Advances in Social Sciences Research Journal – Vol. 12, No. 12
Publication Date: December 13, 2025
DOI:10.14738/assrj.1212.19699.
Sulong, M. S., Abdul-Aziz, A., Bohari, N. M. A. M., Abdullah, R. W., Kasim, A. S., Ahmad, S., & Sanusi, N. M. (2025). Influence of Parental Perception on Students' Willingness to Pursue Vocational Careers: A Synthesis of Literature. *Advances in Social Sciences Research Journal*, *12(12).* 30-38.

A Community Informatics Framework for Enhancing Digital Capability Among Mature Women: A Conceptual Model for the Trefoil Guild Melaka

Muhammad Suhaizan Sulong
Faculty of Information and Communication Technology,
Universiti Teknikal Malaysia Melaka

Azlianor Abdul-Aziz
Faculty of Information and Communication Technology,
Universiti Teknikal Malaysia Melaka

Nor Mas Aina Md Bohari
Faculty of Information and Communication Technology,
Universiti Teknikal Malaysia Melaka

Rosmiza Wahida Abdullah
Faculty of Information and Communication Technology,
Universiti Teknikal Malaysia Melaka

Amir Syarifuddin Kasim
Faculty of Information and Communication Technology,
Universiti Teknikal Malaysia Melaka

Sabrina Ahmad
Faculty of Information and Communication Technology,
Universiti Teknikal Malaysia Melaka

Nurazlina Md. Sanusi
Girl Guides Association of Malaysia, Melaka Branch;

ABSTRACT

Digital capability has become essential for participation in social, civic, and organisational life, yet mature women continue to experience persistent obstacles that inhibit effective digital engagement. Although Malaysia's digital transformation initiatives—such as the Malaysia Digital Economy Blueprint (MyDIGITAL)—have expanded infrastructural access, national-level improvements do not automatically translate into sustained capability among older women. Their digital trajectories are shaped more significantly by learning environments, community expectations, organisational routines, and trust in data use practices than by technology availability alone. Within voluntary organisations such as the Trefoil Guild Melaka, members express interest in using digital tools but face barriers related to unfamiliar interfaces, inconsistent workflows, device limitations, and uncertainty surrounding the sharing, storage, and governance of

community-generated data. Drawing on Digital Capability Theory, Community Informatics (CI), Sociotechnical Systems (STS), and emerging literature on Community Data Governance, this paper proposes a Community Informatics–Based Digital Capability Framework tailored to mature women's learning and participation contexts. This expanded conceptual model explains how social learning environments, sociotechnical alignment, and transparent data practices jointly shape confidence, skill development, digital agency, and sustained organisational participation. The model consolidates theoretical insights, clarifies mechanisms linking community practices to capability outcomes, and offers a foundation for empirical evaluation. Implications for programme design, leadership decisions, and community data stewardship are discussed to support mature women's empowerment in digitally mediated environments.

Keywords: Community Informatics, Mature Women, Digital Capability, Sociotechnical Systems, Data Governance, Trefoil Guild.

INTRODUCTION

Digital participation has become deeply embedded in the routines of contemporary community organisations, yet capability gaps persist among mature women, limiting their ability to participate fully in communication, administration, event coordination, and information sharing. Despite growing national investments in digital infrastructure and literacy programmes, older women continue to encounter barriers involving confidence, access to guided learning, privacy concerns, and limited familiarity with digital devices. Studies have found that older adults' digital participation is shaped not simply by exposure to technology but by a complex interplay of motivation, perceived risks, support structures, cognitive load, and socio-cultural expectations [1, 2]. Malaysia's MyDIGITAL blueprint recognises the need for inclusive digital ecosystems, yet implementation remains disproportionately focused on infrastructural expansion rather than community-level capability building. For mature women in voluntary groups such as the Trefoil Guild Melaka, meaningful digital engagement requires environments that provide reassurance, relational support, culturally aligned learning activities, and clear expectations about data governance.

Existing scholarship identifies two critical gaps. First, digital inclusion research tends to concentrate on individual-level training or macro-level policy interventions, overlooking the meso-level environments where mature women practise and embed new skills. Second, digital capability models often under-theorise the role of sociotechnical alignment and data governance—conditions that significantly influence older adults' readiness to adopt digital routines. Mature women's digital confidence can deteriorate quickly when technological workflows feel inconsistent, socially risky, or inadequately explained. This paper responds to these gaps by integrating four theoretical pillars—Digital Capability Theory, Community Informatics, Sociotechnical Systems, and Community Data Governance—into a conceptual framework that explains how digital capability emerges within community groups comprising mature women. The framework is designed to capture the lived realities of the Trefoil Guild Melaka while contributing generalisable insights for similar organisations.

BACKGROUND & LITERATURE FOUNDATIONS

Digital capability is widely recognised as a multidimensional construct that includes technical skills, confidence, adaptability, information literacy, and awareness of data protection

considerations [3-5]. Contemporary studies emphasise that mature women face persistent challenges, including fear of making mistakes, limited practice opportunities, heightened concern for privacy, and a tendency to defer to younger or more confident users when technological issues arise [1, 6]. These challenges reflect not individual deficits but socio-relational patterns that discourage risk-taking and experimentation. Research consistently shows that older women benefit from learning environments grounded in peer support, repetition, emotional reassurance, and culturally meaningful activities aligned with their lived experiences [7-9].

Community Informatics (CI) provides a robust framework for interpreting these patterns, situating digital engagement within shared norms, collective meaning-making, and group relationships. CI argues that communities are not passive recipients of technology but active agents who adapt technologies to support their social practices [10, 11]. For mature women, CI explains why emotionally safe, relational learning environments are critical enablers of digital confidence. Sociotechnical Systems (STS) theory complements CI by emphasising that successful digital engagement occurs when there is alignment between human capabilities, technological features, organisational structures, and workflow expectations [12]. When tools or processes feel misaligned with user needs, mature women often disengage despite their motivation. Community Data Governance research extends this conversation by demonstrating that older adults evaluate digital participation through questions of safety, fairness, and trust. Responsible stewardship of community-generated data—including photos, contact lists, and documents—is essential for sustained engagement [13, 14].

Together, these literatures suggest that digital capability emerges through layered social, technical, and governance conditions. However, existing studies seldom integrate these layers into a unified conceptual structure. This paper advances such integration.

INTEGRATION OF THEORETICAL DOMAINS

To integrate the diverse insights from digital capability scholarship, Community Informatics, Sociotechnical Systems thinking, and emerging work on data governance, this section synthesises the four theoretical strands into a coherent analytic foundation for the proposed framework. While the previous section reviewed each strand independently, the purpose here is to clarify how they collectively explain the processes through which mature women in community organisations develop digital confidence, competence, agency, and trust. Each theoretical domain contributes a distinct dimension: digital capability identifies the individual attributes involved; CI explains the relational and cultural environments in which these attributes are nurtured; STS highlights the importance of alignment between users, tools, and organisational routines; and community data governance establishes the ethical and procedural safeguards that support sustained participation. Together, these domains form a multidimensional lens through which digital capability can be understood not merely as an individual skill set, but as an emergent process shaped by social, technical, and governance conditions.

Digital Capability Theory

Digital Capability Theory provides the foundational vocabulary for understanding the individual-level attributes that shape how mature women engage with digital technologies. It conceptualises capability as a composite of competencies, confidence, adaptability, motivation,

and awareness of data practices [3, 4]. Studies emphasise that capability is not simply a technical or cognitive achievement but an evolving personal disposition shaped by emotional readiness and repeated exposure to supported practice [1, 7]. Among mature women, digital capability is strongly influenced by anxiety about making mistakes, perceived social judgement, and previous negative encounters with technology. These emotional and social factors can suppress motivation and reinforce avoidance behaviours, making structured community-based learning environments crucial for supporting capability growth. Thus, Digital Capability Theory clarifies what attributes individuals must develop, while the remaining domains explain how these attributes emerge in community settings.

Community Informatics

Community Informatics (CI) expands the lens beyond the individual, situating digital learning within social networks, community structures, and shared cultural practices. CI posits that communities actively appropriate technologies to support their own social goals, and that digital participation is shaped by relational dynamics such as trust, support, and collective meaning-making [10, 11]. CI literature has consistently shown that older adults learn most effectively through peer interaction, guided practice, and emotionally safe environments where learning can occur informally and incrementally [7, 8]. For mature women in the Trefoil Guild Melaka, CI explains why digital experiences are deeply embedded in social identity, organisational rituals, and the values of sisterhood and mutual support. CI therefore functions as the "social enablement layer," showing that capability development for mature women is fundamentally relational rather than individualistic.

Sociotechnical Systems Theory

Sociotechnical Systems (STS) Theory provides further explanatory power by highlighting the need for alignment between people, technologies, workflows, and organisational routines. STS research demonstrates that digital engagement is not solely dependent on user ability but on how well technological systems match users' expectations, capacities, and preferred ways of working [12]. Misalignment—such as confusing interfaces, inconsistent instructions, or fragmented workflows—can significantly undermine confidence among mature women, even when motivation is high. Studies evaluating older adults' technology adoption emphasise that stability, predictability, and simplicity in digital processes reduce anxiety and support sustained use [7]. In community organisations, these sociotechnical factors become even more salient because workflows often depend on volunteers, shared responsibilities, and informal routines. STS thus contributes the "technical and organisational alignment layer" of the model, demonstrating that capability is strengthened when tools and processes are tuned to the realities of mature women's learning preferences and cognitive load.

Community Data Governance

Community Data Governance introduces an ethical and procedural dimension essential to understanding digital participation among mature women. Research consistently shows that older adults are more sensitive to issues of privacy, surveillance, data misuse, and consent [6, 13]. In community organisations such as the Trefoil Guild, concerns around photo sharing, access to member directories, and uncertainty about who controls the digital archive often inhibit participation. Data governance frameworks emphasise fairness, transparency, data rights, role-based access, and continuity practices to prevent information loss during leadership transitions [14]. When governance is unclear, capability development stalls because

members do not feel safe experimenting or contributing content. For this reason, governance forms the "trust layer" of the conceptual model, ensuring that mature women feel secure and respected in digital environments.

The Combined Lens

Together, these four domains create a robust theoretical foundation for understanding how digital capability emerges in mature women's community groups. Digital Capability Theory identifies the personal attributes required for participation. CI explains the social processes through which these attributes develop. STS clarifies how alignment between technology and workflow influences confidence and adoption. Data Governance ensures that digital participation is underpinned by trust, fairness, and continuity. Figure 1, visualises this integration by showing how the four domains converge to create a unified conceptual lens. By combining individual, relational, technological, and ethical dimensions, the integrated framework offers a holistic explanation of why digital capability among mature women is unevenly distributed and how community organisations can actively shape more inclusive outcomes.

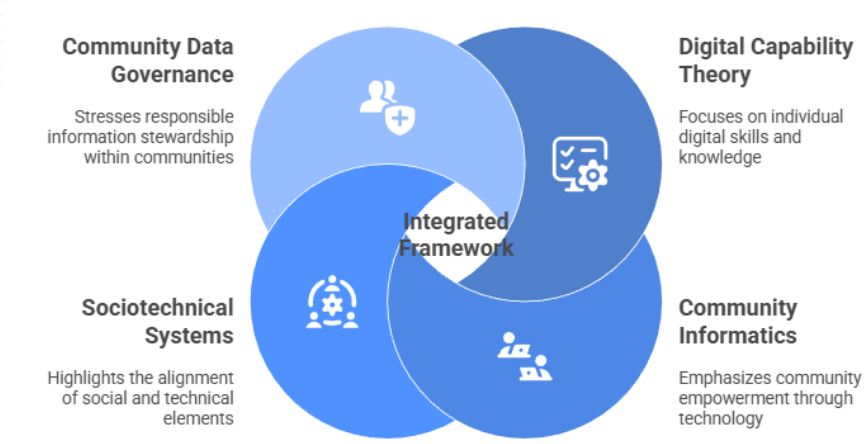

Figure 1: Relationship Between the Four Theoretical Domains

THE CONCEPTUAL MODEL

The proposed Community Informatics–Based Digital Capability Framework synthesises the four theoretical domains into a coherent, layered structure illustrating how mature women develop and sustain digital capability within community environments. The model positions Community Informatics as the social foundation through which peer learning, collective problem-solving, and culturally meaningful activities cultivate emotional readiness and shared motivation. This base layer reflects empirical findings showing that mature women learn best in relational settings where they can observe peers, repeat tasks without judgement, and draw confidence from group solidarity [7, 8]. CI thus generates the social scaffolding necessary for capability to emerge.

Building upon this foundation, Sociotechnical Alignment forms the second layer, emphasising that digital engagement depends heavily on tools and workflows that align with user competencies and organisational routines. For mature women, the complexity of interfaces, unpredictability of processes, and inconsistencies in organisational expectations can create cognitive friction that undermines confidence. STS principles suggest that capability grows

when systems are simplified, workflows stabilised, and digital tools chosen deliberately to match user familiarity and cultural preferences [12]. This alignment is particularly important in voluntary groups like the Trefoil Guild Melaka, where members rely on mutual reinforcement and shared memory rather than formal training.

The third layer, Community Data Governance, provides the ethical and procedural structure that ensures trust in digital participation. Mature women's perceptions of digital environments are strongly influenced by concerns over privacy, fairness, consent, and the safety of shared materials [6]. Without clear governance rules, members may hesitate to contribute digital content or engage consistently in administrative tasks. Transparent governance practices—such as explicit permission for photo use, centralised document storage, role-based access, and continuity planning—help stabilise engagement by reducing uncertainty and demonstrating organisational accountability [13, 14]. When governance is well-established, group members feel more secure, which strengthens confidence and encourages deeper participation.

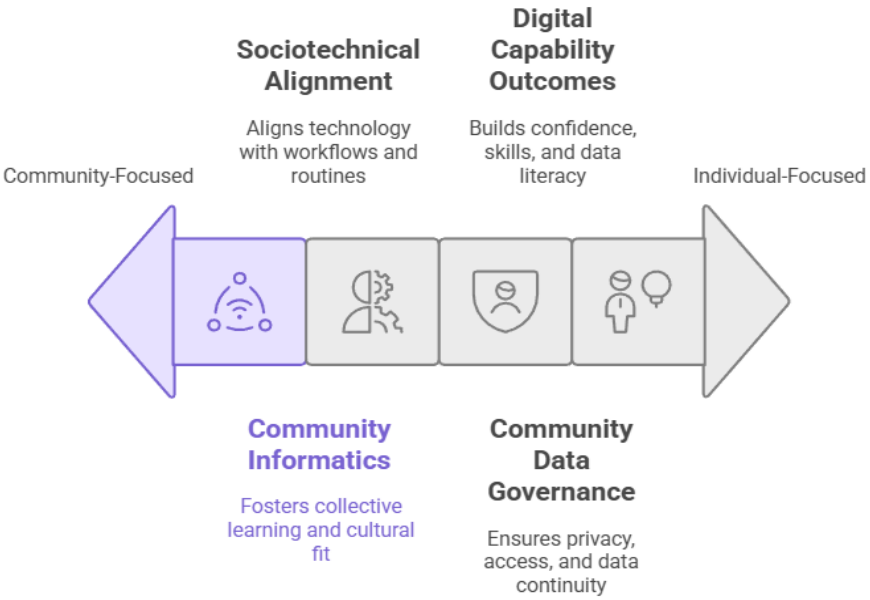

Figure 2: Conceptual Model Community-Individual Focused

These three enabling layers converge to shape the outcome layer: digital capability. In this framework (see Figure 2), capability emerges not merely from individual skill acquisition but from supportive social environments, aligned technological systems, and transparent data-handling practices. Digital capability thus includes increased confidence, operational competence, adaptability, digital agency, and awareness of data ethics. The interaction of these layers creates a feedback loop: as capability grows, members participate more actively in community activities, which further reinforces social support and strengthens organisational processes.

To provide greater conceptual clarity, the model's internal logic—connecting inputs, processes, and outcomes—is summarised in Table 1. This table supports the visual model by explaining how each layer operates and interacts to produce capability gains among mature women.

Table 1: Inputs, Processes, and Outcomes of the Conceptual Model.

Component	Description	Examples Relevant to Trefoil Guild
Inputs	Social, technical, organisational, and governance prerequisites	Peer mentors; WhatsApp groups; meeting routines; consent protocols
Community Learning Processes	Peer-supported, relational learning	Shared practice sessions; demonstration-based learning
STS Alignment Processes	Ensuring usability, predictable workflows	Clear folders; simplified event registration
Governance Processes	Establishing clear data rules	Photo permissions; centralised digital archive
Individual Outcomes	Confidence, skill, adaptability	Sending files; managing group media
Community Outcomes	Shared norms; reduced dependency	Distributed digital responsibilities
Organisational Outcomes	Continuity, transparency	Digitised records; role clarity

Through these interacting elements, the model offers a structured explanation for how digital capability becomes embedded within mature women's organisational participation. Importantly, it emphasises that capability is not a static condition but an evolving process shaped by continuous negotiation between social expectations, technological environments, and governance practices. This conceptualisation sets the groundwork for future empirical evaluation in community contexts and provides a practical schema for designing interventions tailored to mature women's specific learning preferences and organisational settings.

IMPLICATIONS

The framework carries several significant implications for theory, practice, and policy. Theoretically, it advances digital inclusion scholarship by positioning digital capability as a system-level phenomenon shaped by multi-layered interactions rather than by discrete, individual-level training experiences. Existing models often emphasise skills or access independently, but this integrative framework demonstrates that capability among mature women depends on relational ecosystems, sociotechnical fit, and transparent governance. It thus offers a more holistic and actionable conceptualisation of digital capability—one that aligns with emerging calls for multidimensional digital inclusion frameworks that include emotional, ethical, and organisational dimensions [7, 13].

Practically, the framework provides community leaders with a set of organising principles for designing effective digital initiatives. First, leaders can harness the strengths of Community Informatics by cultivating learning environments rooted in collective participation and cultural relevance. This could involve creating peer mentoring roles, embedding digital tasks within routine activities, or scheduling collaborative practice sessions during regular meetings. Second, applying STS principles means selecting digital tools that are accessible and age-friendly, standardising workflows to reduce confusion, and fostering a predictable rhythm in communication and administrative tasks. These actions help reduce cognitive load, support skill retention, and build organisational coherence. Third, implementing clear and consistent data governance policies enhances trust and reduces anxiety. This includes developing consent procedures for photo sharing, defining access rights for digital archives, and documenting procedures for leadership transitions. Such governance practices strengthen institutional

memory and reduce dependence on a single technologically adept individual, promoting resilience and sustainability within the organisation.

Policy implications emerge from recognising that community organisations are important intermediaries in the digital inclusion landscape. National strategies often overlook the unique needs of mature women and the role community groups play in sustaining digital engagement. Policymakers could support these groups by developing age-sensitive teaching templates, offering micro-grants for community-based digital programmes, and producing simplified governance toolkits with step-by-step guidance on ethical data practices. Aligning national strategies with community-led models would enhance digital participation among mature women and strengthen local organisations' capacity to navigate technological change [15].

LIMITATIONS AND CONCLUSION

This paper is conceptual and therefore limited by its absence of empirical validation. Although grounded in a robust body of literature, the framework remains theoretical, and its applicability to diverse contexts has yet to be tested. Its cultural grounding in mature Malaysian women offers contextual relevance but restricts generalisability to other demographic groups or organisational forms. Future research could empirically assess the relationships proposed in the model by conducting case studies, surveys, or mixed-method evaluations across different community settings. Such research would help refine the model's constructs, reveal additional contextual nuances, and assess its utility for guiding interventions.

Despite these limitations, the Community Informatics–Based Digital Capability Framework offers a valuable contribution to digital inclusion scholarship by articulating a holistic, multi-layered understanding of how digital capability emerges and is sustained among mature women in community organisations. By integrating insights from CI, STS, digital capability theory, and data governance, the model explains capability as a socially embedded, technologically supported, and ethically grounded process. For the Trefoil Guild Melaka and similar voluntary groups, the framework provides a practical roadmap for designing inclusive digital learning environments that empower mature women to participate confidently in digital tasks, contribute to organisational continuity, and engage more fully in community life. As digital transformation continues to reshape social participation, such frameworks will be essential for ensuring no demographic group—especially mature women—is left behind.

Acknowledgement

The authors wish to acknowledge the support of Universiti Teknikal Malaysia Melaka.

References

[1]. Kebede, A. S., Ozolins, L.-L., Holst, H., & Galvin, K. (2022). Digital engagement of older adults: A scoping review. JMIR, 24(12).

[2]. Yang, H., et al. (2022). Digital inclusion among older adults. Frontiers in Public Health, 10.

[3]. Vercruyssen, A. (2023). How "basic" is basic digital literacy for older adults? Rethinking skills and learning contexts. Frontiers in Education, 8.

[4]. Pejić Bach, M., & Čelan, M. (2025). Exploring the relationship between digital competency and life satisfaction among older adults. Gerontology & Geriatric Medicine, 11.

[5]. Kacar, Y., & De Luca, G. (2023). Digital inclusion for a good digital society: Leveraging the digital divide. The British Academy.

[6]. An, J., Wan, K., Xiang, Z., Zhu, X., An, J., & Yang, Y. (2025). Effects of privacy concerns on older adults' discontinuous usage intention. Frontiers in Public Health, 13.

[7]. Lu, S. Y., et al. (2024). Older adults' perceptions of community-based digital interventions. JMIR Aging, 7.

[8]. Miller, L.-M., et al. (2024). Digital literacy training for low-income older adults through community engaged learning. JMIR Aging, 7.

[9]. Pizzul, D., et al. (2024). Peer-education digital literacy course for older adults. Frontiers in Sociology, 9.

[10]. McIver, W. J. (2004). Communicating in the information society. UNDP WSIS Report.

[11]. Gurstein, M. (2007). What is community informatics? Community Development Journal, 42(3), 391–404.

[12]. Kronlid, D. O., Bengtsson, S., Eckartz, A., & Elbe, S. (2024). Sociotechnical dimensions of digital systems. Technology in Society, 78.

[13]. Demeke, M. M., Worku, M., & Fante-Coleman, T. (2024). Existing models of community governance of health data. Wellesley Institute.

[14]. Ada Lovelace Institute. (2024). Participatory and inclusive data stewardship.

[15]. Calac, A. J., et al. (2025). Responsible stewardship of research data in community settings. Journal of Empirical Research on Human Research Ethics, 20(3), 245–262.