Chapter 47
MyDiPoRed: A Transformative Model for Reducing Digital Poverty in B40 Communities

Fadhilah Mat Yamin[1*], Wan Hussain Wan Ishak[2], NurSyazwani Mohd. Nawi[1], Hapini Awang[2] & Md. Tajudin Haji Morad[3]

[1]School of Technology Management & Logistics, Universiti Utara Malaysia, Sintok, Kedah
[2]School of Computing, Universiti Utara Malaysia, Sintok, Kedah
[3]Kedah State Education Department, Kedah

fmy@uum.edu.my

ABSTRACT
Digital poverty has emerged as a critical barrier to equitable education, particularly among B40 communities in rural areas. While numerous initiatives have focused on distributing devices and internet access, many fail to produce sustainable impact due to the absence of structured monitoring, skills development, and social support mechanisms. This innovation addresses the persistent gap between digital aid provision and meaningful digital participation. This study introduces MyDiPoRed (Malaysia Digital Poverty Reduction), a holistic and evidence-based model designed to analyse, measure, and reduce digital poverty in educational contexts. Grounded in qualitative field research involving rural students and institutional stakeholders, the model identifies digital poverty as a multidimensional issue shaped by four interrelated factors: physical access, digital knowledge, social support, and economic capacity. The novelty of MyDiPoRed lies in its shift from a distribution-centric approach to a transformative empowerment framework. The model integrates three strategic components: Approach, Solution, and Monitoring. This to guide stakeholders in designing targeted interventions, tracking utilisation of digital assistance, and evaluating long-term impact on learning continuity. Unlike existing ad-hoc aid mechanisms, MyDiPoRed functions both as a diagnostic tool and a decision-support model for policy makers, educators, and social agencies. From a societal perspective, MyDiPoRed contributes to inclusive education by ensuring that digital support initiatives are effective, accountable, and sustainable. By strengthening digital capability rather than merely providing access, the model empowers B40 learners to participate meaningfully in digital education and helps break the cycle of intergenerational digital poverty.

Keywords: Digital poverty, Inclusive education, B40 communities, Digital equity model, Transformative empowerment.

1. INTRODUCTION

Digital technologies have become fundamental to contemporary education, workforce participation, and social inclusion. In Malaysia, the integration of digital platforms into teaching and learning—particularly following the COVID-19 pandemic—has intensified

reliance on online systems across all educational levels. While this transformation has expanded learning opportunities, it has also magnified disparities among learners from different socio-economic backgrounds. Empirical evidence shows that students from B40 households continue to face significant challenges in sustaining participation in digital education, resulting in unequal learning outcomes and prolonged educational disadvantage (Ibrahim & Othman, 2022; Shahren et al., 2021; Lee & Meri, 2021).

Despite extensive initiatives aimed at improving connectivity, device ownership, and e-learning readiness, digital inequality remains persistent. This persistence indicates that digital poverty cannot be addressed solely through infrastructure provision or short-term assistance. Prior studies consistently demonstrate that digital poverty is multidimensional, shaped by limited digital literacy, inadequate skills, economic constraints, and weak social or institutional support (Barrantes, 2007; Barrantes, 2008; Leung, 2014). In educational contexts, these constraints manifest as low confidence in using digital platforms, fragmented engagement in online learning, and reduced ability to benefit from digital resources, even when access is available (Abd Razak & Mohd Rusli, 2022; Sabariah et al., 2021).

These realities highlight a critical disconnect between digital provision and meaningful digital participation. Many interventions continue to rely on assumed indicators such as access or device distribution, with limited attention to how digital technologies are actually used, sustained, and supported within communities. Addressing this gap requires an evidence-based understanding of digital poverty grounded in real experiences. Accordingly, the primary objective of this study is to identify real digital poverty factors experienced by B40 communities and translate these findings into a practical and transformative digital poverty reduction model. Guided by this objective, the study proposes MyDiPoRed, a structured framework designed to inform targeted interventions, enhance digital capability, and support sustainable educational inclusion.

2. LITERATURE REVIEW

Early scholarship on digital inequality conceptualised the problem primarily as a digital divide centred on access to information and communication technologies. However, this perspective has evolved significantly. Barrantes (2007) introduced the concept of digital poverty, emphasising that access alone is insufficient to enable meaningful digital participation. This was further elaborated by Barrantes (2008), who proposed an analytical framework that situates digital poverty within broader socio-economic and capability contexts. These foundational works reposition digital poverty as a structural and multidimensional condition, providing a theoretical basis for examining factors beyond infrastructure availability.

Subsequent international studies reinforce this multidimensional understanding. Research in South Africa demonstrates that disparities in skills, education, and socio-economic status continue to shape digital exclusion despite improvements in access (Bornman, 2016). Similarly, Leung (2014) highlights how affordability and sustained access remain critical barriers among minority and low-income groups. More recent sector-specific research further illustrates that digital poverty extends into professional domains, where limited digital capability constrains productivity and practice, as observed in the construction and quantity surveying sectors (Michael et al., 2025). These findings suggest that digital poverty is not confined to education but reflects broader systemic inequalities.

In Malaysia and the wider Southeast Asian region, digital poverty has been extensively examined within educational settings. Studies consistently report that students in rural and low-income communities experience lower levels of digital literacy and face significant barriers to effective technology use (Mohamed et al., 2012; Lee & Meri, 2021).

During the pandemic, these challenges intensified, with online learning exposing gaps in readiness, skills, and household support (Ibrahim & Othman, 2022; Abd Razak & Mohd Rusli, 2022). Research also indicates that digital constraints negatively affect academic engagement and well-being among both students and academic staff (Sabariah et al., 2021; Shahren et al., 2021).

Recent studies further emphasise the importance of digital literacy development and social support across educational transitions. Research on university entrants reveals persistent gaps in digital literacy, even among computing students, highlighting mismatches between assumed and actual competencies (Liebenberg, 2025a; Liebenberg, 2025b). Teachers likewise report systemic barriers that hinder the effective integration of digital tools, including limited training and institutional support (Sağ & Semerci, 2024). At the population level, multilevel analyses demonstrate that digital poverty is influenced by intertwined individual, household, and regional factors (Shabihah & de Misga, 2025). While studies on technology acceptance show generally positive attitudes toward digital tools (Ishak & Yamin, 2020; Yamin et al., 2023), acceptance alone does not translate into sustained or effective use. Collectively, the literature reveals a clear gap: the absence of holistic, evidence-based models that translate real digital poverty experiences into structured, monitored, and transformative interventions—an issue this study addresses through the development of MyDiPoRed.

3. METHODOLOGY

This study adopts a qualitative research approach to capture an in-depth and context-sensitive understanding of digital poverty as experienced by B40 communities. Qualitative inquiry is particularly appropriate for exploring lived experiences, perceptions, and constraints that are often overlooked by access-based quantitative indicators. The study focuses on students from rural and underserved schools within B40 households, as they represent a population most affected by digital inequality in educational settings. In-depth interviews were conducted to explore participants' real challenges in accessing digital resources, developing digital skills, sustaining online learning participation, and receiving adequate social or institutional support.

Data collection was carried out through semi-structured interviews, allowing participants to articulate their experiences freely while ensuring consistency across key inquiry areas. Interview questions were designed to elicit detailed accounts of digital access conditions, patterns of technology use, learning difficulties, economic constraints, and support mechanisms at home and school. This approach enabled the study to move beyond assumed indicators of digital poverty, such as device ownership, and instead identify the actual factors that shape meaningful digital participation among B40 learners. Interviews were conducted until thematic saturation was achieved, ensuring that the identified issues reflected recurring and substantive patterns rather than isolated cases.

The interview data were analysed using thematic analysis, following a systematic process of transcription, coding, categorisation, and theme development. Initial codes were derived inductively from participants' narratives and subsequently grouped into higher-level categories representing core digital poverty factors. These empirically grounded factors formed the analytical basis for constructing the MyDiPoRed model. Rather than remaining at a descriptive level, the findings were translated into a structured model comprising actionable components for intervention design, solution implementation, and monitoring. In this way, the methodology directly supports the study objective by transforming real-world qualitative insights into a practical and transformative digital poverty reduction framework.

4. FINDINGS OF THE STUDY

Finding 1: Real Digital Poverty Factors Experienced by B40 Communities

Analysis of the interview data reveals that digital poverty among B40 communities is shaped by four interrelated factors—knowledge, skills, economic, and social—rather than by access alone. Participants consistently demonstrated limited digital knowledge, including inadequate understanding of online learning platforms, digital systems, and safe internet practices. This lack of foundational knowledge restricted their ability to navigate digital environments independently and limited their capacity to benefit fully from available digital resources. In parallel, deficiencies in digital skills were evident, particularly in the use of productivity tools, learning management systems, and online communication technologies. These skill gaps reduced participants' confidence and led to passive or minimal engagement in digital learning activities, reinforcing dependency on external assistance.

Economic constraints further intensified digital exclusion by undermining the sustainability of digital access. Many participants reported reliance on shared devices within households, limited ownership of personal devices, and inconsistent internet connectivity due to insufficient or unstable data plans. These conditions disrupted learning continuity and contributed to irregular participation in online educational activities. Beyond economic limitations, social factors emerged as a critical yet often overlooked dimension of digital poverty. Limited parental guidance, absence of digitally competent role models, and weak community-level digital support systems constrained learners' ability to seek help, practise digital skills, and develop positive digital learning habits. Collectively, these findings confirm that digital poverty is a lived, multidimensional condition shaped by intersecting structural and social realities. Importantly, they directly address the study objective by identifying real, experience-based digital poverty factors rather than assumed or proxy indicators.

Finding 2: Development of the MyDiPoRed Transformative Model

Grounded in the empirically identified digital poverty factors, the study translates these findings into the MyDiPoRed model, a holistic and cyclical framework designed to support sustainable digital poverty reduction. The model integrates economic, physical, social, and knowledge dimensions within a continuous improvement structure, recognising that effective digital inclusion requires coordinated and adaptive interventions. The outer framework of MyDiPoRed reflects the contextual conditions that shape digital poverty, emphasising that affordability, infrastructure quality, social support systems, and digital literacy are interdependent and must be addressed collectively rather than in isolation.

The model operationalises these dimensions through three interconnected stages: approach, solution, and monitoring. The approach stage prioritises evidence-based diagnosis by systematically analysing actual digital conditions, usage patterns, and root causes within the community. This ensures that interventions are grounded in real needs rather than assumptions, directly responding to the study objective of identifying authentic digital poverty experiences. The solution stage translates diagnostic findings into targeted and integrated actions, including appropriate technological assistance, infrastructure support, and skills development initiatives aimed at transforming access into meaningful digital capability. Finally, the monitoring stage embeds sustainability through continuous and periodic evaluation of usage, engagement, and outcomes, enabling adaptive refinement of interventions over time. Together, these stages position MyDiPoRed as both a diagnostic and decision-support model, bridging the gap between empirical

understanding and practical action, and fulfilling the study's objective of developing a transformative digital poverty reduction framework.

5. CONCLUSION

This study addresses digital poverty as a persistent and structural challenge affecting B40 communities, particularly in educational contexts where digital participation has become indispensable. The findings affirm that digital poverty is not a singular issue of access, but a complex condition shaped by interconnected knowledge, skills, economic, and social factors. These factors collectively influence not only whether individuals can connect to digital technologies, but whether they are able to use them meaningfully, confidently, and consistently to support learning and personal development. As such, digital poverty must be understood through the lived experiences of affected communities rather than inferred from surface-level indicators.

Building on these insights, the study advances *MyDiPoRed* as a transformative model that bridges empirical understanding and practical intervention. By embedding real community experiences into its design, the model moves beyond distribution-oriented responses and provides a structured mechanism for diagnosing digital poverty, designing targeted solutions, and sustaining impact through continuous monitoring. The integration of contextual dimensions with a cyclical intervention framework enables stakeholders to respond adaptively to changing needs while maintaining accountability and long-term effectiveness.

From a broader perspective, *MyDiPoRed* contributes to efforts aimed at reducing educational inequality and promoting inclusive digital participation among B40 learners. The model offers policy makers, educators, and social agencies a practical decision-support tool that emphasises capability development, responsible resource utilisation, and sustainability. By strengthening digital readiness rather than merely expanding access, the model supports meaningful engagement in digital education and contributes to breaking the cycle of intergenerational digital poverty. Ultimately, this study demonstrates that effective digital poverty reduction requires evidence-based models grounded in real experiences and translated into actionable, monitored, and sustainable interventions.

ACKNOWLEDGEMENT

This research was funded by the Ministry of Higher Education Malaysia through the Fundamental Research Grant Scheme (FRGS) (FRGS/1/2022/SS107/UUM/02/6).

REFERENCES

Abd-Razak, R. H., & Mohd-Rusli, N. F. (2022). Pembelajaran secara dalam talian: Tahap kesediaan dan keberkesanan pelaksanaannya kepada pelajar. *LSP International Journal, 9*(1), 31–43. https://doi.org/10.11113/lspi.v9.18174

Barrantes, R. (2007). *Digital poverty: Concept and measurement, with an application to Peru* (Working Paper No. 337). Institute of Peruvian Studies.

Barrantes, R. (2008). *Digital poverty: An analytical framework*. Paper presented at the 17th Biennial Conference of the International Telecommunications Society, Montreal, Canada.

Bornman, E. (2016). Information society and digital divide in South Africa: Results of longitudinal surveys. *Information, Communication & Society, 19*(2), 264–278. https://doi.org/10.1080/1369118X.2015.1065285

Ibrahim, N. S., & Othman, N. (2022). Faktor kemiskinan digital dalam kalangan pelajar terhadap prestasi belajar ketika pandemik COVID-19. *Malaysian Journal of Social Sciences and Humanities, 7*(8), e001653. https://doi.org/10.47405/mjssh.v7i8.1653

Ishak, W. H. W., & Yamin, F. M. (2020). Student acceptance on game to support teaching & learning. *International Journal of Advanced Trends in Computer Science & Engineering, 9*(3), 2517–2521.

Lee, K. T., & Meri, A. (2021). Kemiskinan digital: Cabaran pengajaran dan pembelajaran di rumah (PdPR) pelajar sekolah menengah di Kota Belud. *Journal of Communication Education, 1*, 46–61.

Leung, L. (2014). Availability, access and affordability across the digital divide: Common experiences amongst minority groups. *Australian Journal of Telecommunications and the Digital Economy, 2*(2), X.1–X.15.

Liebenberg, J. (2025a). Digital literacy: Self-evaluations by computing students entering university. In *Cultivating digital skills for global relevance* (pp. 365–377). Springer. https://doi.org/10.1007/978-981-95-0687-3_25

Liebenberg, J. (2025b). From school to university: Assessing digital literacy gaps for first-year computer science students. In *Software engineering: Emerging trends and practices in system development* (pp. 449–459). Springer. https://doi.org/10.1007/978-3-032-04581-2_32

Michael, I. S., Akinradewo, O. F., & Adegbembo, T. F. (2025). Digital poverty in quantity surveying practice. *Building Engineering, 3*(2), 2105. https://doi.org/10.59400/be2105

Mohamed, H., Judi, H. M., Noor, S. F. M., & Yusof, Z. M. (2012). Jurang digital dan pendidikan di luar bandar: Tahap literasi teknologi maklumat dan komunikasi pelajar. *Asia-Pacific Journal of Information Technology and Multimedia, 1*(2), 1–13. https://doi.org/10.17576/apjitm-2012-0102-01

Sabariah, K. Y., Ahmad, M., Shah, J. M., Foo, J., Daud, R., Hafizi, M., & Seng, L. T. (2021). Penggunaan e-pembelajaran dan kesannya terhadap kesejahteraan kakitangan akademik di institusi pengajian tinggi di Sabah. *Malaysian Journal of Social Sciences and Humanities, 6*(4), 108–116. https://doi.org/10.47405/mjssh.v6i4.761

Sağ, M., & Semerci, Ç. (2024). Teachers' views on digital literacy and barriers. *Bartın University Journal of Faculty of Education, 13*(4), 893–909. https://doi.org/10.14686/buefad.1330922

Shabihah, A., & de Misga, N. (2025). Analisis multilevel: Determinan status kemiskinan digital pada penduduk usia 5 tahun ke atas di Provinsi Nusa Tenggara Timur. *Jurnal Statistika Terapan, 5*(2), 87–102. https://doi.org/10.64930/jstar.v5i2.115

Shahren, S., Ardi, N. A. A., & Azizan, I. S. (2021). The challenges of digital poverty in pursuing online distance learning among university students in Malaysia. In *Proceedings of the International Virtual Conference of Public Policy and Social Sciences (iVCPPS 2021)* (pp. 8–11). Universiti Teknologi MARA.

Yamin, F.M., Mustafar, M., Mohamad, M., David, J., Ramli, M. F., Saad, S., & Nawaz, S. S. (2023). Students' acceptance of technological devices for e-learning during COVID-19 pandemic in Malaysian higher education. *Journal of Advanced Research in Applied Sciences and Engineering Technology, 33*(1), 1–9. https://doi.org/10.37934/araset.33.1.19