# Understanding the digital divide: Contributing factors and their negative effects on rural students' academic performance

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*Abstract: This paper presents a comprehensive review and analysis of research focused on the effects of the digital divide on student learning and academic performance in rural schools. 32 findings analyzed in this review consistently show that limited or absent access to digital technology in these areas hinders students' academic achievement, reduces their classroom participation, and negatively affects their educational outcomes. A key theme emerging from the literature is that unequal digital access reinforces existing educational inequalities. To address these challenges, the paper calls on governments, school leaders, and educational policymakers to take targeted measures to close the digital gap. Recommended actions include enhancing technological infrastructure, providing ongoing professional development for teachers and learners, ensuring equitable distribution of digital devices and resources, and promoting digital literacy among both educators and students.*

*Keywords: Digital Divide, Internet Use, Academic Achievement, Digital Inequality, Urban and Rural Areas*

## Introduction

**Understanding the Digital Divide**

T echnology has shifted from being a luxury to an essential tool for both academic achievement and professional success. Additionally, technology is not only essential for learning but also for securing employment (Barton, 2016). In today's job market, job seekers rely on digital devices to access information, share and download documents, collaborate, and search for work. Reports suggest that "nearly 8 in 10 middle-skill jobs in today's workforce require digital skills," which accounts for 32% of all available jobs (Barton, 2016, p. 4). Despite improvements in global connectivity caused by the increasing broadband and mobile broadband subscriptions, rural, remote, and economically disadvantaged communities continue to face significant connectivity challenges. Students who lack access to broadband internet, affordable service plans, or suitable technological devices face limited learning opportunities, which can negatively affect their academic performance (Kelley & Sisnero, 2020).

The term "digital divide" refers to the disparities in access to information and communication technologies (ICT) and the Internet, highlighting the gap between those who have access to digital tools and those who do not (Miah, 2023). Others define it as a "gap between individuals, households, businesses and geographic areas with regard to their access to ICT and their use of the Internet" (OECD, 2001a, p. 30). Limited internet access, digital illiteracy, and insufficient teacher training are all factors that add to the list of barriers to engaging in digital learning (Bi & Ishak, 2025). These challenges highlight the need for comprehensive government policies and initiatives aimed at improving access to technology and high-speed internet, as well as fostering digital literacy, community capacity-building, and the development of culturally relevant content for Indigenous and remote populations (Reddick, 2000).

The digital divide in Canada has become increasingly pronounced, with higher-income groups experiencing greater improvements in internet access compared to lower-income groups, who continue to face limited or no access. According to a report by Statistics Canada, although some Canadians without internet access perceive little value in using the internet, there is growing concern that this lack of connectivity could lead to significant social and economic disadvantages. As Canada transitions into an information-driven society, access to reliable digital technology and internet has become crucial for both education and employment, particularly in today's rapidly evolving job market (Reddick, 2000). Although designed to reduce the digital gap, programs like CAP and the Canadian Learning Network (CLN) have been insufficient in bridging this gap, and rural students continue to face barriers to achieving equitable educational outcomes (Reddick, 2000).

The COVID-19 pandemic highlighted the gaps in access to at-home learning and underscored the digital and educational inequalities present in society. This period made educators and policymakers more aware of the varying conditions that influence students' home learning environments, which are crucial factors in determining their ability to engage with education and achieve long-term academic success (Porter et al., 2021). When the pandemic forced

schools to close, rural students were disproportionately disadvantaged by weak internet connections, while urban students were able to access online learning with fewer barriers. In Canada, although schools worked quickly to transition to remote learning, many low-income families and those residing in rural areas struggled to access digital devices and reliable internet. It took several months before the Canadian government could provide laptops to low-income families to support students in accessing education from home. While efforts were made to equip students in rural areas with the necessary technology for remote learning, the pace and scale of these efforts varied significantly across different regions. The prolonged period of limited or no digital engagement left rural learners with significant gaps in knowledge and skills, which teachers are still struggling to close. These post-pandemic consequences have reinforced existing inequities in education, making the digital divide an urgent challenge that demands immediate attention.

The digital divide is especially pressing now because the pandemic not only disrupted education but also magnified long-standing inequalities that continue to affect students today. It is a global issue, influenced by factors such as income, education, age, and geographic location. Studies suggested that there are significant disparities in the use of digital technologies, with younger, wealthier, and more educated individuals being more likely to upload and download content online. In the United States, older adults, individuals with lower levels of education, and those with limited income are less likely to use the internet (Miah, 2023). Developing countries face even greater challenges due to insufficient infrastructure and resources, which further exacerbates the ongoing gap in digital connectivity (Miah, 2023).

## The Impacts of Internet and Digital Technology Access on Students' Academic Success

Reliable internet access and strong digital literacy open opportunities for students to fully participate in learning and achieve greater academic progress. This is especially important in rural and low-income communities, where unreliable or nonexistent home internet makes it difficult for students to complete assignments or attend virtual classes. Consequently, many are forced to rely on public spaces such as libraries or even fast-food restaurants to access Wi-Fi for their schoolwork (Barton, 2016). A Pew Research study reveals that 17% of teenagers aged 13 to 17 report being unable to complete their homework due to unreliable internet connections (Kelley & Sisnero, 2020). Another research, conducted by the Quello Center at Michigan State University, also highlights that students without consistent internet access tend to have lower grade point averages (GPAs), perform worse on standardized assessments such as the PSAT and SAT, and show less enthusiasm for higher education opportunities (Kelley & Sisnero, 2020). These issues disproportionately affect students from marginalized backgrounds, including Native American, Black, and Hispanic communities, as well as those from low-income families and rural locations (Kelley & Sisnero, 2020).

For students, equitable access to digital tools and opportunities for digital skills development enhances their ability to compete academically and prepare for future opportunities. Those with reliable internet, access to modern digital devices, and adequate training can access online learning resources and participate in various educational opportunities (Reddick, 2000). Access to resources and specialized training in digital skills is linked to higher academic achievements and allows students to meaningfully engage in online learning. Although internet access is essential, it is insufficient to overcome the social and economic inequalities underlying the digital divide (Reddick, 2000). This is because academic success today depends not only on having access to technology but also on digital literacy and the ability to use technology responsibly and effectively (Vodopivec, 2024). Being digitally literate involves the capacity to use digital technology and communication tools to locate, utilize, manage, assess, and communicate information (Lennon et al., 2003). When students use the internet for research, communication, and collaboration, they strengthen their subject knowledge and study skills. Additionally, when they access online materials, lectures, and interactive platforms, they have a better overall learning experience. Studies indicated that those who can responsibly and skillfully use the internet often perform better academically (Banik, 2021; Yusof & Steinmueller, 2022). In other words, students with stronger digital skills and responsible online behaviour generally achieve higher results and set more ambitious learning goals (Banik, 2021). Yet, due to the main causes behind the digital divide, which are unequal broadband access, limited digital literacy education, financial constraints, and disparities in school resources, many students are left disadvantaged. These inequalities directly shape their educational outcomes, restricting participation, lowering performance, and narrowing long-term aspirations.

Beyond academic performance, internet access plays a critical role in shaping students' academic ambitions and enriching their overall educational experiences (Bouygues, 2019). The internet is a valuable tool that supports

academic activities such as research and communication (Amponsah et al., 2022; Kumah, 2015). By fostering collaboration and creativity, technology enhances the quality of education and allows teachers to design engaging lessons while facilitating distance learning (Raja & Nagasubramani, 2018). Research shows that students with regular internet access not only achieve higher GPAs and perform better on standardized reading assessments but also engage more actively in planning for their futures (Chen & Bai, 2022; Jackson et al., 2006). They also engage in frequent communication with peers and teachers, which enhances their learning and helps them set and pursue long-term educational goals (Chen & Bai, 2022). Students with a reliable internet connection can review materials, complete assignments beyond school hours, and actively participate in remote learning. Evidence shows that those with consistent home internet access achieve considerably higher academic outcomes (Badasyan & Silva, 2018). For students in rural areas, online resources provide access to information and academic support that would otherwise be unavailable, helping them set clearer goals and strengthen their educational aspirations. These findings demonstrate that connectivity is not a luxury but a necessity and fundamental component of educational equity.

### Research Questions

1. What are the key factors that contribute to the digital divide?
2. What are some impacts of the digital divide on students and their educational outcomes?

## Methodology

This paper employs a qualitative meta-synthesis approach, which, as described by Erwin, Brotherson, and Summers (2011), is a systematic and intentional method for synthesizing and interpreting data across qualitative studies. This method differs from a traditional narrative review in its process of generating new conceptual insights from existing literature. While a narrative review typically describes and summarizes findings, a qualitative meta-synthesis systematically identifies, organizes, and integrates themes from a wide range of studies to build a new, more comprehensive understanding of a topic.

For this research, I followed a multi-step process. First, I conducted a systematic search of electronic databases, including ERIC and Google Scholar. Using a set of descriptors, including "digital divide," "rural education," "technology gap," "academic achievement," and "student outcomes." I collected studies and reports, including qualitative research studies, peer-reviewed articles, government reports, and books in the disciplines of education, information and communication technology, public policy, equity, and digital literacy. After filtering through a vast amount of information, a total of 32 key findings across these sources were selected and analyzed. My selection process was based on the following specific criteria:

### Inclusion Criteria

- Studies focusing on the effects of digital technology on student learning.
- Explicit mention of challenges faced by rural communities.
- Peer-reviewed studies published in a complete form and written in English.

### Exclusion Criteria

- Studies not directly relevant to student academic performance.
- Studies not focused on rural contexts.
- Incomplete studies or those written in languages other than English.

The studies were systematically reviewed and analyzed to uncover recurring themes and consistent patterns. A thematic analysis approach was applied to categorize the findings into core areas, including infrastructure challenges, digital literacy limitations, and socioeconomic influences. Through this process of grouping related ideas, several key themes emerged, demonstrating that the digital divide extends beyond connectivity alone and represents a multifaceted issue shaped by a range of interconnected factors.

For transparency, a supplementary table (Appendix A) summarizes the reviewed studies. This table includes the author(s), year of publication, key findings, and their relevance to this paper's research questions. This systematic approach of identifying and integrating themes across diverse studies allowed this paper to generate a new

conceptual framework that addresses the digital divide as a multi-layered challenge requiring integrated policy solutions.

### A Note on Methodological Bias

My positionality is influenced by my personal experience as a student and educator in today's technology-driven world. These perspectives may have impacted my initial interest in the topic of technology's effect on learning. To mitigate potential bias, I followed a systematic process of qualitative meta-synthesis, ensuring the inclusion and exclusion criteria were applied consistently across all sources of information. I concentrated on drawing the thematic analysis from the findings of the 32 reviewed studies, rather than allowing my own assumptions to guide the process.

## The Key Factors that Contribute to the Digital Divide

### Broadband Gaps and ICT Integration Barriers in Rural Education

Rural schools face multiple disadvantages when it comes to the use of digital technology and internet access. For instance, they are less likely to have dedicated ICT coordinators, particularly specialists who are not burdened with additional teaching responsibilities. Research highlighted that rural schools typically have access to fewer educational software programs and make less use of specialized applications across different subjects. Additionally, teachers in rural areas often receive limited technical training. These findings indicated that the overall priority given to ICT integration and support is significantly lower in rural schools compared to their urban counterparts (Looker, 2003).

The SITES dataset, which provides a detailed look into the availability of computer resources in rural and urban schools, reveals that rural schools are less likely than urban schools to have a designated technology coordinator. Only 43% of rural schools have one, compared to 63% in urban schools. Additionally, technology coordinators in rural schools are more likely to have teaching responsibilities, with 89% of rural coordinators also teaching, compared to 83% or fewer in urban schools. This dual role leads to rural coordinators spending less time on technology management tasks than their urban peers. Additionally, the survey results show that urban schools have greater access to educational software for core subjects like mathematics and language arts. Urban schools also report more opportunities for knowledge transfer about ICT among teachers, along with more external training options. As a result, urban technology coordinators are more likely to feel adequately supported in several areas of ICT. These schools also place a stronger emphasis on securing support for online curriculum services. Unlike urban schools, rural schools face more barriers in achieving their technology-related goals, such as software complexity and insufficient technical support. They also report slow network connections as their main barrier to progress. (Statistics Canada, 2001).

Remote areas often lack the necessary broadband infrastructure, making internet access impossible regardless of affordability (Kelley & Sisnero, 2020). According to a 2019 report from the Federal Communications Commission (FCC), 21.3 million Americans did not have access to broadband at industry-standard speeds. Students in rural areas, particularly those attending under-resourced schools, face limited access to both digital tools and stable internet connections. They struggle with slow or unreliable broadband that disrupts learning by affecting students' ability to complete assignments, participate in virtual lessons, and access online resources. For example, one report finds that 18% of Canadians, primarily from rural and remote areas, do not have access to internet speeds of 50/10 Mbps, which is considered the minimum standard for reliable internet access by the Canadian Radio-television and Telecommunications Commission (CRTC). Without this standard, users may face difficulties accessing educational resources, participating in online learning, and engaging in video-based learning or communication (Ruimy, 2018, p. 6). This substantial connectivity gap puts rural students at a disadvantage compared to their urban counterparts, who have access to more reliable and faster internet connections. These barriers not only undermine academic achievement but also negatively affect students' long-term educational and career opportunities, supporting inequalities between rural and urban populations.

### Economic Inequalities and Affordability Barriers to Digital Access

Rural schools and communities also face significant economic challenges that hinder their ability to provide adequate digital infrastructure. As some findings suggest "rural schools and rural communities often have a weaker

economic base," which contributes to the difficulty of offering essential services like internet access and technical support (Looker, 2003, p. 481). Extending these services to remote areas, which are far from urban centers, can be extremely expensive. Studies report that lower socio-economic groups are most vulnerable to the digital divide, as they often lack the financial means to afford internet services, modern devices, or the necessary training to utilize digital tools effectively. Rural and remote communities are specifically impacted by these issues, with varying levels of connectivity and a lack of perceived need or interest in digital technology (Reddick, 2000). As a result, these communities often struggle to provide the same level of ICT resources and opportunities as their urban counterparts, putting rural youth at a significant disadvantage when it comes to accessing digital education and technology.

Although many families recognize the value of digital technology in education, financial constraints often prevent them from affording the necessary tools and internet services (Metros & Sun, 2011). In 2018, an estimated 13.5 million K-12 public school students in the United States were without either sufficient internet access or appropriate digital devices for remote learning. In California alone, over 100,000 college students from economically disadvantaged households were believed to lack reliable internet access (Kelley & Sisnero, 2020). Approximately two-thirds of individuals from middle- to upper-income groups and over half of those in lower income brackets view internet service costs as a persistent barrier to access (Reddick, 2000). Individuals who are younger, wealthier, and more educated are more likely to have access to digital technologies and the internet, whereas those from lower-income backgrounds and with limited education are less likely to benefit from such access (Reddick, 2000).

Barriers to internet access disproportionately affect lower-income individuals, those with limited technical skills, and people living in rural or remote areas. Key factors contributing to these challenges include unemployment, lower educational attainment, and age-related digital illiteracy. Many factors, including financial constraints, technical literacy, and social literacy, affect how individuals use and engage with digital technologies to access and share information (Reddick, 2000). One of the major barriers to digital learning is the issue of cost and affordability, which can limit students' ability to access the internet and use technology effectively. Financial constraints play a crucial role in determining how students from different income groups engage with digital tools. Multiple findings reveal that barriers to internet access disproportionately affect lower-income individuals, those with limited technical skills, and people living in rural or remote areas. Key factors contributing to these challenges include unemployment, lower educational attainment, and age-related digital illiteracy.

A clear relationship between income, education, and broadband adoption exists. Higher-income households are significantly more likely to own computers and use the internet, with educational attainment strongly influencing digital engagement (Reddick, 2000). For instance, youth and individuals with higher levels of education engage with digital technology at higher rates. Additionally, "the households with less educational attainment have lower rates of broadband adoption" (Barton, 2016, p. 5). The disparity is stark: fewer than 50% of individuals with only a high school diploma use the internet, compared to over 90% of those with a college degree (Barton, 2016). This gap highlights how income and education levels significantly impact access to digital learning resources, further entrenching social inequalities.

As shown in Figure 1, the federal government's minimum high-speed Internet connectivity target for all Canadians: 50/10 Mbps (50 megabits per second for downloads and 10 megabits per second for uploads) is available to 91.4% Canadians and 62% those living in rural communities.
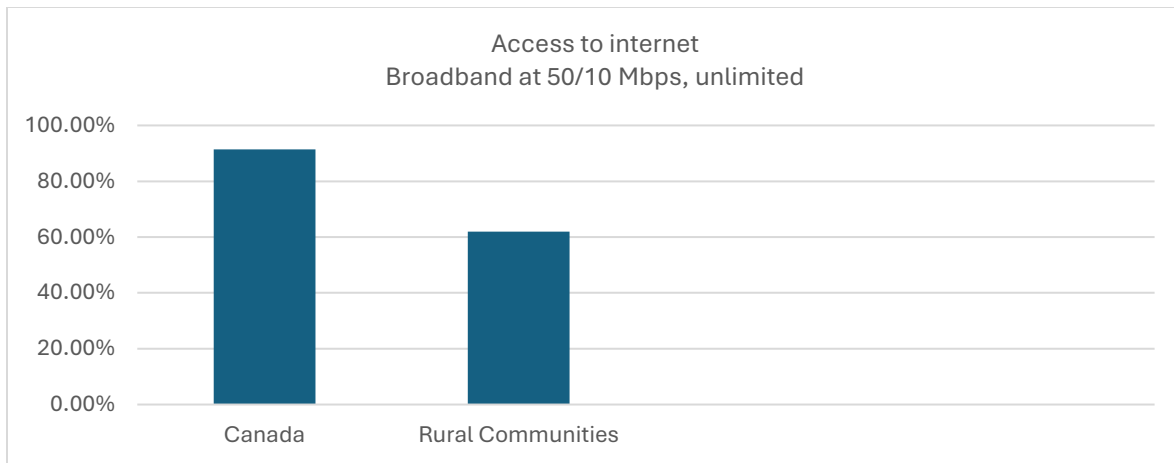
Figure 1.÷ Access to internet (Broadband at 50/10 Mbps, unlimited)
*Source: Canadian Radio-television and Telecommunications Commission, 2025*

As shown in Figure 2, in 2019, the broadband at 50/10 Mbps unlimited was available to almost 90% of Canadians, with the exception of those living in Yukon, Northwest Territories, and Nunavut, where this type of internet connection was completely unavailable.
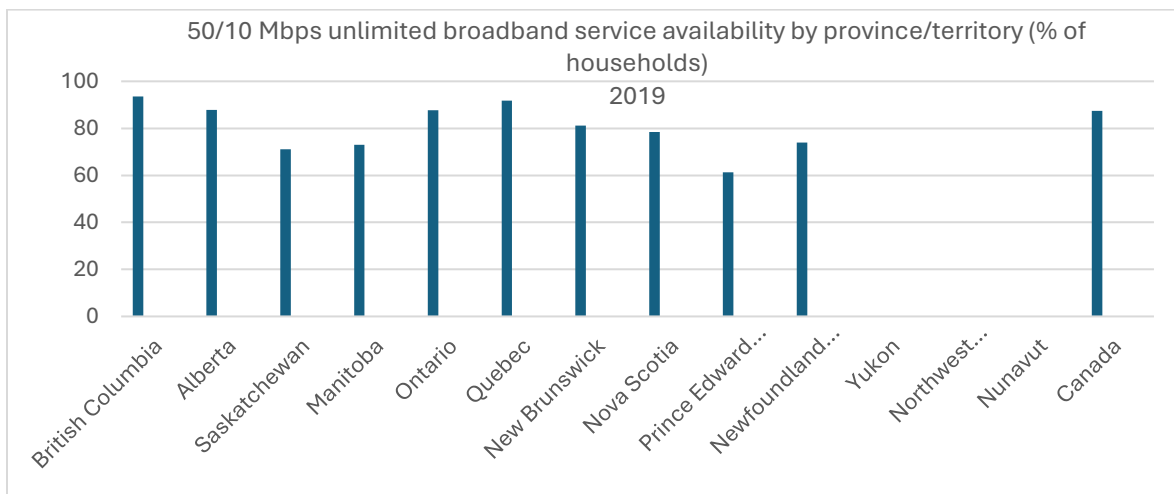


Figure 2: 50/10 Mbps unlimited broadband service availability by province/territory
*Source: Canadian Radio-television and Telecommunications Commission, 2020*

**Digital Literacy: A Key Factor Contributing to the Digital Divide**

Digital literacy is often overlooked when discussing the digital divide, yet it plays a critical role in bridging the gap between those who have access to technology and those who do not. Research indicates that merely owning digital devices does not equate to being digitally competent. In fact, many individuals, particularly in underserved communities, may have access to technology but lack the necessary skills to use it effectively. Digital literacy involves more than basic reading and writing; it also includes the ability to use technology and information tools meaningfully. Social literacy, a subset of digital literacy, refers to the capacity to critically evaluate, interpret, and apply information in various contexts.

Studies show that digital competence exists at varying levels, from basic understanding to advanced proficiency. According to the European Qualifications Framework (EQF), a standardized system for comparing qualifications across European countries, there are eight distinct levels of digital literacy. Each level is defined by specific learning outcomes that demonstrate the user's ability to manage, evaluate, and communicate information using digital tools. This highlights that digital literacy is not a uniform skill but varies greatly depending on education, exposure, and the opportunity to learn. They are as follows:

Table 1: Levels of Digital Literacy (EQF Framework)

| Level | Task |
|---|---|
| Level 1: Information and Data Literacy | 1.1. Browsing, searching and filtering data, information and digital content<br>1.2. Evaluating data, information and digital content<br>1.3. Managing data, information and digital content |
| Level 2: Communication and collaboration | 2.1. Interacting through digital technologies<br>2.2. Sharing information and content through digital technologies<br>2.3. Engaging in citizenship through digital technologies<br>2.4. Collaborating through digital technologies<br>2.5. Netiquette<br>2.6. Managing digital identity |
| Level 3: Digital content creation | 3.1. Developing digital content<br>3.2. Integrating and re-elaborating digital content<br>3.3. Copyright and licences<br>3.4. Programming |
| Level 4: Safety | 4.1. Protecting devices<br>4.2. Protecting personal data and privacy<br>4.3. Protecting health and well-being<br>4.4. Protecting the environment |
| Level 5: Problem solving | 5.1. Solving technical problems<br>5.2. Identifying needs and technological responses<br>5.3. Creatively using digital technologies<br>5.4. Identifying digital competence gaps |

*Source: Joint Research Centre. (n.d.). European Commission Joint Research Centre. Retrieved from https://joint-research-centre.ec.europa.eu/*

## Policy Efforts and the Ongoing Digital Gap

Access to the internet and emerging technologies remains closely tied to income, education, and geographic location, with rural households often facing both technological and economic barriers. These disparities have created a persistent digital divide, where those living in marginalized groups, low-income families, and rural communities are frequently left without the same educational opportunities as their urban peers. Addressing both technological access and digital proficiency is vital for enabling meaningful participation in modern-day learning. However, governments and policymakers have the capacity to address these gaps by providing targeted funding to ensure that all communities meet a minimum standard of digital connectivity. Every child deserves equal access to education, and achieving this requires collaboration among governments, policymakers, and stakeholders. Through collective action, we can create a more equitable digital future that supports both educational and employment opportunities for all.

Over the past two decades, government officials and policymakers have focused on improving education and student performance using information and communication technologies; however, significant efforts are still needed to bridge the persistent digital divide (Atasoy et al., 2022). Their policies have prioritized lifelong learning, job creation, and access to public services, with various initiatives designed to address digital access disparities. Programs such as Industry CAP and SchoolNet were created to enhance technological access and skill-building in underserved communities, including rural areas. Similarly, Georgia's "Achieving Connectivity Everywhere Act" has focused on creating broadband maps to identify underserved regions. States such as Virginia and Vermont have also pursued partnerships and funding programs to expand internet infrastructure (Kelley & Sisnero, 2020). As a result, there has been an increase in fixed broadband subscriptions. According to one finding, "the number of fixed

broadband subscriptions per 100 inhabitants worldwide increased from 3.7 in 2005 to 17.8 in 2021. Active mobile-broadband subscriptions soared from 8.3 per 100 inhabitants to 83.5 between 2009 and 2022, reflecting the spread of smartphones and other personal devices. (OECD, 2025, p. 70). Similarly, improving internet connectivity in rural areas has been a key political priority in Canada, with several policy proposals, including the Universal Broadband Fund (UBF), Connect to Innovate Program, and the CRTC Broadband Fund. These initiatives are designed to provide households with speeds of at least 50/10 Mbps and support rural and Indigenous communities (Government of Canada, n.d.). However, despite these efforts, many rural schools still struggle with limited access to technology, largely due to a lack of infrastructure and resources necessary for meaningful technological integration in education.

## Recommendations

The government's lack of investment in low-density areas is a significant barrier to improving broadband access. While many Canadian communities have some form of Internet access, the speeds in many rural areas are so slow that they can only support a few basic uses (Ruimy, 2018).  Research suggests that improving broadband internet connectivity in rural and remote regions presents numerous challenges, as major service providers typically focus their investments on high-density, more profitable areas (Ruimy, 2018).  However, smaller providers, non-profit groups, and other companies could successfully bring broadband to these underserved areas if the Canadian government changed its rules, especially regarding how it manages frequencies, oversees networks, and allocates funding. "To facilitate broadband deployment in rural and remote communities, the Committee recommends, notably that the Government of Canada consider ways to increase the accessibility of funding programs for small providers, non-profit providers and non-incumbent providers, and consider the spectrum allocation process for the purpose of broadband deployment" (Ruimy, 2018, p. 2).  This is important because broadband internet could help students achieve higher academic goals and improve living in "rural and remote areas by providing access to things like educational resources, better healthcare, and more job opportunities (Ruimy, 2018, p. 2).

**Strategies to Promote Equity, Access, and Participation**

### Involve the Marginalized and Disadvantaged Groups in the Decision-making Process

Digital divides disproportionately affect many Canadians, including marginalized groups, low-income households, and people living in rural areas. To improve affordability and digital literacy, governments, policy makers, and investors could expand efforts to improve affordability and digital literacy by providing targeted support to these communities. Equally important is ensuring the active participation of remote and Indigenous communities in the decision-making process. Involving these groups can lead to policies that better reflect their unique needs, values, and lived experiences. Such inclusive approaches can strengthen local capacity, support economic development, and lead to more effective, sustainable, and culturally responsive outcomes (First Nations Technology Council, 2024; OECD, 2025).

### Provide Digital Literacy Education to Help Individuals Use Technology Responsibly for Finding Jobs, Reaching Educational Goals, and Enhancing Their Quality of Life

Providing access to technology and the internet, along with appropriate education and training, is essential to bridging the digital divide. It is not enough to simply offer access—individuals of all ages and backgrounds must be equipped with the skills to navigate digital environments, engage in online learning, and manage a healthy balance between digital and offline life (OECD, 2025, p. 71). Research shows that access to digital tools alone does not automatically enhance academic performance (Vodopivec, 2024). Therefore, digital literacy education is just as critical as connectivity. To reduce the risk of long-term disadvantage for non-users, government initiatives must adopt a more comprehensive approach to literacy that includes both access and the skills necessary to navigate the digital world. Policymakers should focus on bridging the digital divide in rural areas with immediate actions and long-term plans to ensure everyone has equal opportunities for education and employment.

### Expand Affordable, Reliable Internet Infrastructure in Rural and Remote Areas Through Public–Private Partnerships

Addressing the digital divide and achieving universal broadband access across Canada is important to ensuring all students, especially those living in rural communities, can learn and participate in the digital world. By bridging the digital divide, policymakers can promote equal educational opportunities and empower students from all

backgrounds to thrive. The governments and policymakers are encouraged to prioritize addressing the digital divide challenges through both short-term initiatives and long-term policy strategies (Ruimy, 2018; Kelley & Sisnero, 2020). This could include providing devices to students (both at home and in schools), investing in building internet infrastructure, educating communities about responsible and effective use of technology, and offering low-cost internet plans to low-income families. Additionally, the government could partner up with local internet service providers to build more reliable and affordable internet connections in remote areas. Such initiatives would ensure that people in rural areas have the same opportunities to access online education, healthcare services, and job opportunities as those in urban centers (OECD, 2025).

## Study contributions and implications

This paper expands on the summary of existing findings by synthesizing them into a policy framework designed to address the complex nature of the digital divide. While prior research has consistently identified the central issues of limited broadband access in rural areas (Ruimy, 2018) and the consequent negative impact on academic performance, this research paper advances this discussion by proposing a specific set of solutions. Specifically, it advocates for targeted policy changes in government funding, which would empower smaller providers and offer better solutions to the lack of private sector investment. In addition, I propose recommendations that take a broad and balanced approach, addressing both the need for strong technological infrastructure and the importance of inclusive policies and digital literacy education. By bringing these areas this paper provides a clear guide for policymakers and stakeholders to work toward not just equal access to technology, but real educational equity for all students.

Additionally, this paper adds to the existing research by demonstrating how digital gaps are directly linked to student performance, revealing that current broadband policy standards do not adequately meet the needs of modern-day education. The recommendations shared here are guided by the principles of equity, access, and participation. It is important to understand that lasting change cannot come from focusing only on connectivity. Instead, the solutions discussed in this paper promote equity by offering a plan to ensure that all communities, regardless of their location or socioeconomic background, have the basic technology needed to grow and function. Access goes beyond simply providing digital devices and infrastructure. It also includes ensuring that individuals have the knowledge and skills to use them effectively to work and learn in today's world. In other words, providing communities with computers, tablets, and internet access is not enough to bridge the digital divide. For access to be meaningful, individuals also need to develop the skills and knowledge to use these tools effectively, which includes understanding how to navigate online learning platforms, evaluate information, and use digital tools for problem-solving. Real participation refers to the active involvement of marginalized groups in the decision-making process, especially when creating policies that impact their lives. By doing so, the recommendations aren't just focused on technical solutions such as improving infrastructure, but also on ensuring fairness and inclusivity.

## Conclusion

The findings of this study highlight the need for policymakers and educators to go beyond funding connectivity and embrace a comprehensive strategy for achieving digital equity. Governments should create funding models and policies to prioritize broadband deployment in rural and remote areas. Most importantly, policy development should involve direct consultation with the communities affected, particularly Indigenous populations, to ensure solutions are both culturally responsive and sustainable.

School districts should invest in both infrastructure and human capacity, including the appointment of coordinators and trained professionals to manage digital systems and provide ongoing professional development for educators. To meet the needs of modern and diverse learners, educators must not only have access to digital technology but also develop the skills to effectively integrate it into their instruction. At the same time, students should be taught digital literacy not just as a technical skill but as a core competency essential for academic success and long-term development.

**Appendix A**

Table 2: Reviewed Studies

| Author & Year | Key Findings |
|---|---|
| **Empirical Evidence** | |
| **Amponsah et al. (2022)** | Found that internet usage positively impacts student success for academic tasks like research and communication.<br>Relevance: Digital access serves as a positive tool for academic achievement. |
| **Atasoy et al. (2022)** | Showed that ICT use, alongside parental support, influences science achievement.<br>Relevance: Technology integration, when supported, can enhance student performance. |
| **Badasyan & Silva (2018)** | Found that Brazilian students with consistent home internet access achieved significantly higher academic outcomes.<br>Relevance: Home internet access is a crucial factor in educational equity and academic success. |
| **Banik (2021)** | Demonstrated a positive relationship between responsible and skillful internet use and academic performance among university students.<br>Relevance: Digital literacy is as important as access. |
| **Bi & Ishak (2025)** | Identified barriers to digital learning and engagement, including access issues and insufficient teacher training.<br>Relevance: Provides international context on the barriers to digital learning. |
| **Bouygues (2019)** | Argued that, if used responsibly, educational technology can help students learn more effectively and achieve higher results.<br>Relevance: Technology enhances the quality of education and learning. |
| **Chen & Bai (2022)** | Found that internet access among Chinese adolescents, particularly in rural areas, improved academic performance and future orientation.<br>Relevance: Internet access impacts both academic and future goals in a rural context. |
| **Jackson et al. (2006)** | Found a strong link between home internet use and improved academic performance, including higher GPAs and standardized reading scores.<br>Relevance: Consistent internet access is linked to better academic outcomes. |
| **Kumah (2015)** | Found that students use the internet for academic tasks like research and communication.<br>Relevance: Reinforces the academic benefits of internet access. |
| **Looker & Thiessen (2003)** | Showed that rural schools face unique disadvantages regarding ICT, with less access to technology coordinators and educational software.<br>Relevance: Explores the effects of systemic barriers within rural school systems. |
| **Miah (2023)** | Highlighted that digital inequality is a global issue influenced by income, education, and geography.<br>Relevance: Provides a broad context for our understanding of the digital divide. |
| **Statistics Canada (2001, 2003)** | Revealed significant disparities in internet access and technology use between urban and rural households and schools.<br>Relevance: Provides crucial, foundational data for the paper's focus on the digital divide in Canada. |
| **Yusof & Steinmueller (2022)** | Correlated internet use with improved academic performance due to access to rich learning materials.<br>Relevance: The internet acts as a compensatory tool for students in under-resourced schools. |
| **Policy Analysis** | |
| **Barton (2016)** | Supports a framework to close the digital divide, highlighting that many jobs require digital skills. |

| | |
|---|---|
| | Relevance: Supports the policy recommendations and the broader argument that the digital divide affects employment opportunities. |
| ***Canadian Radio-television and Telecommunications Commission (CRTC) (2020, 2025)*** | Provides statistical data and reports on internet services and connectivity standards in Canada.<br>Relevance: Supports the foundational policy context and highlights the ongoing challenges of meeting minimum connectivity standards in rural areas. |
| ***First Nations Technology Council (2024)*** | Highlights ongoing challenges for Indigenous communities regarding internet connectivity.<br>Relevance: Supports the call for inclusive policy-making and the active participation of marginalized communities. |
| ***Innovation, Science and Economic Development Canada (2021, 2025)*** | Describes government initiatives like the Universal Broadband Fund and Connect to Innovate.<br>Relevance: Provides direct examples of government efforts to address the digital divide and informs the paper's policy recommendations. |
| ***Kelley & Sisnero (2020)*** | Presents a policy brief on broadband access and the digital divide.<br>Relevance: Used to establish the policy context and the need for government intervention to close the digital gap. |
| ***OECD (2001, 2025)*** | Provided global data and reports on trends in education and technology.<br>Relevance: Offers an international perspective on the digital divide and its socioeconomic impacts. |
| ***Reddick et al. (2000)*** | Defined the "dual digital divide" and identified financial, technical, and social literacy as key contributing factors.<br>Relevance: Provided foundational concepts for the paper's discussion of barriers to digital access and literacy. |
| ***Ruimy (2018)*** | A government report highlighting policy failures in addressing broadband access in low-density areas.<br>Relevance: Supports the argument that government policy changes are necessary to address infrastructure challenges in rural Canada. |
| ***Reviews of Related Literature*** | |
| ***Metros & Sun (2011)*** | Provides a summary of previous literature on the digital divide and its impact on academic performance.<br>Also offers an overview of existing research. |
| ***Porter et al. (2021)*** | Discusses access and inclusion for students with disabilities in virtual learning, highlighting the inequalities magnified by the pandemic.<br>Supports the argument that the pandemic exposed educational and digital inequalities. |
| ***Raja & Nagasubramani (2018)*** | Provides a general overview of the impact of modern technology on education.<br>Contributes to the background on how technology is used in contemporary education. |
| ***Vodopivec (2024)*** | A review of studies exploring the negative effects of digital technology on student learning.<br>Provides a balanced perspective by highlighting drawbacks like cognitive overload and multitasking behaviour. These findings reinforce the view that the digital divide is not solely about access to the internet or devices, but also about the essential need for digital fluency and proper guidance to minimize potential risks. |

Note: This table provides a summary of the studies, reports, and literature reviews used as the foundation for this paper. The studies are categorized by type and provide a clear overview of the key findings and their direct relevance to the research questions.

Canadian Journal for New Scholars in Education
Volume 16, Issue/Numéro 2
Revue canadienne des jeunes chercheures et chercheurs en éducation
Fall/Automne 2025

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