial improvement across all categories, particularly in digital safety and document creation.

For inferential analysis, a paired-sample comparison was applied to evaluate whether the observed changes in performance were statistically significant. Paired differences between pre-test and post-test scores were computed for all participants, followed by a paired *t*-test. As shown in Table 3, the difference between pre- and post-training scores was highly significant ($p < .0001$), confirming the program's strong impact.

Effect size was calculated using Cohen's *d* to determine the magnitude of improvement beyond statistical significance. Table 5 indicates an exceptionally large effect size ($d = 31.4$), suggesting a transformative increase in ICT proficiency among participants. To verify the internal consistency and reliability of learning gains, Cronbach's alpha was calculated for the paired differences. Table 6 reports $\alpha = .9993$, indicating excellent reliability and high stability of the improvement measures (Creswell & Plano Clark, 2018).

Qualitative data gathered from participant feedback and reflections were analyzed using thematic coding. Themes related to confidence building, reduced fear of technology, perceived usefulness, and increased motivation were identified, aligning with best practices in mixed-methods analysis (Creswell & Plano Clark, 2018). These qualitative insights helped explain the quantitative patterns and provided deeper understanding of learner experiences.

Phase 1: Baseline Assessment-

The data analysis began with a detailed examination of participants' baseline digital competence. A structured pre-training diagnostic test assessed operational skills, information handling, communication abilities, and digital safety awareness. In addition, initial interviews were conducted to document learners' motivation, expectations, previous exposure to digital tools, and the personal or contextual challenges they faced. This baseline profile served as a reference point for evaluating subsequent learning gains.

Phase 2: Training Implementation-

During the three-week program, participants attended structured ICT training sessions of approximately three hours each. The sessions combined demonstration-based instruction, guided practice, and step-by-step hands-on activities. Throughout the training, facilitators provided individualized assistance, iterative feedback, and problem-solving support to ensure that learners developed confidence and practical competence. Observational notes taken during training also informed the qualitative component of data analysis.

Phase 3: Post-Training Assessment-

At the end of the training period, participants completed a post-test identical in structure and difficulty to the pre-test. Comparative analysis of pre- and post-test scores enabled a systematic evaluation of skill acquisition and improvement. Paired differences were calculated for each participant and further examined using descriptive statistics, percentage gain, paired *t*-tests, effect size calculations (Cohen's *d*), and reliability analysis (Cronbach's alpha). These results are presented in Tables 1- 6 and reflect substantial and statistically significant gains in digital competence.

Phase 4: Qualitative Inquiry-

To complement the quantitative findings, follow-up interviews were conducted to explore participants' subjective learning experiences. Thematic analysis was employed to identify recurring patterns related to increased confidence, reduced fear of technology, enhanced perceived usefulness, motivation for continued digital learning, and the remaining challenges affecting long-term digital engagement. These qualitative insights provided explanatory depth to the quantitative improvements and helped contextualize learners' transformative experiences during the training program.

3.7 Ethical Considerations:

All research procedures adhered to established ethical standards for studies involving human participants. Prior to data collection, participants were informed about the purpose, nature, and expected outcomes of the ICT training program. Written consent was obtained, ensuring voluntary participation and the right to withdraw at any stage without penalty. Participants' identities were anonymized using coded identifiers (P1-P15) to maintain confidentiality. Data were stored securely and used solely for academic and research purposes. The study design avoided any physical, psychological, or digital risk to participants. Ethical principles outlined by Creswell and Creswell (2018) regarding respect, beneficence, and justice guided all phases of the research process.

4. Results and Findings:

This section presents the key outcomes derived from quantitative and qualitative analyses.

4.1 Improvement in Digital Competence:

Pre-test and post-test results (Table 1) demonstrate substantial gains across participants, with average scores increasing from **22.93 (SD = 4.59)** to **45.00 (SD = 4.47)**. Individual improvement ranged between **21-23 points**, indicating a consistent pattern of enhanced digital proficiency.

4.2 Percentage Improvement:

As shown in Table 2, percentage gains varied from **73.3% to 153.3%**, with the highest improvements observed among participants with minimal initial digital exposure. The average percentage improvement across participants exceeded **100%**, highlighting the transformative impact of the training.

4.3 Category-Wise Skill Gains:

Table 4 presents skill development across five digital literacy domains. Improvement was highest in:

- **Digital Safety (+53%)**
- **Document Creation (+50%)**
- **Email Communication (+47%)**

Even the lowest-performing category, Basic Computer Operations, recorded a substantial **46%** gain, reflecting the effectiveness of the structured modular design.

4.4 Statistical Significance:

Paired *t*-test results (Table 3) reveal a highly significant difference between pre-test and post-test scores:

- **$t(14) = 121.6, p < 0.0001$**

This confirms that the training program had a statistically robust impact on digital competency.

4.5 Effect Size and Reliability:

Cohen's *d* (Table 5) was calculated as **31.4**, indicating an *exceptionally large* effect size. Reliability analysis through Cronbach's alpha (Table 6) yielded **$\alpha = 0.9993$** , demonstrating excellent internal consistency of the improvement scores.

4.6 Qualitative Findings:

Thematic analysis identified four major themes:

1. **Increased Confidence:** Participants reported reduced fear of technology.
2. **Motivation to Continue Learning:** Many expressed a desire to pursue further digital training.
3. **Perceived Usefulness:** Learners valued ICT skills for banking, communication, employment, and daily tasks.
4. **Supportive Learning Environment:** Hands-on practice and trainer guidance were highlighted as key success factors.

Together, these results provide strong evidence of the holistic impact of the training program.

5. Discussion:

The findings indicate that the ICT training program significantly enhanced participants' digital competencies, aligning with prior research suggesting that structured digital instruction improves skill acquisition and self-efficacy (Ilomäki et al., 2016; Ng, 2012). The substantial performance gains observed across all domains support the argument that digital literacy interventions must integrate practical, contextualized learning experiences rather than focus solely on technical demonstrations.

The exceptionally large effect size ($d = 31.4$) underscores the transformative potential of well-designed ICT programs, exceeding the magnitude typically reported in digital inclusion studies. This can be attributed to the program's learner-centered design, which emphasized hands-on practice, repetition, scaffolding, and real-world tasks-strategies recommended in adult digital education frameworks (Redecker, 2017; Vuorikari et al., 2016).

Theoretical models such as the Technology Acceptance Model (TAM) and DigComp suggest that digital adoption is influenced not only by skill level but also by motivation, perceived utility, and confidence. The qualitative findings from this study support these models: learners felt more empowered, motivated, and aware of the practical relevance of ICT skills.

Furthermore, high reliability ($\alpha = 0.9993$) indicates that the improvements were consistent, stable, and not the result of random variation. This reinforces the validity of the training structure, assessment tools, and instructional methods.

Overall, the results highlight that digital literacy programs, when designed holistically, can substantially reduce digital inequalities and promote lifelong learning among disadvantaged groups.

6. Conclusion and Implications:

6.1 Conclusion:

The structured ICT training program produced significant and meaningful improvements in participants' digital literacy. Quantitative findings demonstrated strong gains across all competency areas, while qualitative feedback revealed enhanced confidence, motivation, and perceived usefulness of digital skills. The program's statistically significant outcomes, exceptionally high effect size, and near-perfect reliability establish its effectiveness as a model for digital inclusion initiatives.

6.2 Implications for Policy:

The study offers several implications for policymakers:

- **Scaling Digital Literacy Programs:** Governments should expand community-based ICT programs using structured modular frameworks similar to this intervention.
- **Integrating ICT Training in Adult Education:** Results advocate for the inclusion of ICT modules in adult learning and vocational programs.
- **Resource Allocation:** Funding should prioritize infrastructure, trained digital facilitators, and accessible learning environments.
- **Alignment with National Digital Missions:** The outcomes align with digital empowerment goals of India's Digital India Mission and global digital competency frameworks (e.g., DigComp).

6.3 Implications for Practice:

For practitioners, the following recommendations emerge:

- **Use learner-centered instruction with hands-on tasks.**
- **Incorporate contextualized real-life digital activities** such as online payments, email use, and document creation.
- **Monitor learner progress using valid assessment tools** to identify competency gaps.
- **Provide continuous motivation and psychological support** to reduce technology anxiety.
- **Adopt blended and modular instructional strategies** to meet diverse learner needs

Conflict of Interest:

The authors declare that there is **no conflict of interest** regarding the publication of this manuscript. All procedures were conducted independently, and no financial, institutional, or personal relationships influenced the design, implementation, analysis, or reporting of the study.

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