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Article abstract

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Abstract

Despite known inequalities of digital access in rural Canada, we know little about the foundational digital literacies learning needs of students attending rural elementary schools. This exploratory case study, conducted in Ontario, presents 13 rural-serving Grade 4–6 teachers' insights on the access needs and digital literacies learning needs of their students. Results point to a set of mixed digital materialities and opportunities across home and school that raise concerns of digital marginalization for children who are least connected. Teachers named 14 unique digital literacies learning needs in relation to online reading, digital writing, and participation. Their insights also reflect an understanding of digital literacies learning as situated in a complex assemblage of structural, social, emotional, cultural, cognitive, developmental, technological, and material considerations. Implications for policy and the design of uniquely rural solutions to digital literacies instruction are discussed.

Keywords: digital literacies learning, rural teacher insights, elementary education, digital inequalities, rural digital divides

Résumé

Même si les inégalités en matière d'accès au numérique dans les régions rurales du Canada sont connues, notre compréhension des besoins fondamentaux des élèves des milieux ruraux en matière d'apprentissage des littératies numériques est très limitée. Cette étude de cas exploratoire, menée en Ontario, présente les perceptions de 13 enseignant[e]s de 4e à 6e année en milieu rural sur les besoins de leurs élèves en matière d'accès au numérique et d'apprentissage des littératies numériques. Dans l'ensemble, les participant[e]s ont décrit une variété de conditions d'accès au numérique à la maison et à l'école pour leurs élèves. Tout en considérant le lien entre l'accès au numérique et le développement des littératies numériques, les analyses soulèvent des inquiétudes quant à la marginalisation numérique des enfants les moins branchés. Les participant[e]s identifient 14 besoins d'apprentissage uniques quant à la lecture en ligne, l'écriture numérique et la participation. La synthèse de leurs perceptions reflète une compréhension complexe et située de l'apprentissage des littératies numériques, car les dimensions structurelles, sociales, émotionnelles, culturelles, cognitives, développementales, technologiques et matérielles figuraient dans les observations partagées. La discussion fait état de l'importance de ces données pour le développement de la politique et pour la conception de solutions spécifiques à l'enseignement des littératies numériques en milieu rural.

Mots clés : l'apprentissage des littératies numériques, les perceptions du personnel enseignant en milieu rural, éducation primaire, les inégalités numériques, les fractures numériques en milieu rural

Introduction

For students, the development of digital skills and digital literacies practices (Lankshear & Knobel, 2008) depends on access to computers and the Internet (Haight et al., 2014; Hargittai & Hinnant, 2008; Howard et al., 2010; Van Dijk, 2005). Although the persistent lack of Internet infrastructure in rural communities is known (LaRose et al, 2007; Salemink et al., 2017) millions of rural Canadians are still not able to access the Internet reliably and affordably (Hambly & Rajabiun, 2021). This infrastructure divide means that rural Canadians—including rural youth—face significant barriers to participation in digital life.

Approximately 17% of the Canadian population—or about 6.6 million people—live in communities designated as rural (Statistics Canada, 2022). National broadband connectivity estimates indicate that 38% of rural communities remain digitally underserved, meaning that even if they want to connect, and can afford the associated costs, residents and businesses in rural Canada cannot access broadband Internet services that meet the minimum national standard of 50 megabytes per second download and 10 megabytes per second upload speeds (Canadian Radio-television and Telecommunications Commission [CRTC], 2020, 2023; Hambly & Rajabiun, 2021). For young adults aged 15–24, living in a rural community is a statistically significant and *negative* predictor of using advanced-level digital skills and strategies (Wavrock et al., 2021). By comparison, suburban and urban youth of the same age are *more* likely than the general Canadian population to be "advanced" Internet users (Wavrock et al., 2021).

Digital divides of access to broadband, and, by extension, to opportunities for digital skill development (Chen, 2015; Collins & Wellman, 2010; Hoechsmann & DeWaard, 2015; Mingo & Bracciale, 2018; Wavrock et al., 2021) represent layered marginalizations that have implications for the future lives that young people might imagine for themselves, and for their capacity to participate in the digital cultural practices of their generation, which are important for their social development (Dahlström, 2022). Although much has been written about the perils of too much digital access for children and teens (McCrory et al., 2022; Orben & Blakemore, 2023; Twenge, 2020), a recent study of more than 3,200 teens aged 13–17 living in rural Michigan found that lack of access to the Internet was a strong and statistically significant predictor of low self-esteem (Hampton & Shin, 2023). Participants with no Internet, slow Internet, cell phone-only Internet access, or those whose access to the Internet was limited because of restrictive digital

parenting, scored lower on a standardized measure of self-esteem than teens who reported the highest media use in the study. The authors conclude that "the cost to psychological well-being due to disconnection, especially inequality in Internet access, may be more acute in rural areas." (Hampton & Shin, 2023, p. 642).

Access divides also limit opportunities for youth to develop (a) online resilience, or the capacity to bounce back from adverse experiences online (Rodriguez-de-Dios et al., 2018), and (b) the digital literacies skills that some evidence suggests may play a protective role for children and teens while they navigate digital environments (Livingstone et al., 2021; Stoilova et al., 2021; Vissenberg et al., 2022). Although foundational digital literacies, which we define as the assemblage of skills, strategies, practices, and dispositions that enable a person to read and understand digital texts, to create digital texts, and to participate with confidence in digitally networked environments for a range of personal, economic, academic, professional, and civic purposes (Hagerman, 2017; Leu et al., 2018; McLean & Rowsell, 2020) are essential for contemporary life in Canada (Brisson-Boivin & McAleese, 2021), we have very little research that has focused specifically on digital literacies learning in rural Canadian schools (Dewaard & Hoechsmann, 2021; Doyle-Jones, 2019; Hébert et al., 2021; Wilson et al., 2015). This lack of research focused on the specific digital literacies learning needs of rural youth means that recommendations for approaches to digital literacies teaching may overlook rural needs. A recent analysis by Petrone and Wynhoff Olsen (2021) described the need for a critical rural English pedagogy in the United States that "marks rurality as a visible social construct and interrogates it with and through the English curricula" (p. 119). A similarly critical approach to the teaching of digital literacies, with considerations for the social, structural, and material realities of rurality, may be needed.

Almost a decade ago, Chen's (2015) study of digital divides in Ontario—the context of the current study—found that public schools situated in communities with lower family incomes, that are smaller in size, and that are geographically remote faced "first-level digital divide challenges including the lack of network infrastructure and unstable wireless access" (p. 16). By 2020, during the COVID-19 pandemic, these pernicious first-level digital divides (Dow-Fleisner et al., 2022) meant that rural youth struggled disproportionately to participate in periods of emergency remote instruction (Westheimer & Hagerman, 2021).

With the release of the new Ontario Language Curriculum for Grades 1–8 in the fall of 2023, which, for the first time, includes expectations for digital literacies learning (Ontario Ministry of Education, 2023), the longstanding digital access divides that continue to exist for rural communities are of urgent concern. Although new investment in broadband expansion for digitally underserved schools and communities in Ontario is ongoing (Building Broadband Faster Act, 2021), the legacy of enduring digital access divides coupled with evidence of the downstream impacts on the digital skills of young adults (Wavrock et al., 2021) suggest that rural students may be starting from a position well back from the starting line of their more connected urban and suburban peers in the province. We know little about what the starting line looks like for rural children in Ontario, however. Targeted supports may be warranted for rural students and their teachers, but the design and implementation of these supports should be informed by evidence of their digital access, and digital literacies learning needs.

Leveraging interview data from 13 Grade 4–6 teachers working in 12 rural Ontario communities, the current study explores rural elementary teachers' insights on their students' foundational digital literacies learning needs. It is guided by two questions:

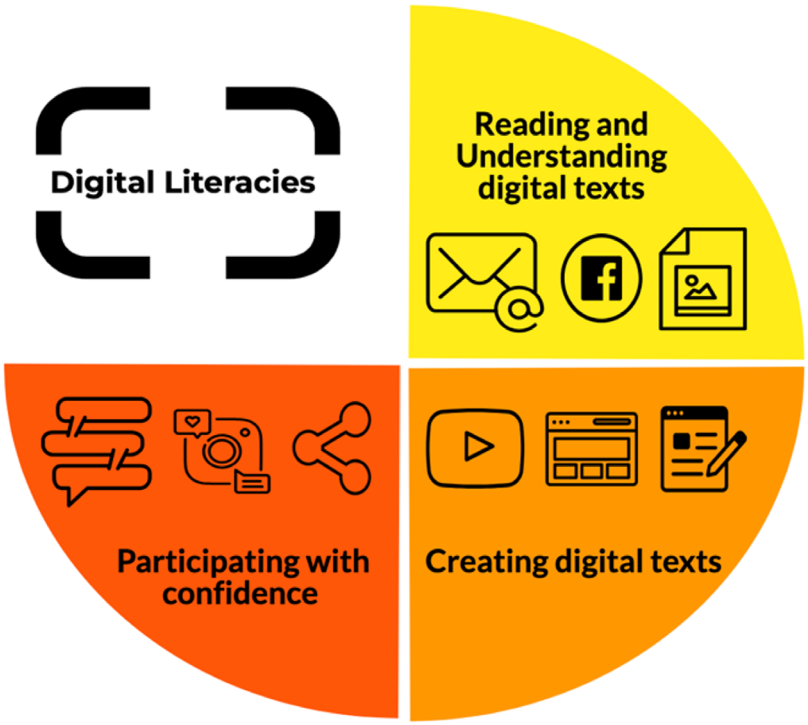
1. According to their teachers, what access do rural students have to the Internet at school and at home?
2. How do rural-serving teachers describe their students' foundational digital literacies learning needs?

Theoretical Perspectives

Our definition and conceptual model of foundational digital literacies (see Figure 1) is informed by the dual-level theory of new literacies (Coiro, 2020; Leu et al., 2018), which describes literacies as dynamic, multimodal, and socially situated, and by the model of digital literacy developed in Canada by MediaSmarts (2014, 2015) that includes three foundational and interconnected categories of digital literacies skills: use, understand, and create. As we presented the visual model to participants, we defined foundational digital literacies practices as all of the skills, strategies, mindsets, and dispositions that enable students to (a) read and understand diverse and multimodal digital texts for multiple purposes, (b) create digital texts using various digital tools, and (c) participate with confidence in collaborative activities and conversations online and across diverse platforms for personal, professional, civic, and/or academic purposes.

Figure 1

Foundational Components of Digital Literacies: A Conceptual Model

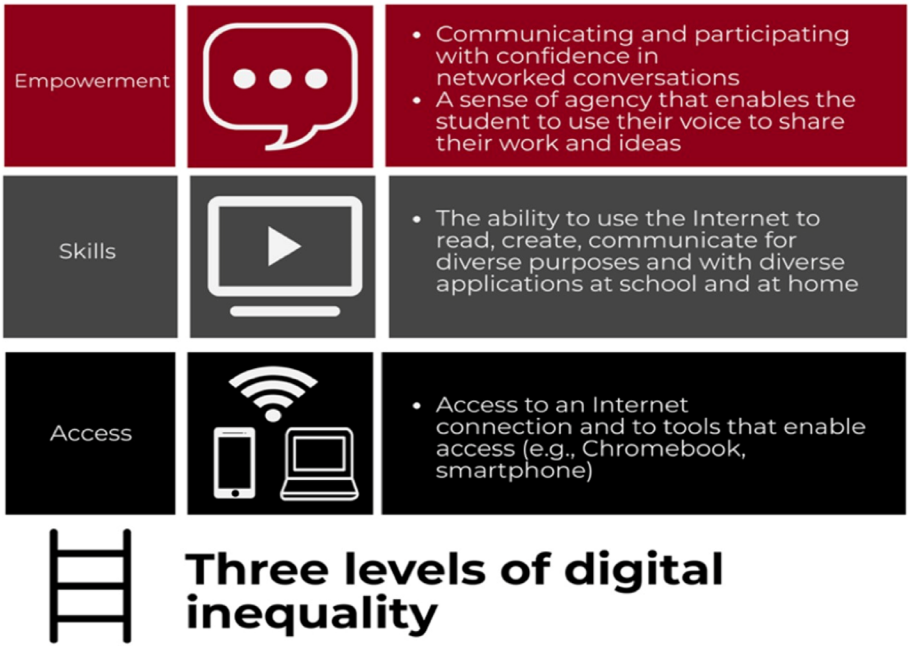


Note: Figure 1 created by M. S. Hagerman and M. Cotnam-Kappel.

The study is also informed by a tiered theorization of digital inequalities. Evidence suggests that over time, differences in the frequency and quality of access to digital technologies and to the Internet can lead to measurable differences in patterns of digital use (Haight et al., 2014; US Department of Education, 2024), in levels of digital skill (Hargittai & Shaw, 2015), and to differences in the level of confidence or agency that people feel when using digital technologies, including the Internet (Collin et al., 2016; Hargittai, 2010; Hargittai & Hinnant, 2008). Chen (2015) described this third tier as inequality in digital empowerment—a concept that we borrow. In Figure 2, we present a visual model of digital inequality with three levels: access, skill, and empowerment (cf. Ventrella & Cotnam-Kappel, 2024).

Figure 2

Three Levels of Digital Inequality: A Conceptual Model



Note: Figure 2 created by M. S. Hagerman and M. Cotnam-Kappel.

Method

Design

We view this analysis as an exploratory case study (Hamilton & Corbett-Whittier, 2013; Yin, 2014). Each interview is an instance of the overarching case of rural Ontario elementary teachers' insights on their students' digital literacies learning needs.

Defining Rural: Inclusion Criteria

Data for this exploratory case study were selected from a larger set of 53 teacher interviews. Although Canada defines rural communities as having "populations of 1000 or less, or a population density of fewer than 400 persons per square km" (CRTC, 2020), rurality

as an identity or lived experience is more complex (Coladarci, 2007; Hambly & Rajabiun, 2021; Nelson et al., 2021; Rich et al., 2021; Salemink et al., 2017). We considered six indicators to determine inclusion: (a) school location, (b) proximity to agricultural, forested, or crown lands, (c) teachers' descriptions of the community, (d) public descriptions of the community on websites, (e) population and population density, and (f) availability of 50/10 mbps unlimited broadband Internet services (Innovation, Science and Economic Development Canada, 2021). Interviews from participants working in communities that met the federal definition of rurality were included ($n = 2$). Others were included after a balanced consideration of all rurality dimensions, summarized in Table 1. Population data are taken from the 2016 census (Statistics Canada, 2021). To protect participants' identities, community names have been replaced with a regional label and a number.

Participants

All participants were recruited via the social media platforms Facebook and Twitter (now known as X). The 13 teachers work in 12 rural communities. Community East 3 had two participants, all others had one. Grade levels taught, language of instruction, and participant gender self-identification are summarized in Table 2.

Data Collection: Semi-Structured Interviews

All participants consented to a 45–60 minute semi-structured interview via the video conferencing platform Zoom. Interviews took place in French or in English, according to each teacher's preference. Questions focused on (a) in-school and out-of-school digital activities, including Internet use, (b) foundational digital literacies learning at school and instructional approaches, and (c) whether, or in what ways, students are impacted by inequalities of digital access, skill, or empowerment. Interviews were conducted between February and July of 2020.

Table 1

Selected Indicators of Rurality, Organized by Region

Community	Population	Population Density/km^2	Descriptions	% of Households with 50/10 mbps Access
East 1*	7,702	10.9	School website: "a small rural school with big rural spirit."	0–25%
East 2	13,701	962.3	Teacher: "we have a large portion of our area where we are very, very rural."	75–100%
East 3	3,911	1,048	Teacher: I teach in a rural community.	75–100%
East 4	1,169	525.1	Municipal website: "a modern municipality perfectly aligning rural charm with urban vitality."	50–75%
South-Central 1	3,132	1,130.8	School surrounded by agricultural land to north, south, east, and west of town.	0–25%
South-Central 2*	64,044	39.8	Municipal website: "Our landscape is diverse – we have lakefront cottages, beautiful beaches, and pristine farms and forests."	25–50%
South-Central 3	1,482	521.8	Teacher: "It's in transition, but I see it as a rural community."	0–25%
South-Central 4	12,310	946.8	Teacher: "Our community is very rural."	75–100%
North 1	1,343	799.8	Teacher: "We're kind of a rural school … where I teach is not in town … a lot of our kids don't have good Internet at home."	0–25%
North 2	6,215	1,144.4	Informational website: "There are still some farms producing mostly potatoes, small fruits and corn."	75–100%
North 3	2,955	1,891.7	Teacher: I'm in a little community in Northern Ontario.	0%
North 4	10,687	796.3	Teacher: "I didn't realize that there are some kids working at home without any Internet access." Municipal website: Diverse labour force including workers in mining, forestry, agriculture.	75–100%

Note: *Population centre data unavailable. We therefore used census data for the corresponding census subdivision in which the named place is located.

Table 2

Summary of Participant Information

Teacher	Grades Taught	Language (FR/EN)	Self-Identified Gender
East 1 (E1)	4 & 5	EN	M
East 2 (E2)	6	EN	F
East 3.1 (E3.1)	4, 5 & 6	FR	F
East 3.2 (E3.2)	4	FR	F
East 4 (E4)	4, 5 & 6	FR	F
South-Central 1 (SC1)	4	EN	M
South-Central 2 (SC2)	6	EN	M
South-Central 3 (SC3)	4 & 5	EN	F
South-Central 4 (SC4)	4 & 5	EN	F
North 1 (N1)	5 & 6	EN	Not Indicated
North 2 (N2)	6	FR	F
North 3 (N3)	4	FR	F
North 4 (N4)	5 & 6	EN	M

Data Analyses

Interviews were transcribed and imported to Dedoose. Analyses of access included reports of frequency of use, number and type of devices available for use, and location of use (lab vs. classroom). Through several rounds of deductive and inductive coding, we constructed an agreed-upon set of unique codes that captured the breadth of the learning needs that teachers identified for their students (Miles et al., 2014). We constructed and defined codes from idea units at the sentence and paragraph levels (Miles et al., 2014, p. 85). Findings are supported by representative quotations and frequencies tallies. French-language quotations were translated to English by the first author, who is fluently bilingual.

Results

Internet Access at School and at Home

All teachers (n = 13) reported that their students use the Internet at school. Frequency of computer and Internet use ranged from once or twice a week to multiple times daily (see Table 3). Teachers also reported varied models of material access to computers for their students at school. Teachers with the most devices and most reliable access to devices reported that their students accessed the Internet daily for a range of purposes; those who needed to take students to computer labs outside of their classrooms reported using the Internet least. Speed and reliability were noted by two teachers as challenges. Teacher South-Central 1 reported that accessing the Internet at school was "the biggest frustrator" for his students, in part because of persistent problems connecting to the school's network. Teacher North 3 noted that although they have Internet access, "downloading a YouTube video to show a lesson to my students, takes like two hours! My computer, and my Internet are very slow."

Although digital access at school was possible for all, six teachers explicitly named known inequalities in their students' home-based access to digital devices and Internet services. Awareness of these at-home realities, which they attributed to lack of infrastructure, to family incomes, to parents' own digital skills, and to differences in parenting choices, was heightened given teachers' management of emergency remote instruction during the pandemic. Teacher East 2 explains the nuances of at-home access for students in her school board and in her classroom.

> In our school board, you can drive an hour in any direction and still be within our school board and we have a large portion of our area where we are very, very rural where we are on satellite Internet which is extremely expensive, if possible. … All of my students have Internet access, which is a good thing. Now, access to equipment, on the other hand, is a different story. I've just surveyed—out of 29 students, I have six who don't have access to anything more than a cell phone at home to be able to do any sort of research, write, and read on, and then I have another probably 10 who are using or trying to make use of just an iPad. You know the days of having a desktop computer or even a laptop is very long gone. It's quite surprising.

Teacher South-Central 3 described access this way.

> [This community] is very rural. There are some people in million-dollar houses that don't have strong access to the Internet because they just don't if they're in an area that doesn't have proper Internet access. … They want to engage, but because of the standards around their living, they can't.

Importantly, two teachers noted that at-home differences in access seem predictive of the digital skills students are able to leverage for school work. After describing ways that she tries to bridge digital literacies gaps by pairing more skilled students with those who are still learning technical skills, Teacher East 4 shared her worries.

> I have a bit of fear that the gap that exists between students who have access—those who are more advanced with technologies, that the gap is just getting deeper and wider with the years that pass, because I mean, there are always going to be families who can't provide access and there will always be families who can, so I'm thinking of ways—like if we could offer a technology lending program, but then there is the issue of connectivity— it gets so complicated. But if my students could have this kind of support in the future, I think it would really help to remove a lot of obstacles.

Teacher East 1 explained how lack of access to digital devices and popular games at home comes with social and emotional consequences for children too.

> There is one student that every time we do preferred activity time she runs over to the iPad to play Minecraft. Because that's the only time she gets to play a game. She's one of the students that doesn't have any technology, she doesn't have the Internet access. So she wants to play Minecraft and she can get it for 45 minutes. If the class does something that requires a reduction in Pad time, she cries. Because she's like: "It's not fair, everybody else gets it at home and I don't and it's my only chance to get it here and it's not fair." And it's heartbreaking … you can see how that inequality of access and skill weighs heavily on individual kids whether it's in a whole group setting and they're trying to do school-related tasks but it's also a social piece for them. It sets them apart socially because they don't have those things.

An additional indicator of the social implications of access, Teacher East 4 noted, is how students stay in touch with one another.

> I have a student who, one time, as I was doing attendance in the morning said "Oh, Madame, this student won't be here today. She sent me a message this morning to let me know." So I think they're talking to one another. I think they're playing games, they're on TikTok, some of them are on Instagram. Social media … it starts young.

Table 3

Teacher Reports of Frequency of Internet Use, Type of Access at School

Community	Frequency of Internet Use	Type of Access
North 3	1 or 2 times/week for 40–60 minutes/session	Only in computer lab on Windows desktops
South-Central 4	1 or 2 times weekly	Tablets with a patch keyboard (but not 1:1); shared access to more through "tablet tubs"
South-Central 2	2 times/week for 40 minutes/session Periodic use of personal devices	Computer lab on Windows desktops Classroom access with personal devices (Bring Your Own Device or BYOD) or with "old, unreliable netbooks" in classroom
East 4	2 or 3 times/week for about 60 minutes	1:1 Chromebooks when available, shared among the Grade 4, 5, and 6 classes
North 2	3 or 4 times/week for 60 minutes	1:1 tablet computers and 1:1 laptops, but on a coordinated schedule with other classes
South-Central 3	Several times/week	10 Chromebooks for classroom use with option to borrow 10 more (not quite 1:1 for the class of 23 students)
East 1	Most days	1:1 Chromebooks iPads, iPods
South-Central 1	Daily	5 tablets, plus desktops in class acquired through a refurbishment program; BYOD
North 1	Daily	Classroom access; iPads and Chromebooks 8 laptops in the classroom; rotating iPad cart shared with other classes
East 3.1	Daily	Classroom access; 1:1 Chromebooks for all Tablets available as needed
East 3.2	Daily	Classroom access; 1:1 Chromebooks for all
North 4	Daily	Classroom access; 1:1 Chromebooks for all
East 2	Daily	24 Chromebooks (29 students in the class) Students with IEPs have their own laptops Access to iPads

Needs: Online Reading

Against this backdrop of varied frequency and quality of access in school and at home, teachers identified six reading-specific needs.

Managing overwhelm (n = 6). All teachers noted a range of complex and interdependent reading challenges for students to overcome during online inquiry projects on topics in Science and Social Studies. First among them is managing information overwhelm. Students struggle to regulate their reading activities in complex, multimodal, web-based environments such as search engine results pages. As Teacher North 4 explained,

> A lot of students are overwhelmed. There's too much information. They don't know where to start. They don't know where to stop. They don't know what the important information is that they need to be taking away from things. And for some of them, I mean, even in a (Grade) five/six, I have kids that—they struggle at reading at grade level.

Teachers noted that the cognitive demands of online inquiry exceed what is generally required for reading single printed texts, and that the need to engage additional strategies as they search for and decide on which texts to read contributes to students' feelings of overwhelm. Although inferencing is always required when reading for meaning, Teacher East 3.1 recognized that for her students, the constant need to make inferences and to judge information while conducting online research are unique challenges:

> When you do a search on Google, it's completely about making inferences. They have to make inferences all the time because they have to find out what keyword they're entering in to Google, and then how do I know that my search is going to work or not? Did I find what I need? Did I not find it? Then, if I haven't found what I wanted, what do I do?

Development of print-based reading skills (n = 4). The observed variability in students' print-based reading skills noted by Teacher North 4 was described as an underlying determinant of emergent digital and online reading skills by four teachers. Teacher South-Central 1 noted that his students' reading comprehension levels are "all over the place" and that this might partially explain why his students struggle to understand online information and evaluate nuanced indicators of trustworthiness in digital texts. He noted,

"A lot of their reading would just be like, yep, I saw it. It's real, it's on the Internet," suggesting that they aren't yet able to situate what they read, or to evaluate whether information is credible. Relatedly, teacher East 4 explained how learning disabilities, which influence children's reading development, can intersect with online reading. When decoding is difficult, comprehension, including critical evaluation, suffers. She explained,

> I also have students who have a lot of difficulty, you know, in terms of their ability to attend to reading tasks, who have dyslexia, and it's hard for them to read. I'm thinking of my students for whom reading a text online, it's difficult—just on the level of decoding the text, which obviously has an impact on comprehension. And I would say that in terms of attention, reading on screen is a lot harder than reading a text on paper.

Critical evaluation of online information (n = 7). Critical evaluation of online information was noted as a significant learning need by seven teachers. Teacher North 4 emphasized the difference between finding and fact-checking information.

> I would say that they're all pretty good at being able to go online, find and gather information. The one thing that I think they could improve on is making sure that the information they get is credible and that they're kind of fact-checking it.

Teacher East 2 also expressed concern about critical evaluation as an urgent learning need.

> They're our next generation of decision-makers and we need to be able to teach them the difference between, you know, biased—we need to be able to teach them how to analyze and decide. … When this started with the Corona Virus—I had kids who were my high achievers coming in and said "I heard that…" and I said, "Where did you hear that?" and it was, "Well, I saw it on social media." Very rarely do I hear that, "I read it in the newspaper or I read it on this website." If we don't teach them these skills, they're not gonna know where to go for accurate information.

Broader life experiences (n = 2). Teacher East 1 suggested that to make sense of what they find online, his students need more opportunities to "experience the world" beyond their local community, as well as opportunities to build "critical thinking skills

generally, outside of the digital world." Citing the absence of public transportation in rural communities, he said:

> Kids in my area can't just hop on a bus and go somewhere and learn about stuff. They need this [the Internet] to be able to learn about how things work and how to access different things. … Technology is not the only inequality.

Engaging texts (n = 2). Teacher South-Central 2 said that although his school board (like many others in the province) provides access to online libraries such as Epic (https://www.getepic.com) where students can read books on screens, and to platforms designed to support emergent reading skills such as Lexia (https://www.lexialearning.com/) students need access to more "engaging texts" that align with their interests. Teacher East 2 also noted reading motivation as an important learning need.

> So, they don't actively seek out things to read, you know, whether they're articles or information or even when they're stuck on a problem and trying to find a solution … we need to get them reading anything, you know graphic novels or whether it would be anime online. Something like news articles, CBC News for kids, or something? … We need to get them reading, as to how, I haven't quite figured it out yet.

Early intervention. Teachers South-Central 1, East 2, South-Central 2, and South-Central 3 all noted the importance of early intervention that would support students' print-based and online reading comprehension skills concomitantly. As Teacher South-Central 2 noted, teachers might assume students are more competent online readers than they actually are. "Quite often, they don't know" he said, prompting him to suggest that his Grade 6 students need more chances over time to build foundational online reading skills. "I think it's maybe something that has to start before they get to me."

Needs: Online Writing and Digital Composition

Teachers described four learning needs specific to digital writing.

Keyboarding skills (n = 3). For three teachers, digital writing includes typing handwritten work such as letters or fairy tales into a word processing application such as Microsoft Word or a Google Document. This process of transcription from paper to pixel takes a lot of time because, as Teacher South-Central 3 noted, "it's hunt and peck mostly,

but they're patient with themselves." Similarly, Teacher North 2 said, "there are some who type with just one finger and it takes an eternity to finish writing a sentence!"

Practice writing in print-based and digital genres (n = 4). Although Teacher North 1 explained their efforts to support writing for different purposes using example prompts from the standardized provincial literacy test for Grade 6, they also noted that students are keen to use multimodal design features in their digital writing, but less able to organize ideas logically.

> They are really good at making their writing look presentable, like they're so good at using super nice fonts and making sure they're adding pictures and stuff like stuff that. … What we really focus on is making sure that the organization of the writing online is organized and coherent—follows a logical order. Those are the big things that we try to focus on.

Similarly, Teacher East 2 noted that her students are more interested in digital, multimodal composition practices than in writing descriptive paragraphs, procedural texts, or essays.

> They don't enjoy writing. They're creative, and you have a whole generation of graphic novelists and video game designers, but as for sitting down and writing a piece, as like a traditional newspaper writer or a blogger or something, they just don't have the stamina. … I gave a challenge to my class last year … to make memes, and I've never seen so much excitement in my entire life. It was the biggest success of an assignment …, I asked them to write memes and all of a sudden there were, you know, 10 words on a picture and they created 30, 40 of them.

Teachers East 3.1 and North 2 noted that students seem to apply different notions of writing conventions when writing in digital contexts, and that this requires constant reminders of punctuation, capitalization, and spacing.

Use technological systems to support writing (n = 4). Four teachers specifically noted that use of software applications such as Antidote, Read & Write, and digital platforms such as Seesaw and Book Creator, which offer text-to-speech functionality, give essential writing supports to students with learning disabilities, while also supporting the accuracy and organization of writing for all. Teacher East 1 stated,

> One of my younger students, he has an LD, and when we started the year working on Book Creator, he asked for the code for the library and he has made his own. He sits on his own and makes his own Book Creator books. Because he can actually speak into it and it'll dictate it for him, it'll transcribe it for him. So he now has the ability—he can barely write his own name—but he has the ability to actually write a book or write a story.

Writing confidence (n = 3). The need to develop writing confidence was raised by three teachers. Teacher North 1 expressed their students' need for confidence when writing in digitally networked environments this way:

> I think especially the age group I have, it's that confidence that they need—that little boost that what they're doing is on the right track, that they're doing the right thing, that it looks good. … I've got them sharing their thoughts. If the first person posts something, they'll kind of all want to agree. They don't want to take a stance. I think it's that confidence that they need to develop, and especially at this age, to not be afraid to post their ideas and to post their writing and to feel good about what they're posting.

Needs: Participation

Teachers identified four learning needs related to digital participation.

Privacy and safety (n = 9). For most teachers, students' digital work is never shared beyond the physical classroom. Those who reported sharing student work publicly did so through school-based accounts (e.g., the school Facebook page) with parental consent, and respect for student privacy. Safety and privacy concerns and the importance of modelling how to stay safe online for students were explicitly mentioned by three participants as their reason for not prioritizing online participatory activities at school. For Teacher North 2, students' online security was her biggest concern. Teacher South-Central 1 noted that safety and being "knowledgeable" are linked.

> I wish for them to be safe. … I know that there are very many things on the Internet that can be unkind and unsafe. And my biggest wish for them on the computer is for them to be knowledgeable about what they are looking at … understanding that not all sources are kind sources.

Activities that align with developmental needs (n = 3). Although nine teachers provide opportunities to create multimodal products using a range of password protected online platforms where students can compose, collaborate, and learn to comment on one another's work, three teachers questioned whether children at this age are ready for online participation. For example, Teacher East 1 expressed concerns about students' social and emotional development as a reason to avoid these activities.

> My kids can barely navigate and collaborate in person without putting each other down or calling each other names or stumping off … in terms of doing that stuff online and especially social media, their brains are nowhere near ready for social media.

Teacher South-Central 1 explained that for children, learning to socialize in person is a fundamental need, whereas online participation is not:

> I don't think you need to participate online when you're small. I don't think you need to participate online at all, really. I feel like kids need to learn how to socialize with the people in front of them before they learn how to socialize with the people who aren't in front of them.

Teachers also observed that children at this age struggle to understand how digital systems work, and may not be ready to consider hidden user agendas, or the longer-term implications and consequences of participatory exchange. "You're not necessarily talking to who you think you're talking to online" said Teacher North 2.

Guidance on social media use (n = 4). Four teachers explicitly named their students' need for guidance on the use of social media platforms outside of school. As Teacher North 2 reflected on the risks of online participation, she grappled with her own role.

> Ya, so knowing that everything they say online can always be traced—even if you erase it, people can find it. … I don't know whether this should be taken up at school or at home as well?

Teacher East 1 named the ethical boundaries that he must respect as a professional teacher, even as he named his students' need for support. "I can't be with a kid on Facebook or Instagram and show him how to use that. That is a parent issue."

Teacher South-Central 1 expressed his concerns about students' social media use this way:

> So, like, who is watching you [students] have these interactions? … If you're learning how to do anything else, someone's going to be there to help you, whether it's riding a bike or throwing a ball or learning how to skip a rope. … It doesn't happen in online interactions. You sort of just figure it out on your own based on what everyone else is doing. And depending on what your peers are doing, that might be a really bad or really great example.

Participatory empowerment (n = 1). Teacher East 2, who expressed similar worries about a lack of social media guidance, observed that students' out-of-school social media activities seem to inform a participatory baseline that determines how they engage, don't engage, and make sense from chat-based exchanges for school-related purposes. Related to points about writing confidence shared by Teacher North 1, this teacher hypothesized that participatory engagement may be related to the quantified metrics (i.e., likes) that students internalize as judgement on the quality of their ideas and that there is need to support students' sense of empowerment when they have ideas to share.

> They're obsessively checking to see who's commenting and who is liking things and if they're not getting those amounts of likes or comments that they need, they're deleting it. …] They're empowered to post, but if someone posted something on their post with a different opinion, they'd just delete it. They wouldn't engage in trying—they're not empowered enough.

Discussion

As an exploratory case study of teacher insights on the digital literacies learning needs of students living in rural communities across Ontario, these results make visible a complex assemblage of lived realities at school and at home that align with, and extend, our *a priori* understandings of the theorized relations between digital access and digital literacies learning.

Digital Access for Skills and Social Needs

According to participants, inequalities in Internet infrastructure, socio-economic differences, differences in types and availability of digital devices, and family choices contribute to observed differences in the digital skills that students are able to leverage for school work, suggesting that mechanisms of digital divide (Chen, 2015; Collin et al., 2016; Hargittai, 2010) persist in rural Ontario. Consistent with descriptions of digital marginalization as a risk to youth wellness (Dahlström, 2022) and self-esteem (Hampton & Shin, 2023), teachers noted how at-home connectivity enables or disrupts opportunity to socialize with one another, and to participate in digitally mediated activities that have value to their students. The "heartbreaking" feeling of exclusion for the child who could not access Minecraft coupled with evidence of how kids use at-home connectivity to communicate and support one another, expands our conceptual framing of access as precursor to skills development. Access also seems essential for social and participatory opportunities.

In a separate analysis of the layered digital inequalities reported by eight teachers selected from this same data set of 53 interviews (three of which were rural cases), Ventrella and Cotnam-Kappel (2024) described the ways that some students use "their digital access, skills and sense of empowerment, in acquiring additional digital and offline forms of capital" (p. 11). These forms of offline capital can include "externally observable social resources" (Ragnedda, 2018, p. 2367) such as membership in a group and the ability to network online and gain additional digital experiences that, in turn, enable them to become more confident.

The considerable variability in access to reliable Internet and quality devices in these teachers' classrooms raises important questions about the extent to which differences in digital skill and social opportunity through access at home might be exacerbated, rather than alleviated, at school. Within rural Ontario schools, teachers described a spectrum of access from ubiquitous one-to-one computing as a seamless part of how things run in their classrooms every day, to very limited access to computers and the Internet in a shared lab setting twice a week for 40–60 minutes. For children who attend schools where they must share a small number of devices, or where they are permitted short blocks of computer time to navigate the web, and have no or limited at-home

connectivity, what digital capital (Ventrella & Cotnam-Kappel, 2024) can they accumulate relative to their more connected age-cohort of peers across the province? More research is urgently needed to identify the rural youth in Ontario who are most digitally marginalized so that resources and nuanced intervention can be planned to support them. Future inquiry should also be centred in classroom environments where close observation of students' and teachers' digital literacies learning and teaching practices across this spectrum of material realities might also be documented *in situ*.

Foundational Digital Literacies Learning Needs

As keen observers of student behaviour, participants identified 14 unique digital literacies learning needs across dimensions of online and digital reading, digital writing, and online participation. Together, they reflect a set of social, emotional, cognitive, material, cultural, technological, and structural dimensions that warrant future study.

Technological Foundations

Teachers noted that some digital literacies practices are circumscribed through use of password-protected platforms (e.g., use of Epic and Lexia as reading supports; use of BookCreator for multimodal composition) provided by school boards. With affordances such as text-to-speech and speech-to-text, which make digital participation and composition accessible, these platforms scaffold learning. However, as Nichols and Leblanc (2020) note, although it is easy for teachers to identify the ways that platform affordances can support instructional priorities, the technological design of platforms can also become the instructional priority: "If Seesaw becomes the principal means through which growth is documented and parent communication occurs, the logic of the app might remake growth and communication in its own image: as something recognizable to Seesaw's algorithms and interface" (p. 106). The role of platforms in rural Ontario classrooms is understudied, but would be an important dimension of future digital literacies research.

Cultural Foundations

In the case of digital libraries, it was noted that students would benefit from access to texts that align with their interests and that inspire them to read. This insight raises ques-

tions for us about the extent to which rural children in Ontario have access to digital texts that represent their interests and lived realities. As Eppley, Wood, and Stagg-Peterson (2024) write in their critical analysis of rural, Indigenous representation in books for Canadian children, "for rural Indigenous middle-grade readers, literature far more often provides windows into urban, non-Indigenous lives than mirrors reflective of their land-based and place-related cultural identities" (p. 214). Critical research centred on the digital texts to which rural children have access is also needed.

Social, Emotional, Cognitive, and Developmental Foundations

When students openly search for texts and information sources using online search engines, they can become overwhelmed. In fact, the majority of identified learning needs reported were centred on digitally networked activities that require students to make critical judgements, to organize their thinking, to engage a range of social, emotional, and cognitive strategies, to make sense of information, to collaborate with peers, and to situate their decisions in relation to how digital and human social systems work.

Although our study focused on students' digital literacies learning needs, teachers' insights reflected an integrated understanding of the ways that digital literacies relate to other dimensions of need as children grow. Understanding digital texts depends on children's background knowledge, their print-based reading and writing skills, and exposure to enriched experiences more generally, which, as one teacher noted, is a concern. Participating safely on social media platforms requires parental supervision and opportunities to develop broader understandings of how digital systems work, and how people use these systems for purposes that can be obfuscated. Digital writing requires multimodal and graphic design skills, but also stamina, confidence, and the capacity to organize thinking. The "digital" or technological aspects of these foundational literacies are essential, but teachers' explanations for their students' learning needs include social, cultural, and developmental dimensions.

Teachers also wondered about what is lost when, for example, their students show little interest in traditional forms of written expression, and are reticent to share ideas openly for fear of "social" judgement. Lack of writing confidence, and the identified need for participatory empowerment in digitally networked spaces may be two sides of the same coin. Although research has clearly identified writing motivation, which includes

sub-dimensions of self-efficacy and writing beliefs, as a very strong determinant of students' willingness to write (e.g., Moje et al., 2008; Wright et al., 2019) there is a need for research that examines the interactions of social media practices, rural access divides in Canada, and how children develop as digital writers.

Research corroborates our participants' insights regarding the complexity of online inquiry for children and young adolescents (Cho, 2014; Cho & Afflerbach, 2015; Coiro, 2011; Forzani, 2018; Kiili et al., 2018, 2022; Macêdo-Rouet et al., 2019). As a frequently noted digital literacies learning need, rural teachers may benefit from professional learning opportunities centred in the complex and varied access and material realities that exist for them, and for their students.

In sum, these results show that rural Ontario teachers' reports of their students' access needs and digital literacies learning needs reflect deep understandings of structural, material, social, emotional, cognitive, developmental, and technological dimensions that are not easily dissociated from one another, or from the rural contexts of their work. Although access is essential for digital literacies learning, it is also a foundation for social opportunity (Warschauer & Tate, 2018). As students learn to make sense of digital information, and to interact in digitally networked environments, there may be uniquely rural dimensions of reading motivation, writing confidence, and knowledge of the wider world that warrant examination in future.

Limitations of this Research

With only 13 participants, findings from this exploratory case study must be interpreted cautiously. Participants were recruited via social networks, suggesting they could be more connected than other rural educators in Ontario. The early pandemic timing for the data collection was not planned, but likely played a role in teachers' insights about their classroom-based digital literacies instruction, even though we asked them to think back to "the before times." Teachers are close observers of students' digital activities, but future research should include students' voices.

Conclusion

This study describes the digital literacies learning needs of students in rural Ontario, from the perspective of their teachers. Results surface a spectrum of digital access and material realities across rural contexts of schooling. When students are digitally resourced at home, teachers see both skills-based and social benefits for students. Given inequalities of computer and Internet access in rural Ontario classrooms, analyses raise questions about whether schooling exacerbates digital marginalization for rural children who are least digitally connected (Ventrella & Cotnam-Kappel, 2024). Teachers also recognize digital literacies as influenced by a complex constellation of social, emotional, cognitive, developmental, cultural, and technological needs. To eliminate barriers, we need policy that brings those who are digitally marginalized to the centre, and more research that builds from these rural teachers' insights in ways that serve rural youth in Ontario.

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