Evaluating Online Environments for Elementary Teachers' Literacy-Oriented Professional Learning

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As elementary teachers increasingly turn to online environments for their literacy-oriented professional learning, evaluating website quality is of growing importance. Using screen capture recordings of participants' navigations, the purpose of this study was to identify the types of online learning environments that elementary teachers use to enhance their literacy practice as well as to evaluate website quality. Findings reveal that teachers access ten main types of online environments. Those that were resource-based were accessed with the highest frequency despite having the lowest quality. Implications for the design of online learning environments as well as self-directed learning are explored in depth.

Comme les enseignants du primaire se tournent de plus en plus vers les environnements en ligne pour leur apprentissage professionnel axé sur la littératie, l'évaluation de la qualité des sites Web revêt une importance croissante. Reposant sur des enregistrements de captures d'écran de la navigation des participants, l'objectif de cette étude était d'identifier les types d'environnements d'apprentissage en ligne que les enseignants du primaire utilisent pour améliorer leur pratique de l'alphabétisation ainsi que d'évaluer la qualité des sites Web. Les résultats révèlent que les enseignants accèdent à dix types principaux d'environnements en ligne. Ceux qui sont basés sur les ressources sont les plus utilisés, même si leur qualité est la plus faible. Les implications pour la conception d'environnements d'apprentissage en ligne ainsi que pour l'apprentissage autodirigé sont explorées en profondeur.

The classroom is a complex and ever-changing environment (Trust, 2012) that elementary teachers must navigate to ensure students become independent readers, writers, and thinkers (Early Reading Strategy, 2003). A challenge facing researchers and teacher educators is mobilizing effective, evidence-based literacy practices from reliable sources (Beach, 2020). This is an issue affecting the majority of Canadian teachers in the field, with more than 90% reporting that they engage in some form of professional learning for approximately two hours per week (Campbell et al., 2016). Research is still trying to establish the optimal balance between different forms of professional learning; however, there is strong support in the literature for its overall effects, both positive and negative, on students' academic achievements (Borko, 2004; Darling-Hammond et al., 2017). Given the variability in the quality of online professional learning, this study investigated online environments used by practicing elementary teachers for their literacy-oriented professional learning.

Teacher Professional Learning

Though often used interchangeably in the literature, the terms *teacher professional development* and *teacher professional learning* refer to two distinct but related concepts. For the purpose of this article, the term teacher professional development is used to refer to any formal (e.g., workshops) or informal (e.g., networking) learning activities that teachers undertake to enhance their professional knowledge (Bergmark, 2020; Borko, 2004; Koellner & Jacobs, 2015; Stewart, 2014). Teacher professional learning refers to the complex emotional and cognitive processes involving teachers both individually and as a collective during formal or informal professional development activities (Avalos, 2011). Considering this study is framed by theories of self-directed learning, our focus is on professional learning, though we continue to use the term teacher professional development when referring to a specific activity.

In an extensive review of teacher professional learning in the Canadian context, Campbell et al. (2016) identified 10 markers of effectiveness. First, quality content must be 1) evidence-informed; 2) subject-specific and prioritize pedagogical content-knowledge; 3) focus on student outcomes; and 4) balance teacher voice and system coherence. Next, learning design and implementation must be 5) active and variable; 6) collaborative in nature; and 7) job embedded. Finally, support and sustainability must be: 8) ongoing in duration; 9) appropriately resourced; and 10) rely on supportive and engaged leadership. Similar to effective instruction for students, effective professional learning must be differentiated to support diverse teacher strengths and needs, and be flexible in its implementation (Stover et al., 2011). Campbell et al. (2016, p. 8) echoed this sentiment, explaining that there is no "one-size-fits-all" model for professional learning; rather, teachers must engage in multiple and varied opportunities that are differentiated to meet their personal and professional needs.

Barriers to Effective Teacher Professional Learning

Several challenges associated with access to effective professional learning have been identified in the literature, largely related to constraints on time and resources (Campbell et al., 2016). The COVID-19 pandemic and rapid shifts to remote learning have changed the landscape of professional learning (De et al., 2020; Trust et al., 2020). In the past, formal and more conventional models of professional development such as attending workshops, for example, were often delivered face-to-face (Darling-Hammond & Richardson, 2009; Jaquith et al., 2011). Not only is this type of professional development considered incompatible with providing sufficient content to support teachers' individual classroom practice, but also, presenters do not typically have capacity to follow up with teachers after the sessions. Often, this type of professional learning is considered disconnected from the classroom context and the true needs of teachers and their students (Campbell et al., 2016). Attending in-person professional development can also be costly, relying on obtaining funding for an occasional teacher to cover the classroom teacher's lessons. Moreover, as Campbell et al. pointed out, availability and allocation of funding for professional learning can vary substantially between and within jurisdictions, often due to political and economic circumstances. The effects of this have been especially palpable since the onset of the COVID-19 pandemic, which posed unprecedented professional challenges for teachers and exacerbated existing inequalities in access to education (Cavanaugh & DeWeese, 2020; Darling-Hammond & Hyler, 2020; Flores, 2020). Such circumstances can result in inequitable access to professional learning opportunities for teachers, especially for those residing in rural or remote

regions. In these cases, some schools and teachers may forego particular forms of professional learning altogether (Darling-Hammond & Richardson, 2009; Elliott, 2017).

Formal vs. Informal Professional Learning

Considering these challenges, it is important to capitalize on professional learning opportunities that can be delivered outside of the school or classroom context (Campbell et al., 2016). Many school boards have mandated professional learning (Richter et al., 2011). Much is known about formal professional development activities (e.g., workshops, seminars, courses, etc.), but informal professional learning is increasingly being recognized as valuable, and is broadly considered to be the most popular form of learning in the workplace (Kyndt et al., 2016). According to Campbell et al. (2016), opportunities for teachers to "lead their own learning" (p. 13) benefit both the individual and the teaching profession collectively, supporting both changes in practice as well as positive outcomes for students. The Internet has had a substantial impact on individuals' ability to facilitate their own informal professional learning, providing opportunities for people to learn "anywhere, anytime, from anyone" (Song & Lee, 2014, p. 512). Specifically, online learning environments have the potential to provide teachers and educators with relevant theoretical and practical information, especially related to literacy education (Beach, 2017). Online environments for teacher professional learning have seen substantial growth during the last decade with the production of relevant resources outpacing research (Lay et al., 2020). The COVID-19 pandemic and the need to practice physical distancing have drawn even more attention to the preference for online environments and the need for research on their overall quality (De et al., 2020).

Self-Directed Online Learning

An emerging area of informal professional learning for teachers is self-directed online learning (SDOL), which occurs when knowledge is constructed as the product of engaging with multiple modes of digital information, such as photos, videos, and interactive tools (Beach & Willows, 2014; Mayer, 2002; Song & Hill, 2007). SDOL stems from self-directed learning, the branch of adult learning theory defined as the idea that learners "assume personal responsibility and collaborative control of the cognitive (self-monitoring) and the contextual (self-management) processes in constructing and confirming meaningful and worthwhile learning outcomes" (Garrison, 1997, p. 18).

SDOL is distinct to self-directed learning as online learning environments enable teachers to choose what they consider to be personally meaningful in a flexible manner (Elliott, 2017). As with other forms of self-directed learning, those who use the Internet for their professional practice must be conscious of what they are viewing, and continuously assess and evaluate both source features (e.g., credibility of the author or institution that created it) and the mode of information delivery (e.g., video) to ensure they are accessing high quality content (Beach, 2020). Research examining teachers' thought processes during SDOL has demonstrated that this type of thinking does occur while teachers navigate the Internet for their professional learning, and that teachers' decisions during web-based navigation may be rooted in their current literacy practice, classroom learning goals, and student needs (Beach, 2017).

Considering the high volume of information available to both students and teachers on the Internet, SDOL is well-aligned with 21st century literacy, which emphasizes developing deep understanding, navigating uncertainty, and triangulating different viewpoints to construct

meaning (Organization for Economic Cooperation and Development, 2021). In the context of the online learning environment, this may take the form of searching and retrieving personally meaningful and relevant content (Beach & Willows, 2014). In addition to contemplating the relevance of resources, however, teachers must also contemplate their value, evaluate the readability of the interface, and assess the credibility of the content or source (Beach, 2020). The recent emphasis on SDOL in the literature is encouraging; however, few studies have identified the types of resources that teachers can rely on for this type of professional learning. Moreover, there has been limited research investigating the quality of online professional learning environments geared towards elementary literacy teachers.

The Online Learning Environment

Even before the COVID-19 pandemic, which led to an unprecedented demand for professional learning opportunities that could be accessed remotely (Trust et al., 2020), the number of teachers engaging with online learning environments has substantially increased over the last decade, with one study estimating that teachers spend between 1–3 hours per week participating in an online community (Trust, 2012). In a study of teachers' professional learning during the pandemic, Alwafi (2021) found a statistically significant increase in the average size of participants' Twitter professional learning networks. Similarly, in a recent survey, over 80% of practicing elementary teachers indicated that they had participated in some form of online teacher professional development, with three quarters of participants indicating that they had participated in informal professional learning (Beach, Favret, et al, 2022). Findings revealed that the majority of those who participated in professional learning in online environments perceived it to be beneficial, with over 60% reporting that they were able to apply their learning to their practice. Benefits associated with online professional learning environments included ease of access, the ability to connect with teachers outside of their immediate geographic area, and the ability to go at one's own pace (Beach, Minuk, & Favret, 2022). Many teachers consider the Internet a place where they can collect information through various websites quickly, and stay up to date on current teaching techniques, pedagogy, and changes to the field of education (Trust, 2012). However, online environments can be overwhelming for first-time users as they learn the social norms of each space and experiment with unfamiliar tools and features (Flanigan, 2011).

Researchers have also noted the role of social media platforms in expanding online learning communities (Alwafi, 2021; Carpenter & Krutka, 2015; Krutka et al., 2016; Visser et al., 2014). In an analysis of education-related conversations on Twitter, #edchat, a popular hashtag for general education topics (Britt & Paulus, 2016) had over 1 million unique Tweets from approximately 200,000 users between October 2017 and June 2018 (Staudt Willet, 2019). Similarly, in a study of professional learning in the context of math education, teachers reported that the websites *Pinterest* and *Teachers Pay Teachers* were the resources they consulted most frequently when seeking material related to their practice (Shapiro et al., 2019). User activity on platforms such as Twitter tends to outpace the publication of relevant research (De et al., 2020). The findings from existing studies speak to increased engagement in online environments, both before and after the COVID-19 pandemic (Alwafi, 2021; Trust et al., 2020).

The demand for informal learning opportunities has driven educational institutions and organizations to refine existing learning platforms and develop new technologies for self-directed learners (Beach, 2020). During the COVID-19 pandemic, the Government of Ontario launched a series of resources to support teacher and student SDOL, aptly titled *Learn at home*. More

recently, new provincial curricula (e.g., elementary mathematics) have been released in HTML format with hyperlinks to additional sources, allowing teachers to explore a variety of resources at their own discretion. The emergence of these and other resources point to the need to prioritize research focused on the different types of online learning environments that exist, their quality and credibility, as well as their benefits.

Quality and Credibility of Online Learning Environments

When using the Internet as a means of informal professional learning, elementary teachers must adopt a critical lens while making decisions about what material is worthwhile to pursue (Beach, 2020). Teachers can rely on those with expertise in the field to make recommendations, such as administrators, literacy coaches, and researchers, but with so many varied sources producing materials daily and even hourly, determining source quality and credibility can seem like an insurmountable task. In navigating the Internet, educators should consider the extent to which a website focuses on content and pedagogical knowledge, which have been shown to contribute to the success of teachers' professional learning in online spaces (Upitis et al., 2017). Usability research, common in marketing and design, is expanding to include the field of education (Beach, 2020). In any given online environment, user experience can have a direct effect on the likelihood that individuals' will continue their navigations and return. Nielsen (2012) suggested five components of website usability that are most often evaluated through inquiry (i.e., opinion): learnability, efficiency, memorability, errors, and satisfaction. As online learning environments proliferate in digital spaces, evaluation of source quality and credibility is increasingly important.

Benefits of Online Learning Environments

Despite the challenges associated with evaluating source quality and credibility, freely accessible and evidence-based resources have the potential to reach teachers around the world, including elementary teachers, administrators, and teacher educators, and provide them with information about effective literacy practices (Beach, 2020). Online environments afford extensive opportunities for informal professional learning, as well as the potential to overcome the cost and time constraints of more formal professional development activities (Bates et al., 2019; Dede et al., 2009).

Informal professional learning in online environments is considered less demanding on teachers' time as they can use them whenever they have a moment in their schedule (Bates et al., 2019; Trust, 2012). Additionally, with resources remaining online, teachers can reflect upon the content and return to them as often as necessary (Bates et al., 2019). Several online resources include interactive features, which allow teachers to receive feedback, seek support, and collaboratively problem-solve in real time. Many teachers may choose to use online learning environments asynchronously, such as by posting on a discussion forum and viewing responses at a more convenient time (Trust, 2012). Such websites, according to Trust, then become a space to store collective knowledge where teachers can seek support from groups or individuals. Research is needed, however, to shed light on the ideal qualities for online learning environments.

Literacy Education

Research has demonstrated a relationship between elementary teachers' knowledge of how to

implement effective literacy programs and positive student outcomes (Cash et al., 2015; Cunningham et al., 2009). Literacy-oriented professional learning for teachers should address instruction that introduces students to the foundational skills necessary to read and write in the early years while also nurturing an awareness of language and a motivation to continue learning (Ontario Ministry of Education [OME], 2004). Language comprehension and print skills have been identified as an essential element of all literacy programs with strong support for the use of systematic instruction focused on phonemic awareness, phonics, fluency, vocabulary, and reading comprehension (August & Shanahan, 2006; Castles et al., 2018; National Reading Panel, 2000; Ontario Human Rights Commission [OHRC], 2022). As students move through the language and literacy curriculum, professional learning should address how teachers can equip learners to engage meaningfully with the New London Group's (1996) concept of multiliteracies, referring to the multiplicity of both communication modes as well as cultural and linguistic diversity (Cope & Kalantzis, 2016; Oozeerally et al., 2020).

Moreover, critical literacy, or the ability to analyze, critique, and transform the practices that govern everyday life (Harwood, 2008), is also recognized as foundational to the development of literacy skills more broadly (Luke, 2012). Critical literacy extends beyond everyday reading and writing, emphasizing the importance of constructing meaning and using literacy to bring about social justice (Vasquez et al., 2019). Students who engage in critical literacy from an early age are considered more equipped to make informed decisions, participate in a democratic society, and develop the necessary skills to think and act ethically (Vasquez et al., 2019). Critical literacy is not something to be added to the curriculum but a lens through which students can view the world (OME, 2004).

There is an abundance of information related to literacy education on the Internet, but there is no single way of evaluating these resources, their quality, or credibility. With literacy-oriented online resources being developed by government organizations and other educational stakeholders on an ongoing basis, examining professional learning focused on teaching both a) language and print-related skills and b) critical literacy skills is necessary.

Study Purpose and Research Questions

The purpose of this study was to describe the different kinds of literacy-oriented online resources or websites available to elementary teachers and educators, as well as to evaluate their quality. An additional aim of this study was to assess the extent to which the selected resources addressed specific literacy skills, including those that were print-based, language-based, and related to critical literacy. This study was guided by three research questions:

1. What types of online resources do elementary teachers use for their professional learning and to assist them with their literacy instruction?

2. What is the quality of the identified online resources?; and

3. To what extent do the identified online resources effectively address literacy skills, including print-based, language-based, and critical literacy skills?

Methods

The present study was part of a larger program of research investigating elementary teachers' self-directed online learning strategies for and experiences with informal professional learning

(Beach, Minuk, & Favret, 2022). Using screen capture technology to record participants' web-based navigations, quantitative methods were used to categorize and evaluate the websites participants visited across three SDOL sessions. Building on the findings from the broader study, which focused on teachers' thought processes during their web-based navigations, descriptive statistics were used to categorize the websites that participants used for their SDOL, evaluate their overall quality, and determine the extent to which they effectively addressed the literacy skills noted above. Screen capture technology is widely used in education research (Stannard, 2019; Stannard & Sallı, 2019), often in the context of teacher training or producing learning assets (e.g., creating instructional videos). In this study, screen capture technology was used to capture moment-to-moment data on elementary teachers' exploration of online learning environments.

Sampling and Recruitment

After institutional ethical clearance was granted, 12 teachers from Ontario, Canada were recruited to participate in this study via their participation in a related study investigating Canadian teachers' perceptions of online professional development (Beach, Favret, et al, 2022). Participants were recruited to complete the initial survey via multiple social media platforms, including the authors' personal Facebook and Twitter accounts. At the end of the survey, they were asked to indicate their interest in participating in the present study and, if so, to provide their contact information. Participants provided informed consent prior to participation. All participants lived in the province of Ontario and taught in different schools. Table 1 contains a complete breakdown of participants' demographic characteristics.

Table 1

Demographic Characteristics

Characteristic		Frequency (N = 12) n (%)
Teaching Experience		
	1-5 years	7 (58%)
	6-10 years	5 (42%)
Age Range		
	25-29	6 (50%)
	30-34	3 (25%)
	35-39	3 (25%)
	40+	0
Current Grade		
	Kindergarten (JK/SK)	5 (42%)
	Primary (Grades 1-3)	2 (17%)
	Junior (Grades 4-8)	4 (33%)
	Multi-grade range	1 (8%)
Type of School		
	Public	8 (67%)
	Private/Independent	3 (25%)
	Unknown	1 (8%)

Procedures

Participants arranged to meet with a member of the research team via Zoom for a total of three monthly SDOL sessions between November, 2020 and February, 2021. Prior to the first SDOL session, participants were asked to complete a short online questionnaire containing items related to their demographic characteristics (e.g., years of teaching experience; see Table 1) as well as information related to their Internet use for professional learning. For example, participants were asked to indicate their frequency of Internet use for their professional learning as well as their comfort using the Internet for their professional learning as either *very comfortable*, *somewhat comfortable*, *not very comfortable*, or *not comfortable at all.*

Each session began with participants being asked to share a professional learning goal related to their literacy instruction. For example, one participant's goal during a session was to create a visual literacy plan for a student with autism spectrum disorder, whereas another participant's goal was to find resources related to advocacy that aligned with a text she was reading with her class. After sharing their goals, participants began a 20-minute open-ended task to navigate the Internet as they normally would when seeking information related to their practice. As a starting point, participants were provided with the URLs of two literacy-oriented PD websites: *The Balanced Literacy Diet: Putting research into practice in the classroom* (www.litdiet.org) and *Reading Rockets: Launching young readers* (www.readingrockets.org). The websites were selected for their popularity among practicing elementary teachers, evidence-based content, and freely accessible resources. Participants were welcome, however, to select hyperlinks to other websites or start with websites of their choosing.

As the participants navigated the Internet, they shared their screens via Zoom so their actions could be captured using Camtasia Studio, a screen-recording software developed by TechSmith. The 20-minute recordings ($n = 36$, for a total of 720 minutes) resulting from the SDOL sessions were the focus of analysis for this study.

Data Sources

In addition to the online questionnaires, the research team used the screen recordings to construct a list of every website participants visited during the SDOL sessions, noting the frequency with which they were accessed both between and within sessions. The resultant list was used to calculate descriptive statistics (e.g., frequencies and percentages) and provided the foundation for the evaluation.

Data Analysis

Data analysis was divided into three stages. First, the research team viewed each screen recording, pausing to note the name and title of each website accessed by participants across their three SDOL sessions, as well as the number of times they were accessed. Table 2 contains the total number of websites accessed by each participant. Additionally, the Appendix provides a complete list of all websites accessed across the sessions and their frequencies.

Next, the research team used existing criteria (Beach, 2020) to categorize the websites accessed during the sessions. Initially, the authors started with 13 potential classifications, but after carefully reviewing the websites and their content, these were refined to ten categories: professional learning resources, resource-based websites, social networking/content-sharing

Table 2

Number of Websites Accessed by Participants Across the Three Sessions

Participant	Frequency (*n*)
TA02	3
TA05	3
TA06	8
TA07	23
TA08	11
TA09	19
TA11	3
TA13	27
TA14	8
TA16	7
TA17	17
TA18	15

Note. TA= think aloud participant.

websites, blogs, video resources, school board or classroom resources, curriculum resources, online news resources, organization or business-based resources, and web portals. Table 3 contains a brief description of each category as well as the name and a URL of a well-known example.

Finally, the third phase of analysis involved selecting a website to represent each category and applying Song and Lee's (2014) evaluation criteria to assess their quality. Since *The Balanced Literacy Diet: Putting research into practice in the classroom* (www.litdiet.org) and *Reading Rockets: Launching young readers* (www.readingrockets.org) were selected at starting points for the participants' web-based navigations, they were excluded from the list of possible websites to analyze. Additionally, the authors chose not to evaluate websites that were organization or business-based or considered a web portal. Websites that were organization or business-based were excluded for the purpose of focusing the evaluation on freely accessible resources for teachers, whereas web portals were excluded considering the breadth of their scope.

After the exclusions were made, the research team selected the website with the highest frequency from each category. The chosen websites were rated independently by each member of the research team, all of whom have a background in literacy education, using a 5-point Likert scale (1 being low, 5 being high) on eight criteria: content richness, functionality, range of technologies, new technologies, authenticity of the learning environment, potential for learning, potential for change, and audience impact (Song & Lee, 2014). The researchers followed the same protocol as used previously to complete the assessments, which started by: 1) viewing the website's home and about us pages, if available, and any additional pages linked on the home page; 2) if a search or filter function was available, entering search terms related to language (i.e., phonological awareness, phonemic awareness, and vocabulary comprehension), print skills (i.e., phonics and fluency), and critical literacy (i.e., critical literacy, critical awareness, and critical thinking); and 3) rating each website according to Song and Lee's (2014) criteria along the 5-point Likert scale and recording the scores (Beach, 2020). The researchers then met to discuss their ratings for each website, with disagreements being resolved through discussion until consensus

was reached. Specifically, when a website's scores for a given criterion were discrepant, each member of the research team explained how they arrived at their score, leading to the clarification of the meaning of certain criteria or, when appropriate, taking the average of the discrepant scores.

Table 3

Definitions and Examples of Each Website Category

Category	Description	Example	URL
Professional learning resource	A freely accessible multimedia professional development website for elementary teachers with both informational content and available resources.	The Balanced Literacy Diet	www.LitDiet.org
Resource-based	A website designed for teachers to share or download resources that can be used to support their teaching, including those with digital books or that are student-interactive.	Epic Books	www.getepic.com
Social networking/ content-sharing	A social networking site or content-sharing network that provides opportunities for users to share information and resources using media tools (e.g., photos, videos, etc.) through a community platform.	Facebook	www.facebook.com
Blog	A website that provides educational information, both pedagogical and content-based, for educators through regular postings and updates.	Thought co	https://www.thoughtco.com/
School board/ classroom resource	Websites including a range of resources for members of specific school communities or classrooms. Resources are approved and deemed credible for the school or school board context, and are often designed by either teachers or school board staff.	Saskatchewan School Library Association	https://www.ssla.ca/
Curriculum resource	Government website that provides curriculum resources, such as specific expectations for the subject.	Ontario Ministry of Education	www.Edu.gov.ca
Online news resource	Website providing national or international updates on current events.	BBC	www.bbc.org
Organization or business-based website	Website for a service-oriented organization, or where items or services could be purchased, related or unrelated to teaching.	ATL Speech Therapy	www.atlspeechtherapy.com
Video resource	A free online platform for sharing videos.	YouTube	www.YouTube.com
Web portal	A search engine for finding information using key words	Google	www.Google.com

Table 4

Frequency and Percentage of Participant Access to Each Website Category

Category	Frequency (*n*)	Percentage (%)
Professional learning resource	39	27.46
Resource-based	43	30.28
Social networking/content-sharing	7	4.93
Blog	21	14.79
School board/classroom resource	8	5.63
Curriculum resource	1	.7
Online news resource	6	4.23
Organization or business-based website	11	7.75
Video resource	5	3.52
Web portal	1	.7
Total	142	100

Results

What Types of Online Resources do Elementary Teachers Use for Their Professional Learning and to Assist Them With Their Literacy Instruction?

As can be seen in Table 4, participants most frequently accessed resource-based websites (*n* = 43), representing almost one third (30.28%) of all websites accessed. Following closely in frequency were professional learning resources (*n* = 39; 27.46%). Other website categories of note include blogs and social networking/content-sharing sites, of which there were 21(14.79%) and 7(4.93%), respectively. A total of 11(7.75%) organization or business-based websites were also accessed by participants, though these were not included in the overall evaluation. Only one participant (.7%) accessed a curriculum resource across the three sessions.

What is the Quality of the Identified Online Resources?

The mean scores of the resource quality are presented according to the evaluation criteria in Table 5 and the overall mean scores of the resource quality are presented in Table 6. Where a resource was difficult to evaluate (e.g., *YouTube*, a video resource with a search engine) the research team used keywords (e.g., "critical literacy") to explore the content as it related to literacy education (Beach, 2020). This was particularly helpful in evaluating content richness.

Overall, *Read Write Think*, the professional learning resource evaluated, scored the highest (*M* = 3.46), followed closely by *YouTube* (*M* = 3.44). The lowest score (*M* = 2.23) was awarded to the resource-based website *Teachers Pay Teachers* as well as to the Ontario curriculum document, with the remaining mean scores ranging between 2.36 and 2.61.

As can be seen in Table 5, *Read Write Think* had the highest mean score for content richness (*M* = 4.2), followed by the Ontario curriculum document and the Toronto District School Board website, both of which had an average mean score of 3.8. Notably, the resource-based website *Teachers Pay Teachers* scored an average of 1.8 in content richness, largely due to its low score on the source credibility criterion. As for functionality of technology, scores were comparable

across websites, ranging between 3–5 with the exception of the Ontario curriculum resource and *The Measured Mom*, the blog evaluated, both of which had a mean score of 2. The curriculum

Table 5

Mean Scores of the Website Quality by Category

Category	Criteria	Online resource*							
		1	2	3	4	5	6	7	8
Content richness	Is the content adequate for learning purposes?	4	2	2	3	3	3	3	3
	Does the content stem from a credible source?	5	1	1	3	3	5	4	3
	Does the content address language and print-related skills?	4	2	3	3	3	4	4	1
	Does the content address critical literacy skills?	4	2	3	1	3	3	4	4
	Does the content include accurate literacy-related language (e.g., critical thinking and representations)?	4	2	3	2	3	4	4	3
	Content richness (mean score)	4.2	1.8	2.4	2.4	3	3.8	3.8	2.8
Functionality of the technology	Is the resource easy to use and navigate?	4	4	4	4	5	3	2	3
	Does the resource's underlying architecture contribute to the ease of use?	5	4	4	2	4	3	2	3
	Functionality of the technology (mean score)	4.5	4	4	3	4.5	3	2	3
Range of technologies	Does the resource provide a wide range of technologies (e.g., interactive and collaborative tools)?	4	2	3	2	2	2	1	3
	Range of technologies (mean score)	4	2	3	2	2	2	1	3
New technologies	Does the resource utilize new and interactive technologies (e.g., virtual tours)?	3	1	1	1	5	1	1	2
	New technologies (mean score)	3	1	1	1	5	1	1	2
Authenticity of the learning environment	Does the resource provide opportunities to explore real world issues through authentic learning experiences?	4	2	3	3	3	3	2	4
	Authenticity of the learning environment (mean score)	4	2	3	3	3	3	2	4
Potential for learning	Does the resource include tools for tracking learning and self-testing (e.g., test your knowledge)?	1	1	1	1	4	1	1	1
	Potential for learning (mean score)	1	1	1	1	4	1	1	1
Potential for change	Does the resource have the potential for teachers to change their beliefs and practices (e.g., videos include real teachers)?	3	3	3	3	4	3	3	2
	Potential for change (mean score)	3	3	3	3	4	3	3	2
Audience impact	Does the resource have the potential to impact practicing teachers?	4	4	4	4	4	3	4	2
	Does the resource have the potential to impact pre-service teachers?	4	4	4	4	4	3	4	2
	Does the resource have the potential to impact literacy teacher educators?	4	2	3	2	4	5	4	2
	Does the resource have the potential to impact literacy coaches and administrators?	4	2	3	4	4	5	4	2
	Audience impact (mean score)	4	3	3.5	3.5	4	3.5	4	2

* 1= www.readwritethink.org; 2= www.teacherspayteachers.com; 3 = www.pinterest.com;
4= www.themeasuredmom.com; 5= www.youtube.com; 6= www.tdsb.insigniails.com/library/home;
7= www.edu.gov.on; 8= www.teachingkidsnews.com.
Adapted from Song and Lee's (2014) website evaluation criteria.

Table 6

Mean Scores of the Overall Website Quality

Website Name	URL	Category	Mean Score
Read Write Think	www.readwritethink.org	Professional learning resource	3.46
Teachers Pay Teachers	www.teacherspayteachers.com	Resource-based	2.23
Pinterest	www.pinterest.com	Social networking/ content-sharing	2.61
The Measured Mom	www.themeasuredmom.com	Blog	2.36
YouTube	www.YouTube.com	Video resource	3.44
Toronto District School Board	www.tdsb.insigniails.com/library/home	School board/ classroom resource	2.54
Government of Ontario	www.edu.gov.on.ca	Curriculum resource	2.23
Teaching Kids News	www.teachingkidsnews.com	Online news source	2.48

document scored even lower on its range of technologies ($M = 1$), though half of the remaining resources scored an average of 2. *YouTube* was the only website to receive a mean score of 5 for its use of new technologies, with the majority of websites receiving a mean score of 1, with the exception of *Teaching Kids News*, the online news source, and *Read Write Think*, the professional learning resource, which scored a 2 and 3, respectively. The same two resources received the highest scores for authenticity of the learning environment ($M = 4$), or their relevance for teaching about real world issues. Almost all ($n = 7$) websites evaluated scored an average of 1 in the potential for learning category, though *YouTube* stood out with an average mean score of 4. *YouTube* similarly stood out in the potential for change category ($M = 4$), though the other websites scored slightly higher than on the previous category ranging between 2–4. Finally, the audience impact scores all fell between 3.5–4, with the exception of the online news source, which had a mean score of 2.

To What Extent do the Identified Online Resources Effectively Address Literacy Skills, Including Print-Based, Language-Based, and Critical Literacy?

The extent to which each website addressed print-based, language-based, and critical literacy skills can also be seen in Table 5. *Read Write Think* and the Ontario curriculum document received the highest mean scores ($M = 4$) across all three criteria, followed closely by the Toronto District School Board website. The resource-based website *Teachers Pay Teachers* received an average score of 2 across criteria, whereas *Pinterest* and *YouTube* received mean scores of 3. Across the websites, language and print-related skills as well as critical literacy-related skills received a mean score of 2.85, whereas the use of accurate literacy-related language received mean score of 3, suggesting consistency across the categories.

Discussion

This study sought to identify and describe the different types of literacy-oriented websites and resources that elementary teachers use to facilitate their self-directed online learning and provide

insight into their quality. Additional attention was paid to the extent to which the websites and resources addressed print-based, language-based, and critical literacy skills. Analysis revealed that teachers accessed ten main types of websites in their Internet navigations, though some with greater frequency than others. Resource-based websites were accessed with the highest frequency, followed in prevalence by professional learning resources and blogs. Curriculum documents were accessed surprisingly little during the SDOL sessions, though participants did refer to school board or classroom-based websites more often.

The professional learning resource evaluated, *Read Write Think*, was considered to have the highest quality, but when literacy-oriented keywords were entered into YouTube, the video-based resource, it stood out as having high potential to facilitate both learning and change. Considering professional learning is characterized by cognitive and emotional processes, a common conceptualization is its potential to transform teachers' practice (Avalos, 2011). The websites' potential to facilitate change may draw attention to the transformative nature of professional learning as an indicator of overall quality.

The scores of the resource-based website *Teachers Pay Teachers* may have been impacted by the credibility of their sources, despite being the most popular category among participants. This is in line with the findings that social media platforms and blogs may be teachers' "go-to" for information regarding their professional practice (Shapiro et al., 2019; Visser et al., 2014). It is possible, however, that this is more due to their characteristics than their content. As teachers search for personally meaningful information, they must continuously contemplate a website's readability and the source's credibility (Beach, 2020). As Nielsen (2012) noted, user experience is directly related to whether individuals will continue their navigation. With this in mind, our findings suggest that the characteristics of online environments may be even more important than content for teachers seeking resources.

Though the professional learning and curriculum resources evaluated addressed print-based, language-based, and critical literacy skills to the greatest extent, these categories were represented with some consistency across all websites. This is consistent with the recommendations from the National Reading Panel (2000), as well as the more recent emphasis on critical literacy skills (Luke, 2012) and broader equity concerns related to reading outcomes (OHRC, 2022). Considering the online context of this research, focusing on multiliteracies and 21st century literacy skills is increasingly important. The findings from this study highlight the importance of incorporating print-based, language-based, and critical literacy skills across multiple modalities and in ways that honour cultural and linguistic diversity.

Though each participant in the study navigated the Internet for a total of 60 minutes (i.e., 20 minutes during each of the three SDOL sessions), together, the participants accessed a combined total of over 100 online learning environments (see Table 2), consistent with the finding that resources are outpacing research (Lay et al., 2020). Despite providing participants with the URLs of two professional learning websites as potential starting points, resource-based websites were accessed with the greatest frequency. Considering that anyone can contribute to these sites, there are no known processes for quality assurance, nor is there a guarantee that resources stem from evidence-based practices, teachers' reliance on this category of websites is concerning. As Campbell-et al. (2016) pointed out, in order for professional learning to be effective, it must be evidence-based—a feature of professional learning sites, but not necessarily those that are resource-based. Similar concerns surround the popularity of educational blogs, which was also among the most frequent category of websites accessed by participants. Though several studies have outlined the benefits of blogging for teachers engaging in online learning environments

(Churchill, 2009; Heo & Lee, 2013; Hou et al., 2009; Kim, 2011), blogs are often based on teachers' own perspectives, opinions, and experiences, and may have limited generalizability beyond the author's own classroom context.

Related is the somewhat surprising finding that only one participant referred to a curriculum resource across all SDOL sessions. Considering the study focus on professional learning related to print-based, language-based, and critical literacy skills, as well as the emphasis in the extant literature on the importance of quality content for professional learning (Campbell et al., 2016), such limited engagement with curriculum resources may be cause for concern. Though the Ontario mathematics curriculum has recently been published in HTML format, this may reflect teachers' more limited engagement with the PDF version of the current elementary language and literacy document. Several participants, however, consulted school board or classroom websites during their navigations. It may be that participants considered material provided by their own boards to be more compatible with their unique classroom contexts (Krutka et al., 2016). The reliance on school board and classroom websites raises questions about who creates and monitors these sites, ensures they are populated with up to date and evidence-based content, and whether they evolve with changes to the curriculum in a timely manner. These questions are again related to the quality and credibility of online resources, and the need for teachers to evaluate these environments while they simultaneously search for resources (Beach, 2020).

Though online news sources represented just under 5% of the types of websites accessed, their inclusion in participants' navigations may have important implications in the current context. First, online news sources are a meaningful way for students to engage in critical and digital literacy, promoting discussion and reflection on real world events (Vasquez et al., 2019). Additionally, considering the timing of data collection, several of the study participants were teaching remotely and navigating the many challenges associated with a global pandemic. Understanding and interpreting media messaging became increasingly important during this time, and it is possible that participants were making more of a concerted effort to incorporate online news sources in their teaching as a tool to foster students' critical and digital literacy skills. As a result, the findings are closely linked to the context of the COVID-19 pandemic, to which the high volume of online learning environments participants accessed may also be attributable (De et al., 2020; Lay et al., 2020).

Study Limitations

This study is not without its limitations, and results must be interpreted with the research context in mind. Though small sample sizes are ideal for qualitative research, considering multiple quantitative methods were used for the present study, future research should attempt to draw on the perspectives of a larger number of participants. Additionally, including open-ended questions in the demographic questionnaire has the potential to add further insight to analysis through the collection of qualitative data. Moreover, since this sample was limited to the province of Ontario, a pan-Canadian analysis has the potential to identify areas of overlap and discrepancy between teachers in the provinces and territories. Although Ontario is both culturally and geographically diverse, participants were limited to southern Ontario, resulting in limited generalizability. Additionally, efforts were made to recruit participants with a wide range of teaching experience, though no participants older than 40 years old were included in the sample. Future research investigating online learning environments for teachers should utilize diverse recruitment methods for a more heterogeneous sample.

An additional limitation is that Song and Lee's (2014) evaluation criteria, though adapted for our purposes, are more broadly intended to evaluate informal online learning environments. Though the research team conducted a search to find a more recent or perhaps more relevant instrument, to date, the evaluation criteria used were considered the most pertinent. When addressing trends related to the use of technology in teacher professional learning, more current research is essential in interpreting study findings. Lastly, only one website per category was evaluated. As a result, representations of the website categories evaluated rely on generalizations from only one website each.

Conclusion

More than ever, elementary teachers are turning to the Internet as a means of informal professional learning (Beach, 2020). Considering both ease of access to and volume of resources, it is necessary to understand which types of websites teachers use and why, as well as to evaluate their quality. Not only is this type of data useful for teachers and educators, but more broadly, identifying the characteristics conducive to effective online learning environments can inform design across domains.

Moreover, considering the relationship between teacher professional learning and literacy outcomes for students, understanding the types of resources that promote language, print, and critical literacy skills is increasingly important. Without identifying the quality of online learning environments and the credibility of literacy-oriented resources, teachers risk investing time, effort, and even money into using materials without an evidence base. The findings from this study can help to address this issue by offering insight into the markers of high quality online learning websites and resources, to which educational organizations and stakeholders can refer when developing new tools, features, and environments.

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Appendix: Names and Frequency of Websites Accessed by Participants

Website Name	URL	Frequency n
A Guide to Learning English	http://esl.fis.edu/	1
ABC Fast Phonics	http://www.abcfastphonics.com/	1
ABC Mouse	https://www.abcmouse.com/	1
Amazon	https://www.amazon.com/	3
Atlanta Speech Therapy	https://atlspeechtherapy.com/	1
Baby Navigator	https://babynavigator.com/scgc/	1
Balanced Literacy Diet	https://www.oise.utoronto.ca/balancedliteracydiet/Home/	11
Balancing Yin Miao Yang Meow	https://yinmiaoyangmeow.wordpress.com/tag/jolly-phonics/	1
BBC Bite Size	https://www.bbc.co.uk/bitesize	1
Bonnie Campbell Hill	http://bonniecampbellhill.com/	1
Boom Writer	https://boomwriter.com/	1
Capstone	https://shop.capstonepub.com/library/	1
Class Playground	https://classplayground.com/	1
Common Sense	https://www.commonsense.org/	1
Community Bright Space	https://community.brightspace.com/s/	1
Cult of Pedagogy	https://www.cultofpedagogy.com/	2
Education World	https://www.educationworld.com/	1
Education.com	https://www.education.com/	1
Eduscapes	https://eduscapes.com/wp/	1
Edutopia	https://www.edutopia.org/	1
ELA Common Core Lesson Plans	https://www.elacommoncorelessonplans.com/	1
Elementary Librarian	https://elementarylibrarian.com/	1
Elementary Nest	https://elementarynest.com/	1
Epic	https://www.getepic.com/	1
ERIC	https://eric.ed.gov/	1
Facebook	https://www.facebook.com/	2
Florida Centre for Reading Research	https://fcrr.org/	1
For French Immersion	https://www.forfrenchimmersion.com/	1
Fountas and Pinnell	https://www.fountasandpinnell.com/	1
French Immersion at Seneca Trail	https://senecatrailgradeonefi.weebly.com/	1
Fun Learning for Kids	https://funlearningforkids.com/	1
Global C Beebies	https://global.cbeebies.com/	1
Good Reads	https://www.goodreads.com/	1
Growing Book by Book	https://growingbookbybook.com/	1
Howywood Kindergarten	http://www.howywood.rocks/	1
Internet 4 Classrooms	https://www.internet4classrooms.com/	1
Katherine Wanner	https://katherinewanner.wordpress.com/	1
KFF	https://www.kff.org/	1
K1 French Immersion	http://k1frenchimmersionbestpractices.pbworks.com/w/page/31678711/Bienvenue%21.com	1
La Classe de Mme Proulx	https://mmejproulx.weebly.com/	1

Website Name	URL	Frequency n
Larry Ferlazzo	https://larryferlazzo.edublogs.org/	1
Learning at the Primary Pond	https://learningattheprimarypond.com/	1
Learning for Justice	https://www.learningforjustice.org/	1
Literactive	http://www.literactive.com/Home/index.asp	1
Literacy World Wide	https://literacyworldwide.org/	1
Litter@Out	https://www.litteratout.ca/	1
Madame Bellefeuille's Blog	http://madamebellefeuille.blogspot.com/	1
Madame Bernice's Class	http://classedemadamebernice.blogspot.com/	1
Measured Mom	https://www.themeasuredmom.com/	2
Media Smarts	https://mediasmarts.ca/	1
Merriam Webster	https://www.merriam-webster.com/	1
Mes Games	https://www.mes-games.com/	1
Mme Raso's Website	http://www.mmeraso.com/	1
Mrs. Judy Araujo	http://www.mrsjudyaraujo.com/	1
Mrs. Richardson's Class	https://www.mrsrichardsonsclass.com/	1
National Association for the Education of Young Children	https://www.naeyc.org/	1
Ontario Curriculum	http://www.edu.gov.on.ca/eng/curriculum/secondary/english.html	1
PBS Kids	https://pbskids.org/	2
Pebble Go	https://site.pebblego.com/	1
Pinterest	https://www.pinterest.ca/	4
Primary French Immersion Resources	http://primaryfrenchimmersionresources.blogspot.com/	1
Primary Success Publications	https://www.primarysuccesspublications.com/	1
Purdue Owl	https://owl.purdue.edu/	1
Rancheview School	https://rancheview.rockyview.ab.ca/	1
Raz Kids	https://www.raz-kids.com/	1
Read Works	https://www.readworks.org/	1
Read Write Think	http://readwritethink.org/	3
Reading A-Z	https://www.readinga-z.com/	1
Reading is Fundamental	https://www.rif.org/	1
Reading Recovery Clemson University	https://readingrecovery.clemson.edu/	1
Reading Rockets	https://www.readingrockets.org/	11
Sadlier	https://www.sadlier.com/	1
Saskatchewan School Library Association	https://www.ssla.ca/	1
Scholastic	http://scholastic.ca/	2
Scholastic Teachables	https://teachables.scholastic.com/teachables/guesthomepage.html	1
Scoop	https://www.scoop.it/	1
Seesaw	https://web.seesaw.me/	1
SEN Teacher	https://www.senteacher.org/	1
St. Anthony Catholic French Immersion	https://wserra71.wixsite.com/classe-de-m-serrano	1
Starfall	https://teach.starfall.com/lv/	1
Start with a Book	https://www.startwithabook.org/	1

Website Name	URL	Frequency *n*
Story Place	https://www.storyplace.org/	1
Success for Kids with Hearing Loss	https://successforkidswithhearingloss.com/	1
TDSB	https://tdsb.insigniails.com/Library/Home	1
Teacher Trap	http://teachertrap.com/	1
Teachers Pay Teachers	https://www.teacherspayteachers.com/	4
Teaching Kids News	https://teachingkidsnews.com/	1
Tech with Jen	https://techwithjen.com/	1
Tes	https://www.tes.com/	2
The Best Children's Books	https://www.the-best-childrens-books.org/biographies-for-kids.html	1
The Daily Café	https://www.thedailycafe.com/	1
The Independent	https://www.independent.co.uk/	1
The Primary Gal	http://teachertrap.com/	1
This Reading Mama	https://thisreadingmama.com/	1
Thought Co	https://www.thoughtco.com/	1
Toy Theatre	https://toytheater.com/	1
Vanderbilt	https://my.vanderbilt.edu/	1
Vimeo	https://vimeo.com/	1
Washington Post	https://www.washingtonpost.com/	1
Word Central	http://wordcentral.com/	1
Word Wall	https://wordwall.net/	1
Yes Magazine	https://www.yesmagazine.org/	1
YouTube	https://www.youtube.com/	4