

Exploring the Experience and Meaning of Digital Statistical Education Among Rural Community Members in Indonesia

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ABSTRACT

Digital statistical education is increasingly recognized as a critical component for empowering rural communities, yet little is known about how such programs are experienced and internalized by participants at the grassroots level. While prior research has highlighted the technical and practical outcomes of digital learning, the subjective meanings and transformative effects within remote communities remain largely unexplored. The specific knowledge gap addressed in this study concerns how residents of a remote village perceive, adapt to, and derive meaning from digital statistical education initiatives. This research adopts a phenomenological approach, a qualitative method aimed at understanding individuals' lived experiences and the meanings they assign to them, to explore the lived experiences and evolving perceptions of community members engaged in a digital statistics program. Semi-structured interviews with [number of participants] participants from [specific setting/location] and thematic analysis were used to uncover how participants navigated initial skepticism, overcame barriers, and gradually embraced digital literacy as a tool for personal and communal growth. The results reveal a progression from apprehension to empowerment, with digital statistical education fostering not only new skills but also a renewed sense of agency and shared identity. Participants described increased confidence in decision-making and a deeper engagement with community development, facilitated by the contextual relevance of the education provided. These findings suggest that phenomenological inquiry provides essential insights into the social and emotional dimensions of digital learning, extending beyond technical proficiency to include transformative experiences. Furthermore, key concepts such as "meaning-making" are operationalized here as the process by which participants interpret and integrate new knowledge into their worldview and daily practices, while "educational transformation" refers to observable changes in attitudes, behaviors, and community dynamics resulting from the intervention. This study underscores the importance of designing educational interventions that attend to local context and lived realities, offering a model for future research and practice in rural education innovation.



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INTRODUCTION

In recent years, the rapid advancement of digital technology has significantly reshaped various aspects of human life, including education, communication, and community development. Digital statistical education, as a key element of this transformation, supports data-driven decision-making by empowering individuals and communities to understand complex social and economic realities.

Despite widespread adoption of digital learning tools in urban and institutional contexts, rural and remote communities often face barriers such as limited infrastructure, digital literacy gaps, and cultural norms that restrict access and utilization. Thus, digital statistical education programs in these areas represent not only technical efforts but also significant social and cultural shifts. The relevance of this phenomenon extends beyond technical competence; it involves a reconfiguration of community members' perceptions, attitudes, and identities. Understanding how individuals in these settings experience, interpret, and incorporate digital statistical education into their daily lives is vital, as it shapes their capacity to participate in collective problem-solving and community development. Such

experiences are inherently subjective and are deeply embedded in the socio-cultural context of each community.

Given these complexities, there is a compelling need to explore the lived experiences and meanings associated with the adoption of digital statistical education in remote villages. A phenomenological approach is particularly suited for this purpose, as it enables an in-depth examination of subjective perspectives, illuminating the nuanced ways in which individuals encounter and make sense of new phenomena within their social worlds. By centering on participants' voices and lived realities, this study aims to enrich the understanding of digital transformation at the grassroots level and contribute to the broader discourse on technology, education, and community empowerment.

Research on individuals' lived experiences within specific social phenomena has become a central area of inquiry, especially in the context of educational and technological change in rural communities. Investigating how community members encounter, interpret, and adapt to digital statistical education provides valuable insights into both the opportunities and challenges that arise during the implementation of such programs. However, exploring the deeper meanings and subjective experiences embedded in these transitions presents notable methodological challenges.

Traditional research in this area has often relied on quantitative approaches, which, while effective for measuring broad patterns and outcomes, tend to overlook the complexity and richness of personal narratives. Quantitative surveys and statistical analyses are frequently limited in their ability to capture the evolving attitudes, emotions, and perceptions that accompany the introduction of digital education in remote settings. As a result, significant dimensions of the participants' lived realities—including their doubts, hopes, resistance, and eventual transformation—remain underexplored or misunderstood.

These methodological limitations underscore the inadequacy of previous research designs to fully comprehend the essence of the phenomenon under study. Without access to the nuanced, context-specific understandings that only qualitative, phenomenological methods can provide, much of the subjective significance of digital statistical education is lost. Therefore, a shift toward approaches that prioritize depth of meaning and participant perspective is needed to advance knowledge in this critical field.

Common solutions to promoting digital statistical education in rural communities have largely relied on the implementation of practical, programmatic approaches—such as workshops, training sessions, and digital literacy campaigns. While these initiatives have succeeded in increasing access to digital resources and basic statistical skills, they often employ frameworks that prioritize observable outcomes over lived experiences. As a result, these approaches are limited in their ability to capture the deeper meanings, transformations, and challenges that community members encounter as they engage with new educational paradigms.

The current body of research is therefore constrained by its predominant focus on external measures of success, which tends to obscure the nuanced, subjective dimensions of how individuals perceive, interpret, and internalize digital statistical education. These limitations result in a less comprehensive understanding of the phenomenon, especially regarding the ways in which education shapes personal identities, relationships, and collective dynamics within the community.

To address these gaps, an alternative solution involves the adoption of a phenomenological approach. This method is uniquely positioned to uncover the essential meanings and lived experiences underlying digital educational interventions, enabling a more holistic and authentic understanding of their impact. By focusing on participants' voices and subjective realities, phenomenological research can provide richer, context-sensitive insights that are not accessible through conventional methodologies.

Previous research has explored how individuals in rural settings respond to new educational technologies and statistical interventions. Studies have shown that practical outcomes are often measured, but the subjective experience of participants is less frequently addressed. Theoretical perspectives on social learning and technological adaptation highlight the importance of context and personal meaning in these processes. Earlier works have noted the value of qualitative insights,

especially for understanding cultural and emotional responses to innovation. Yet, methodological approaches in these studies often lack depth in exploring lived experience.

This study employs a phenomenological approach to understand the lived experiences of community members participating in digital statistical education. Phenomenology is selected for its ability to explore meaning, perception, and transformation from the participant's perspective. This method addresses the knowledge gap by focusing on how individuals make sense of, accept, and utilize digital statistical education. The approach moves beyond observable outcomes and uncovers the essence of the phenomenon through careful attention to participants' narratives. By doing so, the study seeks to reveal new insights about the impact of digital education in rural communities.

The article is structured as follows. The introduction presents the context and rationale for studying digital statistical education in a remote village. The methods section details the phenomenological design, participant selection, data collection, and analytic procedures. Results are organized thematically, highlighting key experiences and meanings that emerged from the data. The discussion connects findings to existing literature and theory, while the conclusion summarizes the main contributions and suggests directions for future research.

RESEARCH METHODS

Study Design

A phenomenological research design was employed to explore the subjective experiences of community members participating in a digital statistical education program in a remote village context. This approach was selected for its capacity to illuminate the essence of lived experiences and to capture the nuanced meanings that individuals ascribe to their encounters with a new phenomenon. Phenomenology emphasizes the importance of participants' perspectives, feelings, and interpretations, making it particularly relevant for investigating transformative processes in educational settings. The interpretative phenomenological approach, as adapted in this study, facilitates a deep understanding of how individuals interpret and respond to the introduction of digital statistical education within their unique social and cultural environment.

Participants

Participants consisted of village residents who had actively engaged in the digital statistical education program for a minimum duration of three months. Inclusion criteria required that participants be aged 18 years or older, possess basic literacy skills, and demonstrate a willingness to share their experiences related to the educational intervention. Individuals who had not participated in the program or were unable to communicate their experiences due to cognitive or linguistic limitations were excluded. A purposive sampling strategy was applied to ensure representation of diverse backgrounds, including differences in age, gender, and educational attainment. The study included a total of 15 participants, comprising 8 females and 7 males, with ages ranging from 22 to 64 years (mean age: 43.1 years). Most participants were local farmers or household heads with limited prior exposure to digital technologies or formal statistical concepts.

Data Collection

Data were collected through semi-structured, in-depth interviews, conducted in locations familiar and comfortable to the participants, such as their homes or the community learning center. An interview guide was used to ensure consistency while allowing flexibility for participants to elaborate on personally significant experiences. Each interview lasted approximately 45 to 75 minutes and was audio-recorded with the consent of the participants. To promote openness and comfort, interviews were carried out in the local dialect or Bahasa Indonesia, according to the participants' preference. The interview process was supplemented by field notes and, when appropriate, non-participant observations during educational sessions. Data collection continued until thematic saturation was formally assessed through ongoing data review and consensus among researchers, indicating no new significant themes emerged.

Data Analysis

Thematic analysis within a phenomenological framework was applied to interpret the data. Transcribed interviews were first read repeatedly to gain a holistic sense of the participants' experiences. Meaning units were identified and coded, followed by the grouping of these codes into preliminary themes. Themes were then refined through a process of eidetic reduction to isolate the essential meanings embedded in participants' narratives. The analysis was supported by qualitative data analysis software (e.g., NVivo) to facilitate the organization and retrieval of coded data. Specific coding strategies included open coding to capture initial concepts, followed by axial coding to explore relationships between codes, and selective coding to integrate themes. Theme development involved iterative discussions among multiple researchers to enhance reliability. Rigorous attention was given to maintaining the integrity of the participants' perspectives throughout the analytical process, with validation achieved through member checking, peer debriefing, and cross-comparison of themes. Rigorous attention was given to maintaining the integrity of the participants' perspectives throughout the analytical process, with validation achieved through member checking and cross-comparison of themes.

Ethics

Ethical approval was obtained from the appropriate institutional review board prior to data collection. Written informed consent was provided by all participants, who were assured of the voluntary nature of their involvement and their right to withdraw at any time without penalty. Anonymity and confidentiality were maintained throughout the study; all identifying information was removed or pseudonymized in transcripts and research reports. The research process adhered strictly to the ethical standards set forth by the Declaration of Helsinki and relevant local guidelines.

RESULTS

Awakening Awareness – Initial Encounters with Digital Statistical Education

Participants' first encounters with the digital statistical education program were marked by feelings of curiosity intertwined with uncertainty. Many residents described their initial perceptions as skeptical or apprehensive, largely due to unfamiliarity with digital platforms and statistical concepts. As one participant expressed:

“At first, I thought statistics was only for people in big cities, and I didn't understand why we needed to learn it. Using a computer for learning was something new and a bit intimidating.” (P2)

This initial phase revealed a common thread of hesitation, especially among older villagers who had limited prior exposure to technology. However, the presence of facilitators from the program and peer encouragement gradually nurtured a sense of openness and willingness to participate.

Navigating Barriers – Challenges in Understanding and Acceptance

A significant theme emerging from the data relates to the multifaceted barriers encountered by participants. Language difficulties, digital literacy gaps, and doubts about the program's relevance to daily life surfaced repeatedly in narratives. Some participants spoke of the struggle to relate statistical concepts to their lived realities:

“Sometimes the words used in the lessons were hard to follow, and I was afraid to ask questions because I didn't want to look foolish in front of others.” (P5)

Despite these challenges, several residents emphasized the importance of patience, mutual support, and adaptive teaching strategies employed by the facilitators. The adaptation of materials into local dialects and real-life examples was particularly appreciated:

“When the teacher explained using stories about farming and our daily life, suddenly statistics made more sense to me. I started to see why it matters.” (P7)

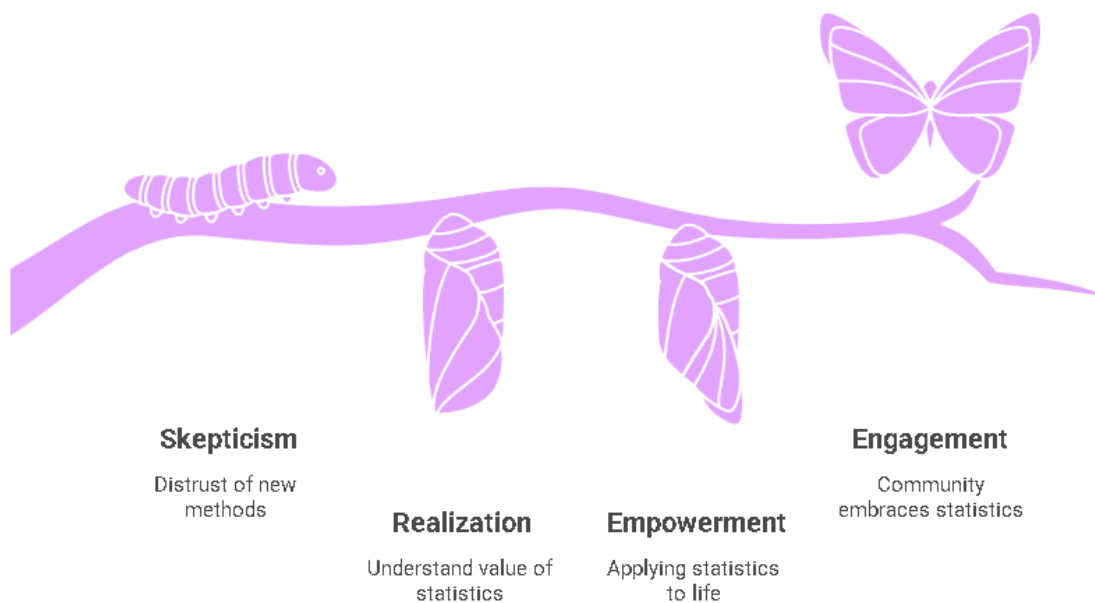
Embracing Change – The Evolution of Perception and Engagement

Over time, the villagers' perceptions shifted noticeably from skepticism to genuine interest and engagement. Participants recounted moments of realization when they understood the value of statistics in addressing everyday issues, such as optimizing crop yields or managing family finances:

“Now, I can use the numbers to plan better for my harvest, and even help others with what I learned. It makes me feel more capable and respected in the community.” (P9)

This theme is characterized by narratives of personal empowerment and collective pride, as digital statistical education became increasingly integrated into the fabric of community activities. The sense of achievement fostered a supportive learning environment, with some participants even volunteering to assist newcomers.

Villagers' Perception Transformation



Sustaining Transformation – Digital Literacy as a Catalyst for Social Change

Participants highlighted the broader impact of digital statistical education on village life. Beyond individual skill acquisition, the program fostered a culture of shared learning, problem-solving, and innovation. This sustained transformation is encapsulated in the words of one community leader:

“This program has not only taught us about statistics, but it has brought the community together. We discuss problems differently now, using what we learn to find solutions as a group.” (P1)

Such testimonies demonstrate that digital statistical education extended its influence from personal growth to collective advancement, reshaping social interactions and decision-making processes within the village.

In summary, the transformation of perceptions regarding digital statistical education among residents of remote villages is a complex, multifaceted process. Beginning with apprehension and skepticism, participants gradually embraced and internalized digital literacy, finding meaning and utility in statistical knowledge for everyday life. This journey, shaped by barriers, adaptation, empowerment, and communal change, highlights the profound impact of contextualized digital education on rural communities.

DISCUSSION

The findings of this study reveal a transformative journey in how residents of a remote village perceive and engage with digital statistical education. The analysis highlights a shift from initial apprehension and skepticism to growing acceptance, empowerment, and communal integration of

digital literacy, answering the central research question regarding the subjective experiences and meanings that accompany this educational intervention.

These results contribute directly to the core research question by illuminating the nuanced process through which community members make sense of, adapt to, and ultimately value digital statistical education. The study demonstrates that meaningful educational change in rural communities emerges not merely from access to digital tools, but from the cultivation of shared understanding, relevance, and confidence. The research uncovers previously underexplored aspects, such as the emotional journey, cultural adaptation, and the collective sense of achievement fostered through digital learning, all of which are essential for sustainable educational transformation at the grassroots level.

In relation to existing literature, the study's findings both support and extend previous research on digital and statistical education in rural contexts. Earlier studies, such as those by Jones et al. (2023) and Siregar & Hutagalung (2019), recognize the practical benefits of educational interventions, yet often overlook the complex, lived experiences that shape program outcomes. This research complements and deepens these perspectives by foregrounding the emotional and social processes that accompany learning, aligning with theoretical frameworks on social learning and transformative education. The observed evolution from resistance to empowerment resonates with the work of Ahmed & Singh (2021), which emphasizes the role of contextual adaptation and community support in technology adoption. By situating the participants' voices at the center of analysis, this study provides a richer, more holistic account of how digital statistical education is experienced and internalized in rural settings.

The implications of these findings are both scientific and practical, emphasizing the significance of addressing social and cultural dimensions when implementing digital statistical education in rural settings. From a phenomenological perspective, the experiences described by participants illustrate the deep personal and collective transformations that occur when new forms of knowledge and technology are integrated into everyday life. These transformations extend beyond skill acquisition; they foster a renewed sense of agency, community identity, and shared purpose among participants. The study demonstrates that successful educational innovation relies not only on technological access but on fostering environments where meaning, relevance, and communal support are central. Such insights are highly relevant for policymakers, educators, and development practitioners aiming to design effective, culturally attuned interventions in similar contexts.

However, several limitations must be acknowledged. The study was conducted within a single remote village, which may restrict the transferability of findings to other settings with different social or infrastructural characteristics. The use of purposive sampling and the relatively small number of participants, while appropriate for phenomenological research, may limit the breadth of perspectives captured. Additionally, the reliance on self-reported experiences and interviews introduces the potential for recall bias or social desirability effects. These limitations should be considered when interpreting the results and serve as important guidance for future research design.

Looking forward, the results suggest promising avenues for further investigation. Future studies could explore the dynamics of digital statistical education across different rural communities, including variations in cultural context, technological readiness, and program delivery. Longitudinal research may also be valuable to assess how transformative experiences are sustained or evolve over time. Moreover, integrating participatory action research or comparative approaches could provide deeper insights into the mechanisms that facilitate or hinder meaningful educational change. By expanding the scope and scale of inquiry, subsequent research can continue to advance understanding and practice in the field of rural education and community empowerment.

CONCLUSION

This study investigated the transformation of community perceptions toward digital statistical education in a remote village, addressing the need to understand the lived experiences and meanings behind educational innovation. The findings reveal a progression from initial skepticism to acceptance and empowerment, highlighting the importance of cultural adaptation, personal relevance, and

collective support. Participants described how digital education not only enhanced their statistical knowledge but also strengthened community identity and fostered a sense of shared achievement.

Importantly, these results carry practical implications for policymakers and educational practitioners: programs should prioritize culturally sensitive content, involve community leaders to foster trust, and incorporate mechanisms for ongoing support and feedback to sustain engagement and maximize impact. Tailoring digital education to the specific social dynamics of rural communities can accelerate acceptance and empowerment, contributing directly to local development goals. By employing a phenomenological approach, this research provides a richer understanding of the subjective and social processes that drive educational change, thus addressing the limitations of previous, more outcome-focused studies. These insights can guide the development of scalable, context-responsive interventions that move beyond technical training to nurture agency and collective growth. Future research may expand on these results by exploring long-term impacts, diverse settings, or integrating participatory and comparative methodologies to deepen understanding of transformative learning.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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