

## UNDERSTANDING STUDENTS' POSITIONS ALONG DIGITAL POVERTY LEVELS IN RURAL SCHOOLS OF KEDAH

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**Abstract:** *Digital technologies are often framed as instruments for expanding educational access; however, students in rural communities continue to experience uneven digital inclusion. This study examines students' positions across different levels of digital poverty in rural schools in Kedah, Malaysia. Adopting a qualitative research design, data were collected through semi-structured interviews with 55 students from six primary schools and three secondary schools in Sik, Baling, and Pulau Tuba (Langkawi), and analysed using thematic analysis. The findings indicate that students' digital experiences are shaped by four interrelated dimensions: physical access, economic capacity, digital knowledge, and social support. Guided by Barrantes' digital poverty framework, students were categorised into four levels of digital poverty, with the majority concentrated in the lower levels, reflecting constraints in infrastructure, device availability, and household resources. The study offers contextual insight into how structural and social conditions shape rural students' digital engagement and highlights the need for integrated responses that combine infrastructure development with digital literacy initiatives and community-based support mechanisms.*

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**Keywords:** *Digital Divide, Digital Poverty, Digital Poverty Levels, Rural Schools, Kedah*

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### Introduction

Digital technologies play an increasingly central role in supporting access to educational resources, communication, and learning continuity. However, unequal access to digital infrastructure, devices, and skills continues to shape students' educational experiences, particularly in rural settings. In Malaysia, students in rural states such as Kedah remain exposed to structural constraints, including unstable internet connectivity, limited device ownership, and restricted opportunities to develop digital competencies (Dawood et al., 2019; Susanto, 2016). These constraints contribute to persistent forms of digital poverty that extend beyond mere access to technology.

The COVID-19 pandemic further highlighted these inequalities when remote and home-based learning became a necessity rather than an option. Many rural students were unable to participate effectively in online learning due to inadequate digital facilities and limited family or community support (Azar et al., 2022). As a result, existing educational disparities between urban and rural students were exacerbated, reinforcing the importance of understanding digital

exclusion as a multidimensional phenomenon rather than a single access issue (Adams et al., 2018).

Prior studies in Malaysia have shown that students' engagement with digital learning tools is closely related to their level of digital literacy, confidence, and perceived usefulness of technology (Ishak & Yamin, 2016; Yamin & Ishak, 2016). Research on ICT literacy and technology acceptance among undergraduate students indicates that while students may demonstrate positive attitudes toward digital systems, their effective use is often constrained by skill gaps and contextual limitations (Ishak & Yamin, 2019; Ishak & Yamin, 2020). These findings suggest that digital participation is shaped not only by availability of technology but also by knowledge, skills, and social environments.

Accordingly, this study focuses on rural primary and secondary school students in Kedah to examine how economic, physical, social, and knowledge-related factors position students at different levels of digital poverty. By identifying students' positions along these levels, the study aims to provide a contextual understanding of digital inequality in rural schools and to inform more targeted and inclusive intervention strategies.

## Literature Review

The concept of digital poverty extends beyond the absence of technological access to include limitations in skills, usage, and meaningful engagement with digital tools. Barrantes (2007, 2014) conceptualised digital poverty as a multidimensional condition encompassing access to ICT, digital skills, and the capacity to use technology productively. This perspective challenges narrow interpretations of the digital divide that focus solely on infrastructure and highlights the need to consider social and human dimensions of digital inclusion.

Subsequent studies have reinforced the view that access alone does not guarantee effective participation in digital learning. Van Dijk (2017) argues that digital inequality is structured across multiple layers, including motivational, material, skills, and usage access. Empirical research further shows that students' digital engagement is shaped by socioeconomic background, geographical location, and support structures within families and communities (Eynon & Malmberg, 2021; Afzal et al., 2023). These findings are particularly relevant in rural contexts, where infrastructural limitations often intersect with lower levels of digital exposure.

In the Malaysian context, several studies have examined students' digital skills and technology acceptance across educational levels. Yamin and Ishak (2016) reported that undergraduate students' e-skills vary significantly, influencing their ability to benefit from digital learning platforms. Similarly, Ishak and Yamin (2016) found that students' acceptance of document-sharing systems depended not only on system features but also on familiarity and perceived ease of use. Studies on ICT literacy further indicate that students with limited exposure to digital tools face challenges in adapting to technology-mediated learning environments, even when basic access is available (Ishak & Yamin, 2019).

More recent work highlights the role of digital engagement in enhancing learning motivation and interaction, particularly through educational technologies such as digital games (Ishak & Yamin, 2020). However, these benefits presuppose a minimum level of access, skills, and support, conditions that are often unevenly distributed in rural settings. This reinforces the need

to examine digital poverty not as a binary condition but as a spectrum of constraints that shape students' learning opportunities.

The literature also emphasises the importance of contextual and place-based analysis of digital inequality, especially in the post-pandemic period (Aissaoui, 2022). While national initiatives in Malaysia aim to reduce the digital divide, implementation gaps remain evident in rural communities (Ayob et al., 2022). Together, these studies support the present research focus on four interrelated dimensions that are economic, physical, social, and knowledge as a framework for understanding students' positions along digital poverty levels in rural schools in Kedah.

## Methodology

This study employed a qualitative research design to explore students' positions along different levels of digital poverty in rural schools in Kedah, Malaysia. A qualitative approach was considered appropriate as it enables an in-depth understanding of students' lived experiences, perceptions, and contextual constraints related to digital access and use, rather than measuring prevalence or making population-level generalisations.

Data were collected through semi-structured interviews involving 55 students from nine rural schools, comprising six primary schools and three secondary schools. The schools were in three districts: Sik, Baling, and Pulau Tuba (Langkawi). Sik and Baling reflect inland rural areas characterised by higher poverty rates and limited infrastructure, while Pulau Tuba represents an island community facing geographical and connectivity constraints.

Participants were selected with the assistance of school administrators to ensure representation across different school levels and backgrounds. Consent was obtained from the relevant authorities, schools, and participants before data collection. The interview protocol focused on students' access to digital devices and internet connectivity, experiences with digital learning activities, levels of digital knowledge and skills, and the role of family and community support. Interviews were conducted in a manner appropriate to students' age and context to facilitate open and meaningful responses.

All interviews were transcribed and analysed using thematic analysis. The analysis involved systematic familiarisation with the data, coding, and theme development to identify recurring patterns related to economic, physical, social, and knowledge-related dimensions of digital poverty. To support structured interpretation, Barrantes' digital poverty framework was applied during the analytical phase to categorise students' digital positions. Based on this framework, students were classified into four categories according to their combined access, skills, and usage characteristics:

- Category A: Students with limited or no access to digital devices and internet connectivity, accompanied by minimal digital skills.
- Category B: Students with basic digital skills but constrained access to devices or reliable internet, often due to economic or infrastructural limitations.
- Category C: Students with relatively adequate access to digital resources but limited skills or confidence in using technology effectively for learning.
- Category D: Students who have access and sufficient skills but choose not to engage with digital technologies for learning purposes.

These categories were not treated as rigid classifications but as analytical lenses for organising and interpreting students' digital experiences. Classification was informed by patterns emerging from the interview data rather than predefined quantitative thresholds. The findings are therefore contextual and exploratory, reflecting the experiences of participating students rather than representing rural students in Kedah more broadly.

## Findings

The analysis revealed that students' digital experiences in rural schools in Kedah are shaped by interrelated economic, physical, social, and knowledge-related factors. When examined through Barrantes' digital poverty framework, these factors position students at different levels of digital poverty, reflecting varying degrees of access, capability, and effective use of digital technologies.

Most participants were classified under **Category B**, representing students from low-income households who possess basic digital skills but face limited access to devices and unstable internet connectivity. This group was dominant across all three districts—Sik, Baling, and Pulau Tuba. Students in this category commonly relied on shared devices, mobile data with usage limits, or intermittent connections, which restricted their ability to participate consistently in online learning activities. Despite these constraints, many demonstrated a willingness to engage with digital tools when access was available.

A smaller number of students were categorised as **Category A**, indicating severe digital poverty characterised by the absence of both adequate access and basic digital skills. This category was most prevalent among students in Pulau Tuba, where geographical isolation and limited infrastructure compounded household-level constraints. Students in this group reported minimal exposure to digital devices and relied heavily on school facilities or assistance from teachers and peers.

Only one participant was identified under **Category C**, reflecting students who had relatively stable access to digital resources but limited digital skills or confidence in using technology for learning purposes. No students were classified under **Category D**, which represents voluntary non-use of digital technology. This absence suggests that limited engagement with digital tools among rural students is largely driven by structural and contextual barriers rather than a lack of interest or motivation.

Across all categories, economic hardship and infrastructural limitations emerged as the most influential constraints shaping students' digital positions. Social support from family members and the surrounding community also played a moderating role, particularly in supporting younger students' engagement with digital learning. Overall, the findings indicate that digital poverty among rural students in Kedah exists along a continuum, shaped by overlapping structural and social conditions that influence both access to and effective use of digital technologies.

## Conclusion and Recommendations

This study examined students' positions along digital poverty levels in rural schools in Kedah by exploring how economic, physical, social, and knowledge-related factors shape their digital experiences. The findings indicate that digital poverty among rural students is not a uniform condition but exists along a continuum, with most students positioned at the lower levels due to limited access to devices, unstable internet connectivity, and constrained household resources.

The analysis shows that restricted digital engagement is largely driven by structural and contextual barriers rather than students' attitudes or willingness to use technology. Across the studied districts, students generally expressed interest in engaging with digital tools for learning, suggesting that non-use or limited use is primarily a consequence of unequal access and support rather than resistance to technology. This reinforces the importance of viewing digital poverty as a multidimensional issue that extends beyond infrastructure provision alone.

From a practical perspective, efforts to address digital inequality in rural schools should adopt integrated approaches that combine improvements in digital infrastructure with initiatives to strengthen digital skills, information literacy, and community-based support. School-level interventions, family involvement, and local community participation are particularly important in supporting younger students and sustaining digital engagement.

As a qualitative and context-specific study, the findings reflect the experiences of participating students and are not intended to represent all rural students in Kedah or Malaysia. Future research could extend this work through comparative or longitudinal designs to examine changes in students' digital positions over time and to assess the effectiveness of targeted interventions. Such efforts would contribute to a more comprehensive understanding of how digital poverty can be reduced in rural educational contexts.

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