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Digital Resilience in War-Affected Contexts: An MIS Framework for Restoring ICT Learning and Freelancing Capacity

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Abstract

ICT learning systems in war-affected regions face continuous disruption caused by damaged infrastructure, unstable connectivity, mobility restrictions, and psychological stress. These conditions interrupt digital-skills development and limit access to online freelancing opportunities. This paper proposes a Digital Resilience MIS Framework designed to restore and sustain ICT learning during active conflict. The framework is developed from two ICT training programs implemented in Gaza during the 2025 war, both of which operated throughout severe instability. Analysis of program documentation shows that learning continuity depended on five interconnected pillars: resilient infrastructure; adaptable instructional workflows; structured monitoring and information flow; human-centred psychosocial support; and coordinated organizational decision-making. When combined, these elements enabled the programs to maintain attendance, progress through technical content, and complete practical projects despite external disruptions. The framework offers a practical model for institutions seeking to preserve digital learning and freelance-readiness in fragile settings and contributes to MIS scholarship by demonstrating how resilience principles can be operationalized in active conflict environments.

Keywords: Conflict-Affected Environments; Digital Resilience; ICT Learning Continuity; Digital Workforce Readiness; Management Information Systems.

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1. Introduction

ICT learning and digital-skills development play a critical role in enabling youth to access online employment and freelancing opportunities (Heeks, 2018; Ojo et al., 2022; Unwin, 2017; Walsham, 2020). In war-affected contexts, however, these pathways are repeatedly disrupted by damaged infrastructure, unstable connectivity, restricted mobility, displacement, and heightened psychological stress. Such conditions interrupt learning routines, weaken digital readiness, and limit participation in global digital markets. Ensuring continuity of ICT learning during conflict is therefore essential for protecting human-capital development and supporting long-term economic resilience (Ojo et al., 2022; Tambo, 2021; Yates & Paquette, 2011).

Management Information Systems (MIS) offer structured mechanisms for coordinating processes, information flow, and digital operations (Benbasat et al., 1987; Bharosa et al., 2010; Walsham, 1995). Yet most MIS models assume relative environmental stability and do not account for the extreme unpredictability present in active conflict situations. Existing literature on resilience, crisis management, and ICT-for-development provides important insights, but it offers limited guidance on how learning systems can continue functioning when disruptions occur daily and infrastructure is severely compromised. This gap becomes especially significant as online freelancing expands worldwide and youth in fragile regions increasingly rely on digital skills as their primary employment pathway (Al-Azawei et al., 2019; Hodges et al., 2020; Kohrt, 2019).

To address this challenge, the present study proposes a Digital Resilience MIS Framework for restoring and sustaining ICT learning and freelance-readiness under conflict conditions. The framework is derived from empirical evidence collected from two ICT training programs implemented in Gaza during the 2025 war. These programs

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operated continuously throughout the conflict and relied on coordinated MIS structures, flexible instructional models, resilient infrastructure, and human-centred support mechanisms. Their experience offers rare real-time insight into how learning systems behave under persistent instability.

The programs faced a range of disruptions that shaped their operational design. These disruptions are summarized in Table 1, which highlights the environmental pressures that any digital learning ecosystem must overcome to remain functional in conflict settings.

Table 1. Disruptions Affecting ICT Learning in War-Affected Contexts

Disruption Type	Description	Impact on ICT Learning
Infrastructure instability	Power cuts; damaged facilities	Interrupts sessions; limits device and hub use
Connectivity challenges	Weak or unreliable networks	Disrupts online tasks and hybrid delivery
Mobility restrictions	Unsafe travel routes; sudden closures	Reduces attendance; forces schedule changes
Human displacement	Loss of stable routines; relocation	Causes learning gaps and irregular participation
Psychosocial stress	Trauma, fear, uncertainty	Reduces concentration and motivation
Resource scarcity	Limited equipment and tools	Restricts hands-on practice and project work

These conditions demonstrate why sustaining ICT learning in conflict settings requires more than technology alone; it demands integrated systems that combine infrastructure resilience, flexible workflows, real-time information management, emotional support, and coordinated decision-making.

The following sections present the Digital Resilience MIS Framework, the methodology used to analyze implementation evidence, and the insights gained from the two Gaza programs. Together, these elements show how MIS principles can be adapted to preserve ICT learning and freelancing capacity even under extreme disruption.

Accordingly, this study addresses the following research question: *How can Management Information Systems be structured* to *sustain ICT learning continuity and freelance-readiness during active conflict environments?*

2. Literature Review

Research relevant to ICT learning in conflict settings spans several paths of MIS and digital-development aspects. While each contributes important insights, none provide a unified framework explaining how ICT training can continue during *active* conflict (Al-Azawei et al., 2019; Alam, 2020; Bharosa et al., 2010; Bozkurt & Karakoç, 2020; Jafar et al., 2021; Ojo et al., 2022; Tambo, 2021; UNESCO, 2022; Walsham, 2020; Winthrop, 2020). The literature therefore presents useful foundations but leaves a gap this study aims to address.

Studies on information systems in crisis contexts emphasize redundancy, continuity planning, and flexible system architectures (Al-Azawei et al., 2019; Kohrt, 2019; Ojo et al., 2022; Tambo, 2021; Winthrop, 2020). These principles highlight the need for adaptable digital processes but typically focus on short-term disruptions rather than prolonged conflict. ICT-for-development research examines digital inclusion, capacity-building, and resilience at the individual and community levels, yet it often concentrates on post-crisis recovery rather than real-time instability.

A second group of studies examines online freelancing and digital workforce readiness (Al-Azawei et al., 2019; Hodges et al., 2020; Kässi & Lehdonvirta, 2018; Wood et al., 2018). These works underline the importance of structured training, mentorship, and portfolio development, but they assume stable learning environments, consistent connectivity, and predictable schedules; all conditions absent in war-affected contexts. Technology-supported learning research adds evidence that hybrid, modular, and blended approaches can sustain education during disruption, though most analyses rely on intact infrastructure and do not address severe mobility or safety constraints (Al-Azawei et al., 2019; Bozkurt & Karakoç, 2020; Hodges et al., 2020; Kohrt, 2019; UNESCO, 2022; Winthrop, 2020).

Finally, crisis-education and psychosocial research demonstrates that emotional well-being and learner support are essential for engagement, especially for youth experiencing trauma or displacement (Al-Azawei et al., 2019; Bozkurt & Karakoç, 2020; UNESCO, 2022). However, these insights are rarely integrated into MIS models for digital-skills training.

Table 2 consolidates these strands, showing both their contributions and the limitations that motivate the need for a new framework.

Table 2. Core Literature Strands and Their Relevance to Conflict-Affected ICT Learning

Domain	Contribution	Limitation
Information systems in crisis	Emphasizes continuity, redundancy, and flexible workflows	Focuses on short disruptions, not sustained conflict
ICT for development	Highlights digital access, inclusion, and capacity building	Centers on post-conflict recovery rather than live instability
Digital freelancing and workforce readiness	Identifies training and portfolio requirements	Assumes stable learning conditions
Technology-supported learning	Shows benefits of hybrid and modular learning	Relies on intact infrastructure
Psychosocial and crisis-education	Demonstrates the importance of emotional support	Rarely integrated into MIS frameworks

Taken together, the literature suggests that effective ICT learning in conflict settings must combine infrastructure readiness, flexible processes, real-time information flow, and psychosocial support. What is missing is a cohesive MIS model that integrates all these components and is validated through evidence from active-conflict environments. This study proposes such a model and tests it using program documentation from Gaza.

3. Proposed MIS Framework

The Digital Resilience MIS Framework developed in this study offers a structured model for sustaining ICT learning and freelance-readiness during active conflict. It integrates technological, organizational, and human-centred elements into a single operational system capable of absorbing disruptions and maintaining learning continuity.

3.1. Purpose and Conceptual Basis

Traditional MIS approaches assume predictable conditions, stable infrastructure, and routine communication (Alam, 2020; Bharosa et al., 2010; Ciborra, 2006; Heeks, 2018; Jafar et al., 2021; Ojo et al., 2022; Ransbotham et al., 2021; Walsham, 1995, 2020; Yates & Paquette, 2011). In conflict settings, these assumptions collapse. Power outages, mobility restrictions, safety risks, and emotional distress interfere with every aspect of ICT training. The framework responds to this reality by adapting MIS principles to conditions where interruptions are routine, information must flow rapidly, and both learners and institutions require reinforced stability.

The framework is built around five interdependent pillars, as shown in Figure 1. In addition to what is shown in Figure 1, the framework and its pillars are explained here. The proposed Digital Resilience MIS Framework is structured around five interrelated pillars that collectively enable continuity of ICT learning and freelancing capacity during active conflict. Infrastructure resilience ensures the availability of electricity, connectivity, and physical or virtual access points under unstable conditions. Adaptive workflows allow training delivery and operational processes to adjust dynamically in response to disruptions. Information-flow and monitoring systems support real-time decision-making through continuous tracking of participation, performance, and system status. Human-centred support addresses psychosocial well-being and motivation as integral components of system effectiveness. Finally, organizational coordination aligns institutional actors, resources, and responses to maintain functional coherence across all framework components. These pillars reflect the combined requirements for delivering ICT learning in environments where instability is persistent, not exceptional. To clarify the role of each pillar within the overall system, Table 3 summarizes the core function and operational implications of each element.

3.2. *Pillar Descriptions*

3.2.1. Infrastructure Resilience

This pillar focuses on ensuring that training hubs remain functional despite power cuts, connectivity failures, or physical risks. It includes redundant electricity sources, multiple internet providers, safe training spaces, and access to required devices and software. These elements form the foundational layer that supports all other operations.

Figure 1. Digital Resilience MIS Framework for ICT Learning Continuity. The framework integrates five interdependent MIS pillars derived from empirical evidence across the two Gaza case studies.

Table 3. Overview of the Five MIS Resilience Pillars

Pillar	Primary Function	Operational Implication
Infrastructure resilience	Maintain essential physical and digital resources	Enables uninterrupted training sessions
Adaptive workflows	Adjust instruction to sudden disruptions	Preserves learning flow and reduces cancellations
Information-flow and monitoring	Track progress, attendance, and challenges	Supports rapid decision-making
Human-centred support	Address emotional stress and learner well-being	Sustains engagement and reduces dropout
Organizational coordination	Align teams and resources efficiently	Ensures cohesive, timely responses to instability

3.2.2. Adaptive Workflows

Adaptive workflows allow programs to continue even when external conditions shift abruptly. Examples include modular content that can be paused and resumed, flexible schedules, alternative delivery modes, and offline learning tasks. These adaptations prevent learning gaps and enable consistent progress.

3.2.3. Information-Flow and Monitoring Systems

Reliable information channels support coordinated decision-making. Attendance logs, weekly reports, KPI tracking, and structured communication ensure visibility across teams. These tools help instructors and managers detect challenges early and respond quickly.

3.2.4. *Human-Centred Support*

Conflict imposes emotional and psychological burdens that affect learning capacity. Integrating psychosocial support, flexible expectations, and clear communication helps maintain learner motivation, participation, and focus.

3.2.5. Organizational Coordination

Clear roles, coordinated workflows, and rapid decision cycles ensure the entire system responds cohesively. Effective coordination allows infrastructure, instruction, and support systems to function as an integrated resilience mechanism rather than isolated components.

3.3. Framework Logic

The pillars reinforce one another: infrastructure stability enables adaptive instruction; adaptive workflows rely on accurate information flow; psychosocial support strengthens learner engagement; and organizational coordination binds all elements into a functional whole. This interconnected design allows ICT learning ecosystems to withstand instability and continue preparing learners for digital employment even during conflict.

4. Methodology

This study uses a qualitative case-study approach (Yin, 2018) to examine how ICT learning can be restored and sustained during active conflict. Such an approach is appropriate for environments where variables cannot be controlled and where real-time operational evidence provides the most accurate understanding of system behaviour (Bowen, 2009; Myers & Newman, 2007; Walsham, 1995).

4.1. Research Design

The analysis focuses on two ICT capacity-building case studies implemented in Gaza during the 2025 war; the two studies were implemented by TAQAT Gaza initiative (TAQAT, 2025a, 2025b) and funded by UNFPA (United Nations Population Fund, 2025a, 2025b; Palestine, 2025). These cases were selected because they operated continuously throughout the conflict and relied heavily on MIS-driven planning, monitoring, and coordination. Observing their real-time adjustments offers meaningful insight into how digital-learning systems function when disruptions are ongoing rather than episodic.

4.2. Data Sources

The study draws exclusively on program-generated documentation, including:

- Training schedules and operational plans
- Attendance and progress logs
- Weekly monitoring reports
- Trainer and coordinator notes
- KPI tracking sheets
- Resource allocation records

These documents were created as part of routine operations, ensuring accuracy and providing a comprehensive view of how each program responded to instability (United Nations Population Fund, 2025a, 2025b; El-Shiekh, personal communication, 2025; TAQAT, 2025a, 2025b). Complete internal documentation (weekly reports, KPIs, attendance logs, training schedules, and operational plans) is archived at the TAQAT Business Development Department and can be provided to the Editor upon request (El-Shiekh, personal communication, 2025). In addition, key operational practices and monitoring mechanisms described in this study were confirmed through a semi-structured interview with a senior Business Development and Human Resources representative at TAQAT Gaza (El-Shiekh, personal communication, 2025).

4.3. Case Selection Criteria

The two programs meet three criteria essential for validating the proposed MIS framework:

- Operation during active conflict, not post-crisis recovery.
- Clear reliance on MIS structures, including monitoring, scheduling, and coordination.
- Availability of complete documentation to analyse processes and outcomes reliably.

Their differing participant groups; adolescents and university students; also offer complementary perspectives on resilience across training levels.

4.4. Analytical Approach

A thematic analysis (Bowen, 2009; Myers & Newman, 2007) was used to identify how the five framework pillars appeared in practice. The process involved:

- Reviewing documents to understand program flow and recurring challenges
- Coding material into categories aligned with the framework
- Mapping interactions between infrastructure, workflows, monitoring, psychosocial support, and coordination
- Comparing patterns across cases to identify shared resilience mechanisms

This systematic process links empirical observations directly to the conceptual structure of the MIS framework. The analysis followed an iterative coding process in which program documentation was reviewed multiple times to identify recurring operational patterns and challenges. Initial codes were consolidated into higher-level thematic categories reflecting infrastructure resilience, adaptive instructional processes, information flow and monitoring, human-centred psychosocial support, and organizational coordination. These thematic categories were then systematically mapped onto the five pillars of the proposed Digital Resilience MIS Framework. This process ensured close alignment between the empirical evidence and the conceptual structure of the framework.

4.5. Ethical Considerations

Only program-level, non-identifiable documentation was used. No personal or sensitive data was included. All materials were originally produced for internal operational purposes, ensuring alignment with ethical standards for document-based research in crisis environments.

5. Implementation Case Study

This section presents evidence from two ICT training programs implemented in Gaza during the 2025 war (United Nations Population Fund, 2025a, 2025b; TAQAT, 2025a, 2025b). Both programs faced severe disruptions but maintained continuity through the coordinated application of the five MIS resilience pillars. The cases differ in participant profile and program depth, offering complementary insights into how digital learning can function under extreme instability.

5.1. Operational Context

The programs operated in training hubs located in relatively safer areas of the Gaza Strip (TAQAT, 2025b). Each hub relied on:

- Redundant power sources to offset prolonged electricity cuts
- Multiple wireless internet providers to stabilize connectivity
- Prepared learning spaces equipped with essential devices and software
- Flexible scheduling to accommodate security alerts and mobility constraints

These hubs served as the physical and digital foundation upon which learning continuity was built. Despite recurring security risks and displacement events, both hubs remained operational throughout the conflict period (El-Shiekh, personal communication, 2025).

5.2. Case A: ICT and Digital Skills Program for Adolescents

Case A (United Nations Population Fund, 2025a) involved 80 adolescents aged 14–18, many of whom were displaced or living under high stress. The program delivered 48 training hours across eight weeks, covering introductory ICT and creative digital skills such as programming basics, graphic design, illustration, video editing, and digital journalism.

Implementation Approach

The program followed a structured yet flexible workflow:

- Daily coordination led by a hub coordinator
- Modular content that could be paused, resumed, or shifted based on safety conditions
- Hybrid activities, including offline assignments when mobility was restricted
- Psychosocial support sessions to help learners manage stress
- Weekly reporting to ensure oversight and timely adjustments

Key Observations

Despite unstable conditions:

- Attendance remained strong
- Participants completed core modules and final projects
- Engagement improved as psychosocial support reduced anxiety
- Trainers maintained continuity by shifting between instructional modes

Case A demonstrates that structured MIS processes and emotional support can stabilize learning for younger participants even under severe disruption.

5.3. *Case B: ICT Field Training and Freelance-Readiness Program for University Students*

Case B (United Nations Population Fund, 2025b) served 90 university students preparing for digital employment. Over 14 weeks, the program delivered 120 training hours across tracks covering programming, multimedia, and artificial intelligence, complemented by soft skills and freelancing readiness sessions.

Implementation Approach (Benbasat et al., 1987; Bowen, 2009; Yin, 2018)

Operational systems were more complex in this program, reflecting the advanced nature of the training:

- Multi-shift scheduling to manage hall capacity and safety considerations
- A blended model combining instructor-led classes, guided self-learning, and technical clinics
- Weekly KPI tracking and milestone-based project evaluations
- Contingency hybrid sessions for students unable to reach the hub
- Stress-management and motivation sessions integrated into the curriculum

Key Observations

Across all tracks:

- Students maintained consistent attendance despite displacement
- Project quality remained high, showing strong technical progression
- Learners demonstrated readiness for freelancing tasks and interviews
- Monitoring tools helped trainers identify challenges early and adapt instruction

Case B confirms that MIS-driven coordination and adaptive workflows enable advanced ICT programs to operate effectively during conflict.

5.4. Cross-Case Summary

To compare the two programs, Table 4 highlights the application of each MIS resilience pillar across both cases.

Table 4. Application of MIS Resilience Pillars Across the Two Programs

Pillar	Case A (Adolescents)	Case B (University Students)
Infrastructure resilience	Backup power, safe hub, redundant internet	Same, with additional planning for equipment and labs
Adaptive workflows	Modular sessions, offline tasks, flexible scheduling	Hybrid model, multi-shift scheduling, alternative delivery
Monitoring systems	Attendance logs, weekly reports	KPI tracking, milestone reviews, centralized reporting
Human-centred support	Psychosocial sessions; flexible expectations	Stress-management sessions; learner-centred flexibility
Organizational coordination	Coordinator-led daily operations	Advanced scheduling, multi-role coordination, rapid adjustments

5.5. Validation of the MIS Framework

The two cases jointly demonstrate that ICT learning can continue during active conflict when the five pillars of the MIS framework are applied in an integrated manner. Programs maintained attendance, achieved learning outcomes,

and supported participants' emotional well-being despite volatile and unsafe conditions. The consistency of these results across different learner groups strengthens the framework's validity and practical applicability (El-Shiekh, personal communication, 2025).

6. Results and Analysis

The analysis of documentation from both programs shows that learning continuity during conflict emerged from the combined operation of the five MIS resilience pillars. The results highlight how infrastructure readiness, adaptable instructional design, structured monitoring, psychosocial support, and coordinated management collectively sustained ICT learning under extreme instability.

6.1. Infrastructure Resilience

Stable infrastructure enabled both programs to function even when surrounding communities faced severe disruption. Table 5 summarizes the main infrastructure mechanisms and their effects.

Table 5. Infrastructure Factors Supporting Continuity

Mechanism	Observed Function	Effect on Learning
Backup electricity	Maintained power during outages	Allowed uninterrupted sessions and device use
Redundant internet	Multiple wireless providers	Enabled hybrid delivery and communication
Safe training hubs	Secure and prepared locations	Ensured predictable access and attendance

The consistency of these mechanisms across both cases shows that infrastructure resilience forms the essential foundation upon which digital-learning continuity depends.

6.2. *Adaptive Workflows*

Both programs relied on instructional flexibility to absorb sudden disruptions. Table 6 presents the key adaptation patterns.

Table 6. Workflow Adaptations Across Programs

Adaptation	Case A Approach	Case B Approach	Impact
Flexible scheduling	Adjusted to safety conditions	Multi-shift sessions	Reduced cancellations
Modular content	Resumable lessons	Milestone-based modules	Preserved learning flow
Hybrid/alternative tasks	Offline assignments	Blended learning + clinics	Supported continuity despite mobility issues

These adaptations ensured that learning progression could continue even when external conditions shifted unexpectedly.

6.3. Monitoring and Information Flow

Structured monitoring created visibility and stability in an otherwise unpredictable environment. Table 7 highlights the tools used and their benefits.

Table 7. Monitoring Tools and their Contribution

Tool	Purpose	Contribution to Continuity
Attendance logs	Track participation	Enabled targeted support
Weekly reports	Summarize progress and challenges	Supported timely decisions
KPI/milestone tracking	Monitor learning outcomes	Maintained accountability
Communication channels	Coordinate daily operations	Facilitated rapid adjustments

These systems provided the informational backbone that allowed the programs to adapt efficiently.

6.4. Human-Centred Support

Emotional and psychological pressures strongly influenced learner engagement. Table 8 outlines the key support mechanisms.

Table 8. Human Support Mechanisms

Mechanism	Application	Observed Effect
Psychosocial sessions	Group support and coping strategies	Improved focus and emotional stability
Supportive communication	Encouragement and flexibility	Sustained motivation
Adjusted workload	Responsive scheduling	Reduced dropout risk

By integrating these approaches, both programs protected learner engagement during periods of heightened stress.

6.5. Organizational Coordination

Smooth coordination enabled all other pillars to function cohesively.

Table 9. Coordination Mechanisms

Mechanism	Role in Operations	Effect on Resilience
Clear roles	Defined trainer–coordinator–manager responsibilities	Ensured consistent processes
Rapid decision cycles	Quick responses to safety updates	Minimized disruption
Structured resource planning	Device, hall, and schedule management	Created stable learning routines

These coordinated processes allowed the programs to operate as unified systems capable of responding quickly to instability.

6.6. Integrated Interpretation

Across both cases, the results demonstrate that no single intervention ensured continuity; resilience emerged from the interaction of all five pillars. Infrastructure provided stability, adaptive workflows absorbed disruptions, monitoring supported informed adjustments, human-centred support sustained engagement, and organizational coordination unified the system. Together, these mechanisms enabled learners to progress, complete projects, and develop freelancing readiness even during active conflict.

7. Discussion

The findings from the two ICT training programs provide clear evidence that digital learning can continue during active conflict when supported by a coordinated set of MIS resilience mechanisms. The Digital Resilience MIS Framework offers a useful lens for understanding how technological, organizational, and human-centred components interact to maintain stability under extreme disruption. The discussion below reflects on the contribution of each pillar and the implications of their combined function.

Infrastructure resilience emerged as the foundational requirement. Without stable access to electricity, connectivity, and safe learning spaces, no instructional activity could have occurred. The programs' ability to remain operational despite severe infrastructure breakdown elsewhere in the region demonstrates that resilience begins with securing core digital and physical resources. This reinforces the idea that MIS frameworks for fragile contexts must treat infrastructure not merely as a background condition but as an active component of continuity planning.

Equally important was the role of adaptive workflows. In stable environments, instructional design often assumes predictable schedules and reliable mobility. During conflict, these assumptions collapse. The flexibility demonstrated in both programs; through modular curricula, adjustable schedules, hybrid delivery, and fall-back learning tasks; allowed learners to continue progressing despite sudden disruptions. This adaptability transforms instructional design into a resilience mechanism, enabling ICT learning systems to absorb and recover from shocks rather than halt entirely.

Monitoring and information flow contributed another essential layer of stability. Attendance logs, weekly reports, KPI tracking, and coordinated communication channels created visibility across teams and made it possible to respond quickly to challenges. These tools acted as the informational backbone of the programs, ensuring that decision-making remained grounded in accurate and timely data (Madianou, 2019; Ransbotham et al., 2021). This confirms that MIS structures are not merely administrative tools but active enablers of resilience.

Human-centred support played a decisive role in sustaining learner engagement. Conflict-induced stress and displacement have direct effects on concentration, motivation, and retention. By integrating psychosocial sessions,

supportive communication, and flexible expectations, both programs helped learners remain connected to their learning pathways despite emotional strain. This demonstrates that resilience in digital learning is not only technological or procedural; it also requires attention to the social and psychological realities of participants.

Finally, organizational coordination unified all the pillars into a functioning system. Clear roles, consistent workflows, and rapid decision-making allowed teams to manage disruptions efficiently and maintain training continuity. Effective coordination ensured that the infrastructural, instructional, informational, and psychosocial components operated cohesively rather than in isolation.

Taken together, the five pillars illustrate that digital resilience is inherently multi-dimensional. The programs did not rely on one strong component but on the integrated performance of all five. This has two key implications: first, institutions operating in conflict settings must design ICT learning systems with interconnected resilience structures rather than isolated features; second, MIS frameworks intended for fragile environments must account for both technical and human-centred needs.

The experiences observed in Gaza (Line, 2025; Palestine, 2025; TAQAT, 2025a, 2025b; United Nations Population Fund, 2025a, 2025b) demonstrate that, with the right systems in place, meaningful ICT learning and freelancing preparation can continue even during prolonged instability.

From a theoretical perspective, this study advances Management Information Systems scholarship by reframing digital resilience as a continuous operational capability rather than a post-crisis recovery function. Unlike existing MIS and ICT4D models that largely assume episodic disruption or stable institutional conditions, the proposed framework operationalizes resilience under active conflict by integrating infrastructure readiness, adaptive workflows, and real-time information coordination into a single socio-technical system. Importantly, the inclusion of human-centred psychosocial support as a core MIS component extends traditional system boundaries beyond technology and process, demonstrating how emotional and organizational stability directly influence system effectiveness in extreme environments. In doing so, the framework contributes a conflict-aware MIS perspective that is theoretically relevant to resilience, crisis management, and ICT-enabled learning systems.

8. Limitations

This study is based on empirical evidence from ICT training programs implemented in Gaza, an extreme and highly specific conflict context. While this setting offers valuable real-time insight into digital learning under severe disruption, contextual factors may influence how the proposed framework operates in other environments. In addition, the analysis relies on qualitative, document-based data generated through routine program monitoring, which prioritizes operational depth over quantitative measurement. As such, the framework is intended to support analytical and practical transferability to other fragile or crisis-affected settings rather than universal generalization.

9. Conclusion

This study examined how ICT learning and freelance-readiness can be sustained during active conflict through the coordinated application of MIS resilience principles. Using documentation from two ICT training programs implemented during the 2025 Gaza war, the analysis showed that learning continuity depended on five interconnected pillars: resilient infrastructure, adaptable instructional workflows, structured monitoring, human-centred support, and coordinated organizational decision-making. Each pillar contributed a distinct layer of stability, and together they formed an integrated system capable of absorbing disruptions and maintaining instructional quality.

Despite severe instability, both programs preserved attendance, progressed through technical content, and supported participants in completing practical projects. These results demonstrate that meaningful ICT learning is possible in conflict settings when MIS components are intentionally designed to reinforce one another. The proposed Digital Resilience MIS Framework synthesizes these findings into a practical model that institutions and development actors can adopt to protect digital learning pathways in fragile environments.

By highlighting how resilience can be operationalized during ongoing conflict; and not only in post-crisis recovery; the study contributes to MIS scholarship and provides actionable guidance for sustaining ICT learning and freelancing capacity where it is most vulnerable.

From a practical perspective, the Digital Resilience MIS Framework provides actionable guidance for educational institutions, development organizations, and donors operating in fragile and conflict-affected contexts. By

emphasizing coordinated infrastructure planning, adaptive instructional workflows, real-time monitoring, and human-centred support, the framework can inform the design, funding, and evaluation of ICT learning interventions where disruption is persistent rather than exceptional. Future research could extend this work by applying the framework in other conflict-affected or crisis-prone regions, incorporating longitudinal data, or combining qualitative evidence with quantitative performance metrics to further assess scalability, transferability, and long-term impact.

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