

## Digital Divide as a Dynamic Challenge and a Leveraging Opportunity: A Phenomenological Study on Seasoned TLE/TVL Teachers' Adaptive Pedagogy



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**ABSTRACT:** This study explores the perspectives and strategies of seasoned Teachers of Technology and Livelihood Education / Technical-Vocational Education and Training (TLE/TVL) in addressing the challenges posed by the Digital Divide in educational settings. The participants are four Master Teachers who have 10 or more teaching experience and currently teaching in the secondary school in the Province of Ilocos Sur. Two of them are from rural secondary schools while the other two are from secondary schools situated in urban areas. Through a phenomenology study and cool and warm analysis, the research investigates how these seasoned teachers view their teaching experience in using adaptive pedagogical approaches and perceive the impact of unequal access to technology and varying levels of digital literacy among learners on engagement and learning outcomes.

Findings reveal that seasoned TLE/TVL teachers view the Digital Divide as both a dynamic challenge and a leveraging opportunity. They employ adaptive pedagogical approaches, including differentiated instruction, flexible grouping, and varied assessment methods, to cater to diverse learner needs. Continuous assessment of individual learner digital competencies and promotion of collaborative learning emerge as effective strategies to bridge digital gaps and enhance student engagement. The study underscores the importance of ongoing professional development in digital competencies and the need for institutions to prioritize access to technology and support flexibility in teaching practices.

However, the study also identifies limitations, including potential sampling bias and the subjectivity of self-reported teacher experiences. Despite these constraints, the findings contribute valuable insights into effective strategies for fostering inclusive learning environments in vocational education amidst technological disparities.

**KEYWORDS:** Adaptive Pedagogy, Digital Divide, Differentiated Instructions, Inclusive learning environment, Seasoned Teachers

### INTRODUCTION

In this fast-expanding digital world, the tailor-fit fusion of digital technology to the teaching and learning process has become the deciding chess move in transforming and enhancing pedagogical approaches and learners' learning experiences (Msafiri et al, 2023). At the current global state, all nations are accelerating towards a more technology-enhanced education setup. In recent years, different research have concluded that technology positively correlates with better learning outcomes. Mir et al (2019), Abbas et al (2020), Memon et al (2022) and Tenorio et al (2023) claims that technology positively influences students' satisfaction, function and academic performance. The extensive utilization of technology in education has opened up various pedagogical opportunities not only for enhancing learning but also for re-engineering teaching. However, the continuous waves of educational technology innovation and integration also gave birth to a significant technology challenge and gap – the Digital Divide.

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Digital Divide refers to the multi-societal level gap concerning both opportunities to access and use of information and communication technologies (ICTs) for a wide variety of activities (OECD, 2022). Digital Divide covers the educational landscape and eventually amplifies economic and social inequality regarding access to, use of, or impact of information and communication technologies (Brown, 2020). This digital disparity poses a critical blockade to educational equity and sustainable lifelong learning (Olanrewaju et al, 2021). The Digital Divide is not a new phenomenon, but its factors, attributes and negative effects have been amplified with the worldwide sudden shift towards synchronous and online learning delivery mode during the pandemic. In the Philippines, this technological gap is mainly influenced by geographic, economic, and ICT logistic factors that affect the whole educational landscape (Pouzevara et al, 2020).

At the core of this study are the seasoned TLE/TVL teachers who epitomize a rich teaching experience and pedagogical expertise in technical and vocational education. Seasoned teachers are experienced educators who have spent more than 10 years in the teaching profession (InfoScipedia, 2020) and are often considered veteran teachers who bring years of rich teaching knowledge, skills, and insights. They share this expertise to new teachers through coaching and mentoring. These educators have experienced different technological shifts in educational technology including the tools and methods, from traditional chalkboard to the current digital technology-enhanced pedagogical approaches (Santos, 2021). Seasoned teachers, with their extensive teaching experience, showcase exceptional qualities that contribute to their effectiveness in the classroom. They are adaptable (Santos, 2021), emphatic, lifelong learners, patient, prepared, respected, engaged, focused on growth, creative and innovative (Tprestianni, 2022). In Philippine settings, seasoned teachers can be seen with the rank of Master Teacher. Master Teachers in the Department of Education (DepEd) are experienced educators who hold higher teaching positions because of their expertise, leadership, and commendable teaching proficiency. They are renowned for their substantial role in mentoring other teachers, transforming the quality of education, and driving instructional excellence within the educational system (Valencia, 2024). They are involved in curriculum development, educational research, and the implementation of innovative teaching strategies (Yang, 2022). Master Teachers are considered seasoned teachers because they have been teaching for so long and they have demonstrated a higher level of expertise in the field of teaching (Skidmore, 2023). They were able to improve learning outcomes by employing innovative and adaptive strategies amidst the Digital Divide. These characteristics are important in ensuring quality education to all students regardless of technology access (Santos, 2021).

Among innovative teaching approaches emerging in this technology-challenging landscape, the noteworthy and somehow an alternative response to the challenges posed by Digital Divide is the adaptive pedagogical approaches. Adaptive pedagogical approach or adaptive teaching is learning delivery of personalized learning activities (Taylor et al, 2021). The approach is emerging to address the individual needs of a learner through differentiated activities, on-time feedbacks, customized learning progression and varied learning resources (Ikwumelu, 2015). These approaches are carefully designed to meet the diverse needs of learners and level the inequalities in digital access (Peng et al., 2019).

However, despite the growing importance of adaptive pedagogical approach in digital era, there is a significant empirical gap. There are limited data available in the literature regarding the specific adaptive pedagogical approaches employed by seasoned TLE/TVL teachers in the Philippines particularly in the Province of Ilocos Sur to mitigate the effects of the Digital Divide. This research aims to answer the research gap in understanding the teaching experiences of seasoned TLE/TVL teachers in using adaptive pedagogical approaches within the context of the Digital Divide. This study also seeks to contribute valuable insights to the field of educational technology and pedagogy and to pave the way for future research and educational policy development.

## METHODOLOGY

This qualitative study employed the phenomenology method. Creswell (2003) as cited by Panganiban et al (2017) defined this qualitative scheme as a method in which the essence of human experience concerning a phenomenon is identified by the researchers. Creswell and Poth (2018) as cited by Weber (2019) expound the definition of phenomenology method as a research method conducted to analyze, interpret and describe the meaning or essence of a common experience shared by individuals sharing similar characteristics and criteria. The participants of the study were four (4) Master Teachers who have a minimum of 10 years of teaching experience, and currently teaching TLE in Junior High School or TVL in Senior High School. Two master teachers were selected from urban public secondary schools and were selected from rural public secondary schools. The research employed purposive sampling. Purposive sampling is a sampling method where the selection of participants is grounded on the judgment of the researchers based on the set of specific characteristics or qualities relevant to the research question (Nikolopoulou, 2023). This deliberate selection strategy enhanced the generalizability of the findings. Generalizability is an important aspect of qualitative research because it will allow a broader application of the research findings (Nikolopoulou, 2023). This study utilized

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different instruments to prepare, collect, gather and analyze data. The researchers prepared a Robotfoto (preliminary sketch of the samples). The main research instrument used is an Aide Memoire (Interview Guide) which contains a list of questions which was developed by the researchers through Aide Memoire (Interview Guide) Development. Prior to the conduct of the study, the researchers sent a letter to the participants. After which, the researchers conducted the interview sessions through series of online meetings using Zoom Video Conferencing Platform. The data analysis employed is Cool and Warm Analysis. Verbatim responses from the interviews were transcribed by the researchers. Statements given in Filipino were provided with English translation. In the cool analysis, the transcribed data were read and reread repeatedly to extract significant statements that provide the essence of the seasoned teachers' teaching experience. The significant statements were further analyzed by identifying statements that may be clustered together to identify categories that reflect the participants' common and typical experiences. In the warm analysis, these initial categories were subjected to thematic analysis by examining similarities and relationships among them in order to extract themes that provide a collective description of the participants' views and experiences.

### RESULTS AND DISCUSSION

#### Theme: Dynamically Challenging and a Leveraging Opportunity

The results of this qualitative research provide an in-depth exploration of the theme "Dynamically Challenging and a Leveraging Opportunity." This study aims to understand the complex interplay between the challenges and opportunities encountered by the seasoned teachers in teaching within the context of Digital Divide. Through rigorous data collection and analysis, several sub-themes emerged. Each sub-themes reflect different aspects of the main theme. These sub-themes not only highlighted the difficulties faced but also reveal the potential for growth and development that arises from these challenges. In the following sections, each sub-theme will be discussed in detail. The sections will illustrate the distinct experiences and insights of the seasoned TLE teachers. This discussion will provide a comprehensive understanding of how Digital Divide is a dynamic challenge that can be leveraged into significant opportunities.

#### Sub-theme 1: Challenges with the Digital Divide

The study revealed the different challenges faced by seasoned TLE teachers as they teach technology-driven subjects within the context of Digital Divide. They mentioned challenges which were already perennial in the context of Digital Divide. As the participants verbalized:

*"The challenge is on lack of connection and lack of connectivity."*

*"There are challenges for this Digital Divide. First is the lack of gadget or materials the students might need on learning."*

*"Medyo mahirap talaga sir kapag wala yung mga materials sir." (It is hard if the resources are limited.)*

*"Another one is infrastructure disparity, rural areas lack reliable internet connectivity, hindering access to online resources."*

Aside from these traditional Digital Divide challenges, participants also described challenges that can be rooted as the cause of the Digital Divide in the classroom. One participant stated, *"And part of the challenge - if there are some computer units not functioning."* This experience shows that although computerization programs were being implemented in the schools to bridge the Digital Gap, the malfunctioning of these units can cause a situational Digital Divide in the school. Another participant stated, *"Financial constraints because many families particularly yung mga poor were not able to afford necessary internet access." (Financial constraints because many families particularly the poor were not able to afford necessary internet access).* Another participant also stated *"Not all students have the same level of digital literacy. This widens the gap between students who are proficient and those students who are not. Naaapektuhan yung kanilang abilidad to engage online learning and using their materials effectively." (Not all students have the same level of digital literacy. This widens the gap between students who are proficient and those students who are not. Their ability to engage online and to use materials effectively has been negatively affected).*

The digital divide presents multifaceted challenges that affect various dimensions such as socio-economic status, geography, education, and technology. Socio-economic factors play a significant role in determining access to digital technologies. Families with lower incomes often lack the financial resources to afford internet access and digital devices for their children which is worsening the existing inequalities (Jamil, 2021). Geographic factors further compound the issue, especially in rural and remote areas where inadequate infrastructure severely limits access to the internet and digital devices (Gemiharto & Priyadarshani, 2022; Sadyrtidinov, 2023). However, the digital divide is not solely about access; it also encompasses the ability to effectively use digital technologies. Educational disparities contribute to a lack of digital literacy and skills, preventing individuals from fully utilizing available digital resources. Addressing these educational inequalities and enhancing digital skills is crucial to bridging this gap

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(Mureşan & Gogu, 2014). By focusing on improving digital literacy and infrastructure, we can work towards a more inclusive digital future where everyone has the opportunity to participate and benefit.

#### Sub-theme 2: Teachers' Strategies in Identifying the Digital Gaps

Identifying the level of digital gaps among our learners is one of the needed skills for teachers to adjust their teaching methods. The participants have shared their common strategies for identifying the digital gap in their class. All of the participants have been using surveys to identify students' needs and learning preferences. *One participant stated, "I addressed this kind of phenomenon by setting a plan. Just like conducting a survey to students. So by survey, I categorized yung mga mas advanced." (I addressed this kind of phenomenon by setting a plan. Just like conducting a survey to students. So by survey, I categorized those students who are advanced). Another participant verbalized, "Sa first meeting pa lang namin sir, Sinu-survey ko na, sino dito yung marunong nang ganito? Tapos yung mga learners na may special need sir, yung mga learners na mas advanced sir, binibigyan ko sila ng mas advanced the activities." (On our first meeting, I am surveying who among them have knowledge or skills on using this technology. Those learners who are advanced, I am giving them advanced activities.). Another participant also stated, "Number one is to understand and assess digital access by conducting surveys and assessment. So regularly, assess your students' access to digital tools and internet connectivity." The responses show the mastery of the seasoned TLE teachers in managing their classes within the context of Digital Divide. Another participant stated, "Yung unang ginagawa ko is assessment and individual learning. I will begin by assessing the ICT skills of my students. And, it is done through survey, interview or formal observations." (The first thing I do is assessment and individual learning. I will begin by assessing the ICT skills of my students. And, it is done through survey, interview or formal observations). They know that Digital Divide exists but they don't know how severe is the gap in their classes. Through the use of simple surveys and initial assessments at the start of their classes, they were able to understand the needs of the learners. By doing so, they were able to adjust their teaching methods.*

Identifying digital gaps is crucial for effective teaching in the context of the digital divide. Teachers can assess students' digital literacy and access levels through formative assessment strategies, such as regular quizzes and feedback sessions. These assessments enable teachers to pinpoint gaps in students' digital skills and access to technology (Lo & Hoover, 2022). Additionally, informal observations and interviews are valuable tools for identifying digital gaps. By conducting classroom observations and engaging in interviews with students, teachers can gather qualitative data on how students interact with digital tools and uncover any barriers they may face. This approach provides teachers with a comprehensive understanding of students' digital access and competencies. It allows them to tailor their instructional strategies accordingly (Kim, 2015). Through these methods, educators can better support their students and work towards bridging the digital divide in their classrooms.

#### Sub-theme 3: Teachers' Solutions to Provide ICT for All

In spite of the challenges to bring equity in terms of access and use of digital technology in the classroom nowadays, seasoned TLE teachers are resilient and hard working to set solutions to provide access of digital devices to all of their students. They have presented different strategies to make sure that all students can interact and engage to the digital materials in their classes. *One participant stated, "To address the need Sir, I grouped them. Dagijay mayat ti gadgets na Sir, agkakagroup da ken dagijay awan connection da, tapno all of the groups magkaroon sila ng, let's say, access to the internet." (To address the need Sir, I grouped them. Those who have digital devices and internet access, I grouped them with those who don't have so that all of them can have access to the internet.) Another participant stated, "Another is peer tutoring and collaboration. Kasi hindi naman lahat ng learners ay may equal access sa technology, ang ginagawa ko, tinatanong ko kung sino yung may mga laptop sa bahay, yung mayron sila na yung leaders." (Another is peer tutoring and collaboration. Since not all learners have equal access to technology, I ask my class who have laptops. Those who have automatically the leader of the group.) Another participant verbalized, "So we have to organize students into flexible groups based on their access to technology and digital skills. Pair students with limited access to technology and pair them with those who have access to technology fostering peer learning and collaboration." Another participant also verbalized, "So we should support peer support and collaboration. Peer tutoring, and mentoring programs so that students can help each other and share resources." These common solutions employed by the seasoned TLE teachers showed the generalizability of groupings and collaborative learning as an effective and strategic tool to ensure equal access of technology in the classroom.*

Research indicates that strategic grouping in collaborative learning environments can significantly enhance learning outcomes. Implementing grouping strategies based on students' learning styles, interests, and knowledge levels creates more effective learning experiences. For example, a clustering-based grouping model ensures that groups are balanced and diverse, fostering

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better interaction and improved learning outcomes (Pang et al., 2014). Peer tutoring, where students with varying skill levels work together, can boost both academic performance and self-esteem. This approach is particularly effective when students are grouped based on complementary skills, allowing them to learn from and support each other's growth (Odendahl, 2016). Furthermore, integrating technology into collaborative learning environments can facilitate effective peer interaction and improve learning outcomes. Tools such as intelligent tutoring systems and digital platforms for peer assessment have been shown to enhance collaboration and develop students' digital skills (Blumenstein et al., 2023). By leveraging these strategies and tools, educators can create dynamic and supportive learning environments that promote student success.

Integrating digital literacy in the instruction is another way of providing equal opportunity for all students to learn within the context of Digital Divide. As narrated: *"Digital literacy instruction yung pinaka-effective na nakita ko to address the gap. I teach them the proper use of the digital devices and the digital tools."* (Digital literacy instruction nis the most effective that I saw to address the gap. I teach them the proper use of the digital devices and the digital tools.)

### Sub-theme 4: Adaptive Pedagogical Approaches

Adaptive pedagogical approach or adaptive teaching is learning delivery of personalized learning activities (Taylor et al, 2021). These approaches are carefully designed to meet the diverse needs of learners and level the inequalities in digital access (Peng et al., 2019). Seasoned TLE teachers have shared the different adaptive approaches they use to bridge the Digital Divide. Bridging the digital divide in education requires adaptive pedagogical approaches that cater to diverse student needs and contexts.

Seasoned TLE teachers have been utilizing adaptive pedagogical approaches to mitigate the effect of Digital Divide in their classes. The most common strategy emerged is the utilization of Differentiated Instructions and Differentiated Activities, as verbalized by the participants:

*"Nagpapa group works ako sir. Nagkakaroon sila ng difference on the level of the activity sir."* (I give them group work. This gives them difference on the level of the activity sir.)

*"Ngayon kailangan na talaga yung differentiated instructions. We have to provide various learning materials and learning resources to accommodate students with different access to technology."* (Now, we need differentiated instructions. We have to provide various learning materials and learning resources to accommodate students with different access to technology.)

*"Another is to have a flexible curriculum. Dapat multimodal yung resources. Provide materials in various formats – online, offline, print."* (Another is to have a flexible curriculum. The resources should be multimodal. Provide materials in various formats – online, offline, print.)

*"Tapos ung differentiated instructions, hindi nawawala yan. Flexible learning plans. Develop learning plans that cater to specific needs of each student. We should allow students to progress on their own pace and provide alternative assignments for those with limited access."* (Then, we should use differentiated instructions and flexible learning plans. Develop learning plans that cater to specific needs of each student. We should allow students to progress on their own pace and provide alternative assignments for those with limited access.)

Research indicates that the application of differentiated instruction (DI) and differentiated activities (DA) represents a pivotal strategy in mitigating the effects of the Digital Divide, thereby fostering an equitable learning environment. By tailoring learning experiences to individual needs and learning styles, DI and DA offer personalized pathways for students to access and engage with educational content. This approach includes both technology-based and non-technology-based methods, ensuring inclusivity across diverse learning environments. Moreover, DI and DA cultivate a collaborative classroom atmosphere conducive to peer learning and mutual support (Stingo, 2024).

For instance, in China, the implementation of differentiated instruction strategies in analog electronic technology experiments demonstrated significant improvements in teaching outcomes and student development. This approach encompassed varied learning objectives, progressive content delivery, and differentiated assessments, enhancing the effectiveness of experimental teaching (Chunyu et al., 2016).

Similarly, a systematic review focusing on secondary education highlighted the positive impact of DI on student achievement. Studies underscored the effectiveness of strategies such as ability grouping, tiering, and heterogeneous grouping in improving academic performance (Smale-Jacobse et al., 2019).

In Jordan, research conducted with primary school students revealed that DI strategies, including flexible grouping and tiered instruction, notably enhanced English reading comprehension. The study emphasized that DI not only addressed classroom diversity but also significantly elevated student learning outcomes (Magableh & Abdullah, 2020).

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## Sub-theme 5: Enhancing Teachers' Competency

The study also revealed that the dynamic challenge brought by Digital Divide has enhanced the pedagogical competency of seasoned TLE teachers. Their teaching experiences have improved their competencies to handle technology-driven classes in the context of Digital Divide. Participants believed that flexibility and adaptability are the two most important competencies must have to provide an engaging learning environment in spite of the existence of Digital Divide. Participants verbalized:

*"Like now our students are highly manipulative. They are the digital natives so to speak. We have to adapt Sir for them."*

*"Another sir is flexibility and adaptability. I am adaptive into new technologies and learning platforms."*

*"We have also to adapt, we have to be flexible. The bottomline there is, from that digital divide, we have to be very flexible and adaptable. Embrace it."*

*"This guided me to prioritize students' needs, pedagogical consideration and flexibility, empowerment and continuous learning by adapting technology."*

Faculty narratives during the pandemic underscored the effectiveness of adopting flexible approaches, prioritizing essential content, and personalizing instruction to mitigate equity challenges. Rooted in a compassionate ethos, these strategies proved pivotal in addressing the digital divide amid the urgent shift to remote learning (Goin Kono & Taylor, 2021). Emphasizing flexibility and adaptability in teaching is crucial for cultivating inclusive digital learning environments that ensure equitable access to digital resources and opportunities for all students, regardless of their socio-economic circumstances (Pittman et al., 2021). Aside from adaptability and flexibility, being knowledgeable in the use of the digital tool is also another competency that teachers should possess to provide effective digital literacy, as one of the participants verbalized, *"I should embrace also yung personalized learning. Dapat ko din alam yung paggamit ng technology so that mayron din akong maituturo sa mga students natin."* (*"I should embrace also personalized learning. I need to know how to use the technology so that I can teach my learners how to use the technology effectively.*) Research conducted by Elsayary in 2023 highlights that teachers frequently participate in professional development programs aimed at enhancing their digital competence, enabling them to more adeptly identify and address digital disparities. These upskilling initiatives play a crucial role in enhancing teachers' digital skills and integrating technology effectively into their teaching practices (Elsayary, 2023). The continuous professional development of teachers in digital competencies is essential for their adaptation to new technologies and evolving teaching methodologies. Studies, such as those by Chapman et al. (2010), demonstrate that targeted training programs focusing on digital literacy and pedagogy significantly bolster teachers' capacity to support students in navigating the digital landscape of education. Continuous monitoring and self-reflection also emerged as an important competency as stated by one participant, *"Kailangan na icheck natin, i-monitor natin yung yung mga students. Yung mga nasolicit natin na feedback, i-reflect natin, mayroon bang natutunan yung mga bata at kung ano pang pwede natin i-improve sa sarili natin as teachers."* (*We need to check and monitor our students. We should reflect on these feedback so that we can assess whether our learners are learning and what adjustments we can do to improve ourselves as teachers.*)

## CONCLUSION

Based on the significant statements and the identified sub-themes, the findings of the research reveal that seasoned TLE/TVL teachers view their teaching experience within the context of the Digital Divide as both a dynamic challenge and a unique opportunity for growth and innovation. Seasoned TLE/TVL teachers acknowledge the significant challenge posed by unequal access to technology and varying levels of digital literacy among our learners. This created a wide disparity in learners' engagement and learning outcomes. They employ a range of adaptive pedagogical approaches, including differentiated instruction, flexible grouping, and varied assessment methods to address these challenges and to cater to diverse learner needs. Seasoned TLE/TVL teachers emphasize the importance of continuously assessing and understanding individual learner needs and digital competencies through surveys and observations. Collaborative learning and peer support are also highlighted as effective strategies to bridge digital gaps and enhance student engagement. Furthermore, teachers demonstrate a commitment to their professional development. They recognize the need for flexibility and adaptability in integrating new technologies and teaching methods. Overall, seasoned TLE/TVL teachers face the Digital Divide with a proactive and resourceful mindset. The main goal is to foster an inclusive and effective learning environment despite technological challenges.

## RECOMMENDATIONS

Based on the insights gathered from seasoned TLE/TVL teachers regarding their experiences with the Digital Divide, the following recommendations are suggested:

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1. Educational institutions should prioritize efforts to improve access to digital devices and reliable internet connectivity for all learners, particularly those from underserved communities both in rural and urban areas.
2. Institutions and education authorities should invest in ongoing professional development programs focused on digital literacy and effective integration of technology in teaching practices.
3. Encourage the adoption of adaptive pedagogical approaches, such as differentiated instruction, flexible grouping, and varied assessment methods. These strategies cater to diverse learner needs and mitigate the disparities in engagement and learning outcomes.
4. Implement regular assessments and surveys to evaluate learners' digital competencies and needs. This information can guide personalized support and intervention strategies to ensure all students can effectively navigate digital learning environments.
5. Emphasize the importance of flexibility and adaptability among teachers in integrating new technologies and innovative teaching methods. Institutions should support teachers with resources, time for experimentation, and recognition of innovative practices.
6. Allocate resources and funding for research initiatives aimed at developing innovative solutions to address the Digital Divide in TLE/TVL education. Support collaborative research projects that explore effective strategies and technologies for inclusive digital learning.

## LIMITATIONS OF THE STUDY

While this study provides valuable insights from seasoned TLE/TVL teachers, several limitations warrant acknowledgment. Firstly, there is potential sampling bias due to the focus on specific teachers or institutions which may restrict the generalizability of findings to broader contexts. Secondly, findings rely on self-reported experiences. Thirdly, time constraints during the study period may have limited the depth and breadth of data collection and analysis. Additionally, external factors such as evolving educational policies, technological advancements, and socio-economic conditions could affect the relevance and applicability of study outcomes over time. Lastly, the chosen qualitative methodology, including interviews, may inherently limit the study's ability to fully capture the multifaceted nature of Digital Divide issues in TLE/TVL education.

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