SELF-DIRECTED ONLINE LEARNING AND SPECIAL EDUCATION TEACHER PROFESSIONAL DEVELOPMENT: A CASE STUDY

Alexandra Minuk,* Pamela Beach, & Elena Favret

Queen's University, Kingston, ON, Canada

*Address all correspondence to: Alexandra Minuk, Queen's University, 511 Union St., Kingston, ON, K7L 3N6, Canada, E-mail: alexandra.minuk@queensu.ca

Self-directed online learning (SDOL) is emerging as an important tool for teacher professional development, especially during a time of physical and social distancing. This may be even more appealing for special education teachers, who are tasked with bridging the gap between research and practice to meet students' diverse needs within their unique classroom contexts. The purpose of this case study was to explore two special education teachers' professional learning goals, thought processes, and web-based behaviors and actions over the course of three SDOL sessions. Participants' professional learning goals and thought processes were analyzed thematically, whereas their web-based behaviors and actions were the subject of a time sampling analysis. Findings revealed that the special education teachers included in the study had four types of goals for their SDOL: those that were (i) student focused, (ii) classroom focused, (iii) literacy focused, and (iv) pedagogy focused. Their thought processes were characterized by five themes: metacognitive awareness, monitoring learning, self-efficacy, challenges specific to special education, and reflecting on the impact of the COVID-19 pandemic. While both participants engaged in several different web-based behaviors, video-viewing and skimming stood out as important processes characterizing SDOL. The implications of these findings for professional development are explored both broadly and as they relate to the optimal design of online learning environments for special educators.

KEY WORDS: teacher professional development, special education teacher professional development, self-directed online learning

1. INTRODUCTION

As educators increasingly turn to the Internet for their professional development (PD) (Charalambousa and Iannou, 2011; Delgado et al., 2015), it is essential to understand how teachers and, specifically, special education teachers engage in self-directed online learning (SDOL). SDOL is an extension of self-directed learning (SDL), the branch of adult learning theory that stems from an individual's desire to understand a given phenomena (Knowles, 1975). There are many models of SDL (e.g., Candy, 1988; Song and Hill, 2007), with Garrison (1997) referring to it as "an approach where learners are motivated to 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).

Caffarella (1993) similarly uses three principles to describe the process of SDL. It must be (i) self-initiated, (ii) characterized by a sense of personal autonomy, and (iii) associated with increases in learner control.

As a form of teacher PD, SDOL is firmly situated in the scholarship of teaching and learning (SoTL) as it creates opportunities for educators to trade ideas, evidence, and approaches that they can bring into their own contexts or classrooms (Hutchings and Taylor Huber, 2008). Moreover, as some scholars (e.g., McKinney, 2004) raise questions about the role of technology in studies of SoTL, understanding SDOL as a means of improving one's teaching practice and, in turn, student learning is of growing importance.

Building on the foundation of SDL, a theoretical model of SDOL is emerging tailored to web-based environments as part of a broader effort to better understand teacher professional learning (Beach, 2017). In a study of elementary teachers' SDL experiences, Beach identified nine themes underlying SDOL, organized into four main areas, as follows:

Area 1: Conditions Affecting Navigation

> i. Perceptions of professional learning

> ii. Focusing on student needs and instructional goals

> iii. Motivating factors

Perceptions of professional learning refers to teachers' ideas and attitudes related to professional learning (e.g., source credibility and trustworthiness), while focusing on student needs and instructional goals draws a connection between the navigational experience and teaching context, students, and instructional practices. Motivating factors, the third theme, includes reasons teachers provide for engaging with online resources.

Area 2: Central Phenomena of the Framework

> iv. Navigating a professional development website

Broadly speaking, the second area refers to the explanations and descriptions that teachers provide for their web-based actions throughout their online explorations.

Area 3: Strategies for Navigating a Professional Development Website

> v. Evaluating information

> vi. Saving information for future retrieval

Evaluating information refers to participants' assessments and opinions of resources during their navigations; whereas saving information for future retrieval refers to saving information digitally (e.g., through bookmarking, note-taking, and emailing), but relies on cognitive strategies for remembering and recalling information.

Area 4: Potential Outcomes of Navigating a Professional Development Website

    vii. reflecting on learning

    viii. continued professional learning

    ix. intentions for practice

Reflecting on learning includes any reflective statements about the teacher's learning from the online environment, including making references to using it in the future, while increases in self-efficacy refers to any statements relating to the teacher's sense of confidence. Intentions for practice includes any statements the teacher makes about planning, adapting information or resources to meet student needs, or making connections with their professional goals (Beach, 2017).

Gaining insight into teachers' experiences with SDL in online environments can inform the development of both teacher professional development opportunities and web-based learning environments such that both are more conducive to teacher learning (Lohman, 2006). Web-based learning environments have proliferated as a source of professional learning for teachers, providing access to opportunities they may not otherwise have had (Demir, 2010; Stosic and Stosic, 2014; Wu and Chen, 2008). The interaction and collaboration characteristic of online environments can promote engagement with content (Powell and Bodur, 2019), and the collaborative culture can lead to improvements in teaching practices (Donohoo, 2018). Additionally, considering that each classroom comprises its own unique context that teachers must learn to effectively navigate (Trust, 2016), online environments allow teachers to seek information directly related to their practice (de Vries et al., 2014). This is particularly beneficial for special education teachers, who must balance both the needs of their individual students as well as their teaching responsibilities (Browder et al., 2012).

2. TEACHER PROFESSIONAL DEVELOPMENT

As web-based learning environments have the potential to remove at least some time and situational barriers, researchers are increasingly turning their attention to the ways in which teachers are engaging with PD in online contexts (Kanuka and Nocente, 2003; Delgado et al., 2015; Kao et al., 2011). Professional development can be considered any formal (e.g., course-based) or informal (e.g., teacher collaboration) activities that develop an individual's knowledge, expertise, and skills in their field (OECD, 2014). Formal PD opportunities are often structured and typically guided by either a facilitator or an established set of expectations (Beach, 2017). By contrast, informal PD is typically open-ended, flexible, and self-directed in nature, allowing teachers to lead their own learning (Campbell et al., 2017) and be guided by their own goals. As a result, informal PD opportunities may more closely coincide with teachers' interests (Callanan et al., 2011).

According to Browder et al. (2012), high-quality teacher PD should: (a) be sustained, intensive, and content-focused; (b) be aligned with and directly related to standards for

academic content, student achievement, and assessment; (c) improve teacher knowledge; (d) increase teacher understanding of instruction based on scientific evidence; and (e) be regularly evaluated to assess its impact on both teacher effectiveness and student achievement. While the informal learning characteristic of SDOL may not occur in the same sustained or intensive bursts as more formal activities such as workshops, which are often measured in hours, several examples of content-focused SDOL exist, such as the emergence of online communities of practice devoted to a particular subject or area (Macia and Garcia, 2016).

Participation in online communities of practice may be sustained, however, over extended periods of time, with the added benefit that teachers can access resources at their convenience (Beach et al., 2022). As for alignment with standards for academic content, achievement, and success, since SDOL can be tailored to teachers' individual contexts, PD in web-based environments allows teachers to continually evaluate the quality and credibility of resources in the context of their current curriculum. The same is true of improving teacher knowledge and increasing teacher understanding of instruction based on scientific evidence. Wu and Chen (2008) found, for example, that teachers who engaged in informal PD using SDOL most often obtained up-to-date information that was directly related to their teaching subjects and current instructional needs. Additionally, considering evaluation is one of the themes underlying SDOL (Beach, 2017), it is particularly conducive to regular evaluations to assess its impact on both student and teacher learning (Powell and Bodur, 2019).

2.1 Special Education Teacher Professional Development

A challenge facing the field of special education—especially in the context of the COVID-19 pandemic—is limited access to PD opportunities that optimize teachers' abilities to use evidence-based practices (Suppo and Mayton, 2014). Limited access to PD can lead to frustration for those in the field who are trying to develop their knowledge and skills in ways that were not addressed during pre-service training (Francois, 2020). Several factors can act as barriers to accessing quality PD, such as traveling distance, arranging a cover teacher during the day, or arranging childcare for one's own children in the evening (Berry et al., 2011). As such, the teacher-led inquiry characteristic of SDL in online environments is emerging as an important tool for professional growth (Shurr et al., 2014). SDOL may be a particularly appealing form of professional learning for special educators as online environments can remove time and situational barriers (Kanuka and Nocente, 2003), and special educators often face additional time constraints due to the need for individualized planning and instruction (Johnson and Semmelroth, 2014).

Professional development specific to special education is associated with many benefits, such as the intention to remain in one's position (Billingsley, 2009), reduced levels of stress, improved teacher effectiveness, and a demonstrated commitment to the field (Berry et al., 2011). Challenges specific to special education that can be addressed through PD include meeting diverse student needs, teaching multiple ability levels, securing appropriate materials and resources, addressing student behavior, and managing various roles

(Billingsley et al., 2009). Though research has recognized the role of PD in improving outcomes for students with disabilities broadly (Browder et al., 2012), the literature that relates to PD opportunities for special educators specifically is scarce.

3. THREE DIMENSIONS OF PROFESSIONALISM

Shurr et al. (2014) proposed a three-dimensional model of professional learning, used interchangeably with the term professionalism, specific to special education. According to this framework, PD can be described as school-based, community-based, and universal with each dimension directly connected to SDL. School-based professionalism begins with the teacher identifying an area for improvement (e.g., using visual supports) and choosing to find a means to address it [e.g., watching a webinar (Shurr et al., 2014)]. The second dimension, community-based professionalism, involves the integration of the teacher within the school, with families, and the community, and their use of SDL to advocate for students [e.g., providing families with access to resources (Shurr et al., 2014)]. The final dimension, universal professionalism, refers to special education teachers' efforts to engage with other professionals in the field and contribute to the community of practice beyond their classroom. Together, these dimensions create a structure for PD that encourages teachers to engage in self-assessment and planning for improvement (Thoonen et al., 2011), allowing them to focus on what is most important in their own classrooms (Shurr et al., 2014).

Considering the importance of PD specific to special education, and the preference for online environments in the midst of the COVID-19 pandemic, this study extends Shurr et al.'s three dimensions of professionalism from SDL to SDOL for special educators. Through this lens, the purpose of this study was to examine two special education teachers' professional learning goals, thought processes, and web-based actions during a series of SDOL sessions. This study was guided by three research questions, as follows:

1. What are special education teachers' professional learning goals during a series of SDOL sessions?

2. What are special education teachers' thought processes during a series of SDOL sessions?

3. What are special education teachers' web-based actions during a series of SDOL sessions?

4. METHODOLOGY

This case study was a part of a larger mixed methods study that investigated the professional learning goals, thought processes, and web-based actions of 12 elementary teachers. Since the focus of the case study was a specific issue (i.e., SDOL for special education teachers), an instrumental case study was chosen such that the data could be

used as a means of better understanding the issue itself (Stake, 1995). The data, which consisted of four different sources, were analyzed again in this context.

4.1 Participants

Two elementary teachers from Ontario, Canada volunteered to participate in the study while employed as special education teachers in self-contained settings within their respective school districts. As part of the larger study, a survey related to teachers' perceptions of online professional development was distributed online via the authors' social media accounts (Beach et al., 2022). At the end of the survey, respondents were asked if they would be interested in participating in the present study and, if so, to contact the authors. From there, homogenous sampling (Patton, 1990) was used to identify the special educators with the intention of describing the experiences of this subgroup of teachers in greater depth. To be included as part of the larger study, participants were all practicing elementary teachers in Canada. To be included as part of the instrumental case study, participants had to be currently working in a special education setting.

The first participant, Lisa (names are pseudonyms), worked in a split grade mixed exceptionalities special education classroom with students in grades 3–6. At the time of data collection, Lisa was between 25 and 29 years of age and had been teaching between one and five years. The second participant, Amanda, also taught in a split grade special education setting for students with autism spectrum disorder (ASD) in grades 6–8, was between 30 and 34 years of age, and had been teaching between six and ten years.

4.2 Procedure

Participants met with a member of the research team over Zoom™ for three monthly SDOL sessions. At the beginning of the first session, participants completed a short demographic questionnaire. Prior to the start of each SDOL session, participants were provided with the URLs to two literacy-oriented professional learning websites [see Ontario Institute for Studies in Education (2021) and WETA (2022)]. While these websites were selected as starting points for the SDOL sessions due to their research-informed content, user-friendly interfaces, and popularity with teachers, participants were also encouraged to select hyperlinks to other sites or explore any websites with which they were familiar.

Each session began by asking the participants to state a professional learning goal related to their literacy practice. Participants were reminded that their goals could be related to the two literacy resources provided, though this could also be related to their current classroom contexts. The participants were then asked to share their screen via Zoom™ while they completed a 20 min open-ended task to navigate websites of their choice. Their navigations were recorded using Camtasia Studio™, a screen-recording program developed by TechSmith™. At the end of the 20 min, participants were asked to stop their navigations so their screen recordings could be played back to them. The virtual revisit think aloud was then

conducted; that is, as participants viewed their online choices, they verbalized their thoughts aloud. Following the final SDOL session, a semi-structured interview was conducted to inform a more complete understanding of participants' experiences.

4.3 Data Sources

4.3.1 Demographic Questionnaires

Participants were asked to indicate the type of school they taught in (public, private, or independent) as well as the province or territory where they taught. Participants were also asked to select all grades that they were currently teaching, ranging from junior kindergarten to grade 8. To provide a measure of how many years participants had been teaching, they were asked to select one of the following ranges: 1–5, 6–10, 11–15, 16–20, or > 20 yr. Participants were also asked to indicate their age by selecting one of the following ranges: < 25, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, or > 55 yr.

The questionnaire also included questions about participants' frequency of Internet use for professional learning (once a month, once a week, once a day, or more than once a day) and comfort level using the Internet (very comfortable, somewhat comfortable, not very comfortable, or not comfortable at all). Participants were asked to indicate what portion of time they use the Internet for professional learning related to their literacy practice, to list the three websites that they use the most often for their professional learning in the subject, and to describe what they liked best about these websites.

4.3.2 Virtual Revisit Think Aloud

The think aloud method involves asking participants to continuously verbalize their thoughts, which are typically audio-recorded, transcribed, and analyzed in segments (Kumar, 2005). This procedure, which is retrospective in nature, frees participants' cognitive resources as participants complete a given task (Cotton and Gretsy, 2006). The virtual revisit think aloud is a variation of the retrospective think aloud and allows participants to review and comment on how they interacted with specific websites (Beach and Willows, 2014). During each of the three SDOL sessions, audio recordings of the participants' virtual revisit think aloud procedure captured participants' verbalizations, providing insight into their thought processes as they viewed their 20-minute navigations. The recordings also included the participants' stated goals for each session, which were analyzed separately.

4.3.3 Screen Capture Recordings

The screen recordings of participants' navigations captured using Camtasia Studio by TechSmith served two purposes: 1) they were the basis for participants' think aloud

verbalizations; and 2) they allowed for an in-depth analysis of participants' web-based behaviors and actions. Together with the virtual revisit think aloud, the screen capture recordings allowed for moment-to-moment insights into the participants' Internet navigations.

4.3.4 Follow Up Semi-Structured Interviews

The semi-structured interviews that immediately followed the third session were also audio recorded, and involved questions related to the participants' general feelings about their navigations and the virtual revisit think aloud process. During the interviews, participants commented on what they found challenging about the process, what stood out to them about particular websites, what they felt was missing from their navigations, if they plan to incorporate any of the information they came across during the sessions into their classroom practice, and anything else that they wanted to share about the experience. Like the think aloud verbalizations, the interviews were audio-recorded and transcribed verbatim.

4.4 Data Analysis

This case study followed similar procedures to the larger mixed methods study, employing both qualitative and quantitative methods. The qualitative component followed a general inductive approach (Thomas, 2006) and involved open coding. As part of the larger study, all audio recordings were transcribed, unitized (Lincoln and Guba, 1985), and reduced to themes in NVivo™ (Version 12). As part of this process, the research team met to review ∼ 10% of the transcripts and established a reliability rate of 96.1%. For the case study, the two participants' transcripts (n = 6) were reflectively read and analyzed again with a specific focus on special education.

The quantitative analysis involved conducting a time sampling analysis, a widely used method of observing and recording behavior (Harrop and Daniels, 1986) to track the frequency of participants' web-based actions in 10 s intervals (see Table 1). Once the frequencies of the participants' web-based actions were recorded, percentages were calculated to represent the proportion of each session that the participant engaged in each specific behavior. These were then graphed across the sessions and inspected visually to note any changes over time. Since a limitation of time sampling is that it does not necessarily provide insight into participants' thoughts, it is best when combined with methods such as the virtual revisit think aloud.

5. RESULTS AND DISCUSSION

The findings from the analysis revealed both similarities and differences in how Lisa and Amanda approached SDOL. In Section 5.1, the results and discussion are addressed together for each participant. Not only do the findings capture the day-to-day challenges that

TABLE 1: Web-based actions and behaviors during a series of SDOL sessions

Action	Session 1 Total *N* (%)	Session 2 Total *N* (%)	Session 3 Total *N* (%)	Overall Total *N* (%)
Enters a search term	0 (0)	1 (0.4)	4 (1.3)	5 (0.6)
Selects an interactive feature	0 (0)	0 (0)	3 (0.9)	3 (0.4)
Uses interactive feature	0 (0)	0 (0)	1 (0.3)	1 (0.1)
Opens content page	8 (3.3)	3 (1.1)	5 (1.6)	16 (1.9)
Opens page about background information	1 (0.4)	2 (0.8)	3 (0.9)	6 (0.7)
Opens homepage	2 (0.8)	2 (0.8)	1 (0.3)	5 (0.6)
Opens a video	6 (2.5)	5 (1.9)	14 (4.4)	25 (3)
Starts a video	5 (2.1)	5 (1.9)	14 (4.4)	24 (2.9)
Views a video	30 (12.3)	70 (26.6)	93 (29.4)	193 (23.5)
Stops video before the end	1 (.41)	0 (0)	4 (1.3)	5 (0.6)
Opens an external link	1 (.41)	1 (0.4)	2 (0.6)	4 (0.5)
Opens lesson plan	9 (3.7)	5 (1.9)	17 (5.4)	31 (3.8)
Selects filter option	7 (2.9)	2 (0.8)	1 (0.3)	10 (1.2)
Takes a note	35 (14.4)	27 (10.27)	45 (14.2)	107 (13)
Highlights text	4 (1.6)	5 (1.9)	2 (0.6)	11 (1.3)
Views a photograph	10 (4.1)	3 (1.1)	0 (0)	13 (1.6)
Saves information	0 (0)	0 (0)	0 (0)	0 (0)
Opens new tab	1 (0.4)	4 (1.5)	0 (0)	5 (0.6)
Switches tab	6 (2.5)	11 (4.2)	17 (5.4)	34 (4.1)
Closes tab	2 (0.8)	3 (1.1)	5 (1.6)	10 (1.2)
Scrolling	85 (35)	102 (38.3)	61 (19.3)	248 (30.2)
Opens a pop-up window	0 (0)	0 (0)	0 (0)	0 (0)
Skips ahead in video	7 (2.9)	0 (0)	1 (0.3)	8 (1)
Uses search function on webpage	4 (1.6)	9 (3.2)	3 (0.9)	16 (1.9)
Uses back button	11 (4.5)	3 (1.1)	15 (5.1)	30 (3.6)
Opens link in new tab	2 (0.8)	0 (0)	2 (0.6)	4 (0.5)
Zooms in or out	0 (0)	0 (0)	0 (0)	0 (0)
Opens downloadable resource	6 (2.5)	0 (0)	1 (0.3)	7 (0.9)

TABLE 1: (*continued*)

Action	Session 1 Total *N* (%)	Session 2 Total *N* (%)	Session 3 Total *N* (%)	Overall Total *N* (%)
Accesses email	0 (0)	0 (0)	0 (0)	0 (0)
Error	0 (0)	0 (0)	0 (0)	0 (0)
Engages in planning activity	0 (0)	0 (0)	0 (0)	0 (0)
Opens resource page	0 (0)	0 (0)	1 (0.3)	1 (0.1)
Accesses personal account	0 (0)	0 (0)	0 (0)	0 (0)

can be characteristic of special education classrooms, but they also provide a picture of what informal PD looks like for two special educators in different contexts.

5.1 Professional Learning Goals

Thematic content analysis revealed four types of goals for teachers' professional learning during SDOL: student focused, classroom focused, literacy focused, and pedagogy focused. Goals that were student focused were further broken down as targeting specific student needs or helping students make connections between home and school. Goals that were classroom focused tended to involve targeting a particular grade level, resource, or assessment, which would be beneficial for all students. Goals that were literacy focused targeted planning for literacy instruction and, finally, goals that were pedagogy focused involved seeking out broader educational information on specific issues, filling knowledge gaps, and focusing on teaching structure.

Since Lisa taught a multiple exceptionalities class with children of different ages and abilities, it is unsurprising that her goals across the sessions were student focused, which is in line with Shurr et al.'s (2014) school-based professionalism. Moreover, Lisa's goals became more specific to her students' individual needs over time and her own classroom context.

At the beginning of the first SDOL session, when asked about her goal, Lisa responded that "there's so many different kinds of literacy goals for each child," focusing on all of her students throughout the session. By the second SDOL session, however, Lisa narrowed her focus to two students, deciding to spend the session developing a visual literacy plan for a student with ASD and intellectual disability, and to find resources to support sight word recall for another student with ASD and general developmental delay. During the final session, however, Lisa focused solely on the second student, continuing to search for resources to support his retention of sight words and ability to transfer knowledge.

Unlike Lisa, Amanda's goals were classified differently during each of the three sessions. Amanda's first goal was literacy focused, stating: "I was looking for different ideas on strategies to build reading comprehension." During the next session, Amanda's goal was

student focused; specifically, she was searching for resources to support a newer student. For the last session, Amanda's goal was classroom focused. She was starting a new book with her class about advocacy and trying to find related resources for her students.

While both Lisa and Amanda are special educators, Amanda taught a class specific to students with ASD. Though her goal during the second session was student focused, representing school-based professionalism (Shurr et al., 2014), since her students have similar needs, it follows that she was able to vary her goals across the sessions. Thus, not only does the makeup of special education classes (e.g., autism class) appear to have implications for planning, it also applies to how teachers approach informal SDOL and perhaps professional learning in general.

5.2 Thought Processes

Four main themes resulted from the thematic content analysis, with a fifth added to reflect the impact of COVID-19 on the participants' classroom contexts. While an overview of the findings from each theme is presented in Sections 5.2.1–5.2.5, additional attention is given to the final theme focused on special education.

5.2.1 Metacognitive Awareness

Throughout the sessions, participants noted when they became distracted or confused due to technical difficulties, described their web-based actions and behaviors, identified tools and resources that they noticed on the websites, provided reasons for returning to specific websites, and reflected on the think aloud and SDOL process itself. The metacognitive awareness of participants was often related to their specific students or classroom contexts. For example, when watching the screen recording of her second session, Lisa paused to think about a specific student: "although he is sort of the only one who is fully able to comprehend and respond to a story in the moment, he might love this and I like the teacher's description."

Similarly, when watching the screen recording of her second session, Amanda noted, "I do come back to that [resource] later in the 20 minutes because I really wanted to make sure that I could set it up, that it does work for all my students regardless of their reading abilities right now." The participants' metacognitive awareness across the sessions demonstrated that not only were they aware of what they were thinking, but also that their thoughts were frequently related to their individual students.

5.2.2 Monitoring Learning

Monitoring learning involved SDOL strategies related to searching and filtering for specific information, skimming through information, and reading for depth. Participants also engaged in active planning and extending ideas related to their students, their literacy practice, and

their curriculum, including making cross-curricular connections wherever possible. Once again, as Lisa and Amanda monitored their learning, their thought processes were characterized by their own classroom contexts. When describing her goal for the first session, Lisa commented, "I'm going to be looking for some videos here to help me understand a little bit more fully the matters that go into identifying the words in front of you and connecting to what they actually mean for these children."

When looking at a resource, Amanda also explained, "I'm wanting the students to understand the history behind the residential schools and, in this case, one child's specific experience. And the history template could be very helpful [for] students in my program and a lot of students with reading comprehension needs struggle with understanding that certain events come before other events."

As Lisa and Amanda monitored their learning throughout the sessions, they frequently referenced their students' specific needs, suggesting that their efforts at professional learning were closely linked to their current classroom contexts.

5.2.3 Self-Efficacy

Participants were continuously thinking about their ability to achieve a task or reach a goal related to their practice. Strategies related to self-efficacy for SDOL involved goal setting, drawing on their own personal experiences, and reflecting on their own literacy learning.

During her first session, Lisa demonstrated how self-efficacy can be tied to SDOL by posing questions about her practice. Lisa asked, "…just maybe pairing it back all the way to: how do I read?" She continued, "…so, if I can help, if I can take a few steps back and just ask: what does a good reader do? How does a reader read? When you're reading to someone, what does that look like? When you're being read to, what does that look like?"

Throughout the session, Lisa continued to ask and seek answers to these questions, returning to the idea of what it means to be a good reader. Like Lisa, Amanda also posed questions that related to her students' learning. While considering assessment criteria during her third session, Amanda reflected, "I think I need to do a little bit more planning to figure out whether it's going to be an essay or it's going to be based on having autism as a superpower or advocating for needs, or is it going to be both?"

The questions that both Lisa and Amanda posed throughout the sessions seemed to be a way of expanding their self-efficacy as well as identifying areas where they wanted to increase their knowledge.

5.2.4 Challenges Specific to Special Education

Though Lisa taught a class for children with mixed exceptionalities and Amanda taught a class for those with ASD, both noted that meeting students' diverse needs was an ongoing consideration for their professional learning. During her second session, Lisa noted,

"because all of my students are on very different levels, it's not always possible to do small group work, which is the downside of a special education classroom."

Similarly, when viewing a resource, Amanda commented, "I have kids who are right now going between grades 1 and grades 8 academically for literacy, so I'm hoping this will help with that." When evaluating a resource, Amanda would consider both her lower and higher-level readers before deciding to download it.

Approximately half of Lisa's and Amanda's thought processes during the SDOL sessions could be described as targeting specific student needs. Moreover, since Lisa's students had different exceptionalities and Amanda's all had ASD, it is unsurprising that Lisa tended to look for resources for specific students while Amanda's thoughts were focused on her whole class.

When thinking about one of her goals, Lisa explained, "I needs comprehension but he's not as verbal, so how am I going to sort of get that across to him?" She continued to say that "C is also not very verbal, it's a little bit hard to understand him, so how am I going to make sure that he is doing more than putting puzzle pieces together with letters on them to build words?"

Throughout the sessions, Lisa continued to reference specific students relative to what she viewed on the screen recordings, often making comments about their preferences, such as "I think E would take a lot of pride in that sort of creation."

In contrast, Amanda's thoughts about her students were more often about them as a group. When viewing a resource, Amanda noted, "A lot of my students will get distracted if there's too many pictures or borders or things like that on a page." She also commented that "a lot of their IEPs [individual education plans] focus on exposure to strategies rather than becoming proficient in a strategy."

Amanda's thoughts were also specific to ASD as a disability when viewing resources, stating, "One thing that we talk about when we read the book is how the students in my class also have a learning difference. They all have autism."

As evidenced by their thought processes, Amanda and Lisa's approaches to targeting student needs during their SDOL again highlight the need for professional learning resources specific to special education and students' unique needs.

5.2.5 Reflecting on the Impact of COVID-19

Given that data collection occurred during the COVID-19 pandemic, it was necessary to note how the participants' thought processes during SDOL were impacted by the changes occurring in Ontario schools. While much of the province was restricted to remote learning, Lisa and Amanda taught in person considering their students' significant support needs.

When describing an activity she came across, for example, Lisa noted, "It would be tricky though, because it's sort of a free walking free writing kind of thing, and that's going to be tricky with the restrictions we have in place."

Amanda also commented, "Our students usually have integration. And this year, because of COVID, [they] don't have that opportunity for integration with the other cohorts." Such challenging circumstances can have a considerable impact on the ways in which special educators approach their SDOL and PD in general.

5.3 Web-Based Actions and Behaviors

Similar to their thought processes, Lisa and Amanda's web-based actions and behaviors demonstrated different patterns across the sessions. Figure 1 provides a visual representation of Lisa's behaviors, and Fig. 2 provides Amanda's. The web-based actions with the greatest frequencies were viewing videos, scrolling, and note-taking; however, the breakdown of their behaviors differed considerably. Lisa spent 30 min viewing videos, often commenting on their quality. Viewing videos represented half of her total time across the three 20 min sessions, whereas Amanda only watched videos during the final session, for a
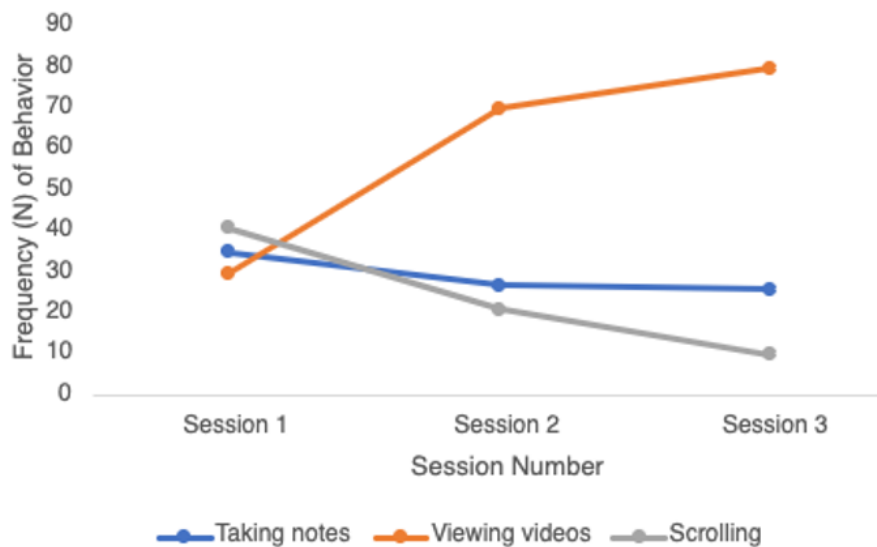

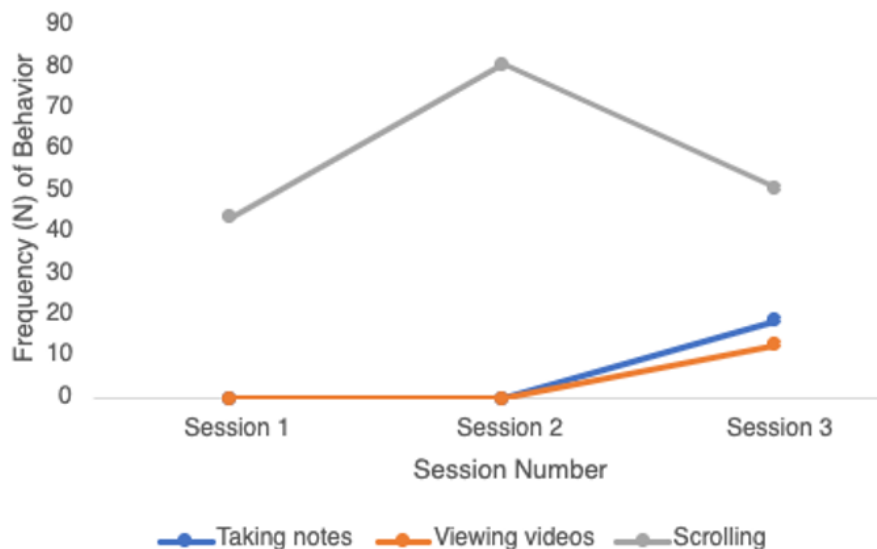**FIG. 1:** Notable web-based behaviors for Lisa

FIG. 2: Notable web-based behaviors for Amanda

total of 2 min and 10 s. Rather, Amanda spent almost half of the time across the three sessions scrolling (29 min and 20 s), which was more than double that of Lisa (12 min).

For Lisa, viewing videos appeared to be a way of enhancing her own literacy knowledge. For example, during her first session, Lisa stated, "I'm going to be looking for some videos here to help me understand a little bit more fully the matters that go into identifying the words in front of you and connecting to what they actually mean for these children." Lisa also took notes during all three sessions of ideas to incorporate in her practice, keeping a record that she could refer back to.

Amanda viewed videos and took notes during the third session, which was perhaps an indication of increased comfort with the process. Her most notable behavior was her scrolling, which may be a proxy for skimming information. When describing how she viewed one resource, Amanda noted, "From my skimming of it, it didn't really have anything specific, it was more just to find an assessment that would work and give you the information that you needed."

Not only do Lisa's and Amanda's different patterns of web-based actions and behaviors demonstrate the differences in how they engage in SDOL, but their approaches can inform website and resource design. Lisa's web-based behaviors, for example, highlight the utility of viewing informational videos as a means of SDOL, whereas Amanda's preference for scrolling and skimming resources may offer insight into the types of layouts that are ideal for sharing professional learning resources online. The patterns that characterized Lisa's and Amanda's web-based actions and behaviors serve as additional evidence that SDL is an independent and autonomous process (Garrison, 1997) often guided by professional learning goals. In light of the overwhelming number of websites to which teachers have access, assessing their quality is of increasing importance (Beach, 2017). Future studies should classify professional learning websites and resources as well as evaluate their quality.

6. CONCLUSION

Special education classrooms can present unique challenges for teachers, and meeting students' individual needs requires teachers to engage in ongoing professional learning (Browder et al., 2012). This case study contributes to our understanding of special educators' approaches to SDOL as well as the types of resources that facilitate effective SDOL. While the research relative to PD opportunities for teachers is extensive, few studies have focused on SDOL as a means of informal professional learning (Macià and García, 2016). Though the research with special education teachers has been limited, SDOL represents a way for this group of teachers to engage in school-based, community-based, and universal PD (Shurr et al., 2014). Not only can the findings from this study offer insight into SDOL as a means of informal learning for special education teachers, but also, the focus on goals and web-based behaviors can facilitate feedback on the types of online environments conducive to effective teacher PD.

REFERENCES

Beach, P. (2017). Self-directed online learning: A theoretical model for understanding elementary teachers' online learning experiences. *Teach. Teach. Educ.*, *61*, 60–72.

Beach, P., Favret, E., Minuk, A., & Martinussen, R. (2022). Canadian teachers' perceptions of online professional development. *J. Educ. Online*, *19*(3), 1–4.

Beach, P. & Willows, D. (2014). Investigating teachers' exploration of a professional development website: An innovative approach to understanding the factors that motivate teachers to use internet-based resources. *Can. J. Learn. Technol.*, *40*(3). https://cjlt.ca/index.php/cjlt/article/view/26278

Berry, A.B., Petrin, R.A., Gravelle, M.L., & Farmer, T.W. (2011). Issues in special education teacher recruitment, retention, professional development: Considerations in supporting rural teachers. *Rural Spec. Educ. Q.*, *30*(4), 3–11.

Billingsley, B.S., Griffin, C.C., Smith, S.J., Kamman, M., & Israel, M. (2009). A review of teacher induction in special education: Research, practice, and technology solutions. National center to inform policy and practice in special education professional development, Gainesville, FL, NCIIP Doc. No. RS-1.

Browder, D.M., Jimenez, B.A., Mims, P.J., Knight, V.F., Spooner, F., Lee, A., & Flowers, C. (2012). The effects of a "tell-show-try-apply" professional development package on teachers of students with severe developmental disabilities. *Teac. Educ. Spec. Educ.*, *35*(3), 212–227.

Caffarella, R. (1993). Self-directed Learning. *New Dir. Adult Contin. Educ.*, *57*, 25–35.

Callanan, M., Cervantes, C., & Loomis, M. (2011). Informal learning. *Wiley Interdiscip. Rev.: Cogn. Sci.*, *2*(6), 646–655.

Campbell, C., Osmond-Johnson, P., Faubert, B., Zeichner, K., & Hobbs-Johnson, A. (2017). The state of educators' professional learning in Canada: Final research report, Learning Forward, Oxford, OH.

Candy, P., Key Issues for research in self-directed learning. *Stud. Contin. Educ.*, *10*(2), 104–124, 1988.

Chametzky, B., Andragogy and engagement in online learning: Tenets and solutions. *Creat. Educ.*, *5*, 813–821, 2014.

Charalambousa, K. & Ioannou, I. (2011). The attitudes and opinions of Cypriot primary teachers about the use of the internet for their professional development and as an educational tool. *Learn. Media Technol.*, *33*(1), 45–57.

Cotton, D. & Gresty, K. (2006). Reflecting on the think aloud for evaluating e-learning. *Brit. J. Educ. Technol.*, *37*(1), 45–54.

de Vries, S., van de Grift, W.J., & Jansen, E.P. (2014). How teachers' beliefs about learning and teaching relate to their continuing professional development. *Teach. Teach.*, *20*(3), 338–357.

Delgado, A.J., Wardlow, L., McKnight, K., & O'Malley, K. (2015). Educational technology: A review of the integration, resources, and effectiveness of technology in K-12 classrooms. *J.*

Inf. Technol. Educ., *14*, 397–416.

Demir, K. (2010). Predictors of internet use for the professional development of teachers: An application of the theory of planned behaviour. *Teach. Dev.*, *14*(1), 1–14.

Donohoo, J. (2018). Collective teacher efficacy research: Productive patterns of behaviour and other positive consequences. *J. Educ. Change*, *19*(3), 323–345.

Francois, J. (2020). Teaching beliefs and their relationship to professional development in special education teachers. *Educational Considerations*, *45*(3), 4.

Garrison, D.R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Educ. Q.*, *48*(1), 18–33.

Harrop, A., & Daniels, M. (1986). Methods of time sampling: A reappraisal of momentary time sampling and partial interval recording. *J. Appl. Behav. Anal.*, *19*(1), 73–77.

Hutchings, P. & Taylor Huber, M. (2008). Placing theory in the scholarship of teaching and learning. *Arts Human. Higher Educ.*, *7*(3), 229–244.

Johnson, E. & Semmelroth, C.L. (2014). Special education teacher evaluation: Why it matters, what makes it challenging, and how to address these challenges. *Assess. Eff. Interv.*, *39*(2), 71–82.

Kanuka, H. & Nocente, N. (2003). Exploring the effects of personality type on perceived satisfaction with web-based learning in continuing professional development. *Distance Educ.*, *24*(2), 227–244.

Kao, C.P., Wu, Y.T., & Tsai, C.C. (2011). Elementary school teachers' motivation toward web-based professional development, and the relationship with internet self-efficacy and belief about web-based learning. *Teach. Teach. Educ.*, *27*, 406–415.

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers*, Association Press, New York.

Kumar, V. (2005). The think aloud method: Some concerns addressed. *J. Mod. Lang.*, *15*(1), 13–25.

Lincoln, Y.S. & Guba, E.G. (1985). *Naturalistic inquiry*, Sage, Thousand Oaks, CA.

Lohman, M.C. (2006). Factors influencing teachers' engagement in informal learning activities. *J. Workplace Learn.*, *18*(3), 141–156.

Macià, M. & García, I. (2016). Informal online communities and networks as a source of teacher professional development: A review. *Teach. Teach. Educ.*, *55*, 291–307.

McKinney, K. (2004). 1: The scholarship of teaching and learning: Past lessons, current challenges, and future visions. *Improve Acad.*, *22*(1), 3–19.

OECD. (2014). *TALIS 2013 results: An international perspective on teaching and learning*, Organisation for Economic Co-operation and Development Publishing, Paris.

Ontario Institute for Studies in Education, University of Toronto (2021). The balanced literacy diet – putting research into practice in the classroom; from https://www.oise.utoronto.ca/balancedliteracydiet/Home/index.html

Patton, M. (1990). *Qualitative evaluation and research methods*, Sage, Thousand Oaks, CA.

Powell, C.G. & Bodur, Y. (2019). Teachers' perceptions of an online professional development experience: Implications for a design and implementation framework. *Teach. Teach. Educ.*, *77*, 19–30.

Shurr, J., Hirth, M., Jasper, A., McCollow, M., & Heroux, J. (2014). Another tool in the belt: Self-directed professional learning for teachers of students with moderate and severe disabilities. *Phys. Disabil.: Educ. Relat. Serv.*, *33*(1), 17–38.

Song, L. & Hill, J.R. (2007). A conceptual model for understanding self-directed learning in online environments. *J. Interact. Online Learn.*, *6*(1), 27–41.

Stake, R.E. (1995). *The art of case study research*, Sage, Thousand Oaks, CA.

Stosic, L. & Stosic, I. (2014). Perception of teachers regarding the implementation of the internet in education. *Comput. Hum. Behav.*, *53*, 462–468.

Suppo, J.L. & Mayton, M.R. (2014). Expanding training opportunities for parents of children with autism. *Rural Spec. Educ. Q.*, *33*(3), 19–28.

Thomas, D.R. (2006). A general inductive approach for analyzing qualitative evaluation data. *Am. J. Eval.*, *27*(2), 237–246.

Thoonen, E.E., Sleegers, P.J., Oort, F.J., Peetsma, T.T., & Geijsel, F.P. (2011). How to improve teaching practices: The role of teacher motivation, organizational factors, and leadership practices. *Educ. Admin. Q.*, *47*(3), 496–536.

Trust, T. (2016). New model of teacher learning in an online network. *J. Res. Technol. Educ.*, *48*(4), 290–305.

WETA (2022). Reading rockets: Launching young readers, WETA Public Broadcasting, Arlington, VA; from www.readingrockets.org

Wu, M. & Chen, S. (2008). Elementary schoolteachers' use of instructional materials on the Web. *Electron. Library*, *26*(6), 833–843.