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Teachers' Perceptions of the Need for Assistive Technology Training in Newfoundland and Labrador's Rural Schools

Perceptions des enseignants quant au besoin de formation en technologie d'assistance dans les écoles rurales de Terre-Neuve et du Labrador

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Abstract

This study examined the perceptions of teachers in rural Newfoundland (NL) about their current ability to support the use of assistive technology (AT) in their classrooms, and identified possible training needs that could be accomplished remotely. Thirty-two educators from rural areas of NL completed an online survey with a mix of closed- and open-ended questions. Five dimensions were explored for this needs assessment including: current beliefs, skills, use, comfort level, and perceptions of AT; identification of specific service needs; learning preferences; available technology; and potential barriers. Results reveal that teachers had positive attitudes about the utility and use of AT in their classrooms, yet were not fully implementing AT with their student's due to a variety of perceived barriers. The study identified a clear need for AT teacher training. Based on the results and the research, literature recommendations are made for teacher training to address the need identified by this study.

Résumé

Cette étude a porté sur les perceptions des enseignants dans les régions rurales de Terre-Neuve de leur capacité actuelle d'appuyer l'usage des technologies d'assistance (TA) dans leurs classes et a cerné de possibles besoins de formation que l'on pourrait combler à distance. Trente-deux éducateurs de régions rurales de Terre-Neuve ont rempli un sondage en ligne comprenant un mélange de questions ouvertes et fermées. Cette évaluation des besoins a exploré cinq dimensions : croyances, compétences, utilisation, perceptions et degré de confort actuels quant aux TA; détermination de besoins de services précis; préférences d'apprentissage; technologie disponible; obstacles potentiels. Les résultats révèlent que les enseignants avaient des attitudes positives quant à l'utilité et à l'utilisation des TA dans leurs classes, mais ne les mettaient pas entièrement en œuvre avec leurs élèves parce qu'ils percevaient une variété d'obstacles. L'étude

a cerné un besoin manifeste de formation des enseignants relativement aux TA. Selon les résultats et la recherche, des recommandations sont avancées pour que la formation des enseignants réponde au besoin cerné dans cette étude.

Introduction

Classroom teachers are tasked with ensuring that all students receive quality educational programming. In Newfoundland and Labrador, inclusive programming is emphasized, and this inclusive education "is about the culture, policies and practices of a school" (Department of Education of Newfoundland and Labrador, 2012, p. 6). For students with language-based learning disabilities (LDs), clinically termed Specific Learning Disorder (SLD; American Psychiatric Association, 2017), inclusive education may prove challenging as teachers must design instruction for the individual needs (Specht et al., 2016). Teachers are now utilizing assistive technology to help adapt teaching and learning to better meet the needs of all students (White & Robertson, 2015). Assistive technology is defined as, "any equipment that is used to increase, maintain, or improve the functional capabilities of a student with an exceptionality" (Government of Newfoundland and Labrador, 2017, para. 1). Assistive technology (AT) has shown to help students with LDs improve their growth and level of functioning (Desch & Gaeblre-Spira, 2008; Smith & Smith, 2004). For example, since 2009, US public policy and standards have undergone a noteworthy shift, putting AT the forefront of the national agenda for individuals with disabilities (Gray & Silver-Pacuilla, 2011). Yet, for teachers in more rural, remote, or northern areas, such as Canada's eastern-most Atlantic province, Newfoundland and Labrador (NL), resources for AT implementation may be more challenging to obtain (Ault, Bausch, & McLaren, 2013). The current study sought to explore if teachers in rural NL perceive the need for training in AT software for themselves and for their intermediate-aged students (grades seven and eight) with language-based LDs, to examine the perceptions of teachers in rural NL about their current ability to support the use of AT in their classrooms, and identify training needs. Although a recent qualitative study has been undertaken around the community-based support for adults with disabilities in NL (Gustafson & Penton, 2014), this needs assessment focuses on a school-based context.

Assistive Technology in Education

AT is utilized to improve the performance of a range of skills including reading, writing, remembering, walking, seeing, hearing, sitting, and communicating (Reed, 2007). The types of AT vary from low, medium, or high-tech options. In NL, AT is referred to as *equipment*; however, this equipment includes software (NL Ministry of Education & Early Childhood Development, 2017). Low-tech items typically require little training and are non-electronic (e.g., visuals, pencil grips, adaptive furniture; Alkahtani, 2013; Desch & Gaeblre-Spira, 2008). Medium-tech refers to electronic devices that require little training to use (e.g., adaptive keyboards, digital recorders, electronic dictionaries; Alkahtani, 2013). High-tech devices are electronic and require significant training but also have a great capacity for individualization (e.g., word prediction software, hearing aids, listening devices; Alkahtani, 2013; Desch & Gaeblre-Spira, 2008). Prevalent high-tech AT used in schools include interactive whiteboards, text-to-speech / text-to-speech software, and classroom amplification systems (Sider & Maich, 2014; White & Robertson, 2015). The use of AT devices can positively impact learning,

independence, self-esteem, and overall quality of life, which can lead to an increase in motivation and enthusiasm for learning, enabling students with LDs to participate at a similar level as their peers (Khek, Lim, & Zhong, 2006; Reed, 2007).

Despite recognition of the benefits, AT devices may not be utilized to their full potential. In Alkahtani's 2013 study of AT knowledge and skills of 127 teachers, most teachers (93.7%) reported not using/requesting AT and that AT was not considered when developing individual education plans (IEP) for students. Alkahtani also found very low rates of AT availability (low-tech, 8.7%; mid-tech, 7.1%; high-tech, 3.9%). In remote and rural areas, lack of technology access can help to explain why teachers are "behind" in terms of AT education (Roberts, O'Sullivan, & Howard, 2005). A more in-depth examination of models and strategies supporting the implementation of AT into the classroom is necessary to better inform educators of its effectiveness for teaching and learning purposes (Sider & Maich, 2014). First, a review of prevalent barriers to the utilization of AT within the classroom is provided.

Prevalent Barriers

Research revealed a lack of AT training within initial teacher education programs in general, resulting in a lack of knowledge around AT (Alkahtani, 2013; Laarhoven, Munk, Chandler, Zurita, & Lynch, 2012; Morrison, 2007). Often times, AT training is only briefly covered in elective special education courses, thus, limiting pre-service teachers' exposure to, and knowledge of, devices and their use within the classroom (Morrison, 2007). Without mandatory and/or focused course exposure to AT technology within their training, teachers may struggle to find ways to include AT in their lesson planning. Subsequently, up to 75% of AT devices are not used effectively and a majority are abandoned soon after being obtained (Desch & Gaeblre-Spira, 2008). Teachers report difficulties in keeping up with AT trends, thus, struggling to effectively use up-to-date AT within the classroom (Edyburn, 2004; Sider & Maich, 2014). Further, professionals may perceive AT devices as inappropriate for classroom use, and may need an implementation period before perceiving benefits for students (Mavrou, 2011). Lack of AT training is also a barrier that adults with disabilities struggle with in community settings, according to Gustafson and Penton (2014), who found that that this barrier applied to supporting professionals, as well—from assessment onward:

> Four main barriers to AT were identified in interviews with service providers: (a) the lack of consistency in the quality and quantity of AT information; (b) the insufficient number and availability of trained personnel; (c) the lack of qualified people to conduct assessments; and (d) the high cost of AT and AT assessments and lack of funding support ("Barriers to AT", para. 40).

Such barriers lead to knowledge deficits. Thus, to address knowledge deficits, researchers have recommended that there be opportunity for both teachers and students to be able to access AT training (Li, Wang, & Ho, 2002; Howard, Nieuwenhuijsen, & Saleeby, 2008). Specifically, training must be flexible and diverse, whether in-service training, or training available through tutorials, online courses, or courses offered through institutions (Li et al., 2002). Training and increasing teacher and student knowledge of AT provides the opportunity for skill development and inclusion (Howard et al., 2008).

Other barriers to AT use include lack of programming, lack of its availability, and lack of student training. In addition, lengthy and/or delayed referral processes for diagnoses, identifications, and/or related services—such as AT devices—can be problematic (De Freitas Alves, Monteiro, Rabello, Freire Gasparetto, & De Carvalho, 2009; Morrison, 2007). Needs such as access to appropriate equipment, a technology specialist, pedagogical supports, and, in many cases, the Internet, have been identified (De Freitas Alves et al., 2009; Morrison, 2007).

Newfoundland and Labrador Context

Dennis Mulcahy represents the state of Newfoundland and Labrador well in Canada's most eastern province, with Newfoundland being a vast rocky island in the North Atlantic Ocean of mostly rural and many isolated regions—including schools:

> Newfoundland and Labrador is a province of small rural schools. In the 2016/17 school year there are only 262 schools, with an average enrolment of 255. The 165 schools classified as rural have an average enrolment of 144. Forty of these rural schools have less than 50 students, and half of them are all-grade schools providing instruction for students from K-12. The senior high school cohort of these all-grade schools is commonly less than 12 students per grade. (2017, para. 4)

Barriers are often exacerbated within rural educational contexts as resources and enrollment are low (Barbour, 2005). Rural students use about half the number of AT devices as the whole population of students (Ault et al., 2013; Davis, Barnard-Brak, & Arredondo, 2013), yet rural teachers report a need for AT training, funding, and updating outdated equipment—though such studies specific to rural school and AT are rare (Ault et al., 2013). Rural schools in NL often face decreasing enrollment and high turnover rates for teachers (Dibbon, 2004; Mulcahy, 2017). In addition to high turnover rates, teachers are often required to teach courses in which they lack subject matter expertise (Dibbon, 2004; Mulcahy, 2017). These additional barriers to teaching and learning success are particularly relevant to the rural, educational context (Mulcahy, 2017).

In an attempt to address low enrollment in rural schools in NL, the Centre for Distance Learning and Innovation (CDLI) was established and modelled on web-based instruction to address the geographical and demographic barriers students face in accessing quality courses (CDLI, 2014). While such online distance education has provided opportunities for rural schools to meet curriculum expectations (Barbour, 2005), this delivery model may provide additional barriers for students with LDs. For example, they may miss out on face-to-face interactions with teachers, or have even more limited access to AT (Murphy & Rodríguez Manzanares, 2008). The virtual classroom does not allow for teachers to have impromptu interactions with their students to help build rapport (Murphy & Rodríguez Manzanares, 2008), all interactions must be intentional. It may also be hard for teachers to be aware of personal issues students may be dealing with that might be affecting their coursework (Murphy & Rodríguez Manzanares, 2008). Additionally, students requiring AT devices may face additional hurdles in acquiring devices and training on how to use them, without being in a school with the direct support of teachers, and technology specialists.

In the 2016-2017 school year, 291 school-based applications for AT were completed in Newfoundland and Labrador (Education and Early Childhood Development [EECD], personal communication, June 8, 2017). This includes examples such as high-tech hardware (e.g., iPads), high-tech software (Kurzweil), and low-tech items (Hush-Ups): the highest number of approvals are for Surface Tablets for grades four to nine with an SLD diagnosis in written expressive language. It is important to note that services for students with vision and hearing diagnoses are supported by the Atlantic Provinces Special Education Authority in Halifax and in part by the now-closed School for the Deaf. The EECD is also working on an initiative to "educate teachers, students and parents regarding the links between assistive technology and alternate format materials to increase the adoption of both in our schools" (EECD, personal communication, June 8, 2017). Guidelines include that this provincial process will not permit purchase of computers or laptops, or individual items below $200; applicants must have a documented exceptionality, and must complete trials of AT (EECD, 2017). Commonly requested items, overall, include hardware such as the aforementioned Surface Tablet and iPads as well as software such as wordQ+speakQ, Kurzweil, Read & Write for Google Chrome, and Proloquo2Go. However, applications for a range of devices are considered, as "there is no finite list of what EECD will or will not provide" (EECD, personal communication, September 25, 2017).

Training agencies have begun to provide training remotely for some professionals in NL (e.g., mental health care providers; see Cheng, deRuiter, Howlett, Hanson, & Dewa, 2013). Cheng and colleagues (2013) demonstrated remote online training as an effective method of professional development, providing access to rural special education training and credentials (see also Larwood, 2005). It may be possible to provide teachers within NL similar access to training on AT. However, the unique context within NL (e.g., its widespread rural population) may pose additional barriers for implementation of such training. In order to understand the particular experiences and needs relative to rural educators in NL, a needs assessment was undertaken.

Purpose of the Current Study

Using a needs assessment approach, the participating NL teachers' current skill, use, comfort level, and perceptions of AT were investigated. Additionally, specific needs and preferred learning topics related to AT were explored. Teachers were also asked about the available technology and potential barriers faced when using AT. A structured online survey was chosen due to ease of contact and affordability in reaching a rural and/or isolated population sample.

Intermediate-level teachers were chosen as intermediate-aged students are more likely to already be diagnosed with a learning disability, and be more independent, self-regulated learners, with strong metacognitive and information-processing skills (Eleven, Karuovic, Radulovic, Jokic, & Pardanjac, 2012; Sternberg, 1998). As formal diagnostic assessment for students with possible LDs is often deferred until this time when assessment tools are more valid, and following the point when students move from "learning to read" to reading as a necessary pre-requisite to classroom-based learning, which involves "reading to learn" by engaging explicitly in meaning-making or content learning from text (Herman & Wardrip, 2012).

Rossi, Lipsey, and Freeman (2004) emphasize that, "effective programs are instruments for improving social conditions" (p. 201). However, prior to any effective program implementation, needs must be clearly, carefully, and meaningfully described and diagnosed (Rossi et al.,2004). To adequately provide a training program, it is essential to understand the needs of the target population, in this case, intermediate-level teachers supporting students with LDs. Therefore, a needs assessment was required to provide an understanding of the context and requirements for recommendations around remote training in AT. It is hoped that this study will represent the first step in establishing, designing, and implementing further provincial or regional AT training with educational stakeholders in NL.

Method

A needs assessment is characterized by systematically assessing a social need or problem, and determining what will be required to address and/or rectify the situation (Grinnell, Garbor, & Unrau, 2012). This survey-based needs assessment utilized quantitative and open-ended text-based data allowing for concurrent triangulation (Creswell, Plano Clark, Gutmann, & Hanson, 2003). Through this survey, researchers sought to explore whether there was a need for more AT training in the rural areas of NL focusing on intermediate-level teachers.

Purpose

Teachers from rural areas, such as rural NL communities, may experience challenges in accessing training programs for professional development; therefore, the goal of the current study was to establish whether rural intermediate teachers express a need for further AT training. The results of this needs assessment can be used to support the design and implementation of a program to address the needs identified.

Sampling

Upon receiving Research Ethics Board clearance from Brock University and the University of Guelph, written approval was obtained from the Newfoundland and Labrador English School District. Principals from the rural schools were then contacted via email and/or phone, and invited to have their staff participate in the study. Based on consultation with a member of the NL House of Assembly (C. Mitchelmore, personal communication, March 10, 2014), rural was defined as a jurisdiction with a population of less than 10,000 residents (excluding only three cities with populations above 25,000 and four towns with populations above 10,000). In the 2014-2015 school year, rural enrolment represented 36% of the overall student enrolment, yet 62.6% of all schools in the province were geographically within rural locales (Government of Newfoundland and Labrador, 2015).

In total, 166 principals were contacted; 20 agreed to distribute the survey link to their intermediate-level teachers, of which, 32 teachers participated. It is important to note, however, that due to the nature of the recruitment process, additional principals may have distributed the survey link.

Procedures

Interested teachers were asked, in an email forwarded by their principal, to complete an online survey hosted by Qualtrics. The survey consisted of a mix of open-ended and Likert-style questions designed to gather information about the knowledge, skills, and attitudes of participating educators. Prior to seeking participants, the survey was tested by a research assistant with graduate-level research methods training to check for survey flow, logic, and other issues; minor adjustments were made as needed.

Survey Design

The survey consisted of six parts with a total of 43 questions: five demographic questions; 31 closed-ended questions, and seven open-ended (i.e., text response). The six survey parts were identified from the literature as contributing to best practices for utilization of AT in the classroom and to examine the current perceptions of educators relating to learning/training needs and perceived barriers: 1) Current skills, comfort level, and perceptions of assistive technology; 2) Identification of specific service needs; 3) Identification of learning topic preferences; 4) Identification of available technology; 5) Identification of potential barriers; and 6) Demographic questions. The survey is available from the study authors on request; a description of each of the six survey components followed by the utilized analytic strategy is included. Specific questions from previous work that were identified as contributing to each section were utilized; gaps were filled with investigator-developed questions. Close-ended questions were selected to provide descriptive data on the various aspects with open-ended questions to expand on participants' perceptions and understandings; this combination was utilized to provide a deeper understanding of the research questions than either a fully quantitative or qualitative approach on their own.

Current skills, comfort level, and perceptions of AT. Participants were asked 10 investigator-developed questions examining their level of comfort, knowledge, and satisfaction with the availability of AT and training for its use. Nine of the questions were closed-ended, answered using 5-point Likert-type scales (i.e., 1-Very dissatisfied to 5-Very satisfied; 1-No knowledge to 5-Extensive knowledge; 1-Strongly disagree to 5-Strongly agree). One open-ended question asked participants who perceived that their students were not using AT software within the classroom properly (or were unsure) to expand on their response. In addition, three questions were replicated from Alkahtani's (2013) research that asked participants to estimate the amount of training they had received pertaining specifically to AT (i.e., workshops, in-service, and formal college or university courses in which AT was covered in detail).

Identification of specific service needs. Participants were asked three questions from Alkahtani's (2013) research regarding the use of, or request for, an AT evaluation and whether AT needs are part of the process of creating an IEP (two closed-ended questions with yes/no/unsure responses, one open-ended question). In addition, three closed-ended questions from Gustafson's (2006) research were included in order to determine interest in AT training, sources from which professional development/training for AT have been received, and the extent to which participants believed they were prepared to provide AT support to their students.

Identification of learning topic preferences. Participants were presented with three closed-ended questions from Alkahtani (2013) and Gustafson (2006) that asked them to first choose all the preferred methods for AT training, then rate each of the methods (1-Dislike to 4-Favourite), and finally identify their willingness to participate in each method (1-Would not participate to 4-Would be most likely to participate). The fourth question in this section was investigator-created and open-ended, asking participants to identify particular AT software for which they felt they needed more information and/or training.

Identification of available technology. Six questions focused on the types of AT that were available to the participants. First, they were asked to identify the general types of AT that are available at their schools, ranging from low-, mid-, and high-tech devices (Alkahtani, 2013). For each of their selections, an investigator-created question solicited specific devices that were used. Finally, participants were asked two open-ended, investigator-created questions in order to identify particular AT software they would use if available, and other AT that weren't identified in the questions that they believed could be useful to their students. Please note that a list of AT devices, including software, is publicly available (NL Ministry of Education & Early Childhood, 2013).

Identification of potential barriers. Six questions focused on attitudes about the use of AT (Garcia & Seevers, 2005). These closed-ended questions were answered using Likert-type response options (1-Strongly disagree to 5-Strongly agree), and one question where participants specifically selected all potential barriers to using AT within their classrooms. An additional open-ended, investigator-created question provided participants with an opportunity to expand on any other potential barriers. Finally, two open-ended questions from Ritter, Holley, and Jensen (2012) were used to identify participants' perceptions of gaps in their knowledge, skills, and equipment availability prior to AT training such as understanding LDs, understanding how students with LDs process information, or availability of hardware and/or software.

Participant characteristics. Participants were asked five demographic questions including level of education, current teaching position, gender, and age, plus a final, open-ended question allowing for additional comments or feedback.

Analysis. Following a survey design, qualitative and quantitative data were analyzed separately, and then compared to triangulate the data and support findings from both phases of analysis (Creswell et al., 2003). The first phase was an analysis of the quantitative data. Descriptive analyses were conducted to provide means, ranges, frequencies, and percentages based on each question. The second phase consisted of thematic analysis of the qualitative data. This analysis was used to further contextualize the quantitative findings, to identify potential barriers to the use of AT, and clarify future service priorities.

Results

Participants

A total of 32 intermediate-focused educators participated in this needs assessment. As is typical for the education field, more self-reported females (n = 20; 62.5%) participated than males (n = 12; 37.5%). The mean age of participants was 39.6 (SD=9.32; Range: 26-58). Many

participants (*n* = 14; 43.8%) held classroom teaching roles; however, only two of these participants noted a single grade level responsibility (e.g., grade six). Many respondents reported being in a support services role (*n* = 12; 37.5%): either resource, guidance, special education, or assessment. For three participants, a support services role was combined with classroom teaching. Six participants reported school leadership roles (e.g., principal, vice-principal); however, only two reported sole responsibilities in that leadership role. The remainder also included classroom instruction as part of their roles and responsibilities. Overall, 65.6% (*n* = 21) of participants held a professional degree (e.g., B.Ed.), 71.9% (*n* = 23) a bachelor's degree, and 65.6% (*n* = 21) a master's degree. Some participants (*n* = 7) specified additional learning in technology, such as diplomas, certificates, and/or graduate degrees in technology education and information technology.

The primary question for this study was: Do teachers in rural NL perceive the need for training in assistive technology software for themselves and for their intermediate-aged students with language-based learning disabilities? Findings are presented corresponding to the five main parts of the survey: (1) Current beliefs, skills, use, comfort level, and perceptions of assistive technology; (2) Identification of specific service needs; (3) Identification of learning preferences; (4) Identification of available technology; and (5) Identification of potential barriers.

Current Beliefs, Skills, Use, Comfort Level, and Perceptions of Assistive Technology

Overall, the participants had a high degree of positive beliefs that AT has a place in the classroom, with the highest agreement ratings (96.9%) given to the statement: "I think the availability of Assistive Technology software for students is important in my class." Refer to Table 1 for details. Participants universally agreed with the statement, "I would feel comfortable learning about new Assistive Technology devices if provided with opportunity to do so" (100%). They had a high level of comfort around using computer-based technology in general (87.6%), but felt less comfortable about choosing appropriate AT with their students (62.5%; Table 1). When asked to estimate their level of knowledge about AT, 46.9% rated their knowledge as "some" and 40.6% described their knowledge as "good." Only 9.4% of participants rated themselves as having "little" knowledge and 3.1% as "extensive." The mean score for level of knowledge was 3.38 (out of 4; *SD*=0.71). The participants believed in the use of AT in the classroom yet, despite being open to learning about AT, they were not confident in their current ability to appropriately select and support the use of AT for their students.

Table 1

Beliefs and Comfort Level Regarding Assistive Technology (N = 32)

	M (*SD*)	% Agree/ Strongly Agree
I think the availability of Assistive Technology software for students is important in my class.	4.47 (0.57)	96.9
I think students who use Assistive Technology software in my class will have higher achievement scores.	4.23 (0.62)	90.4
I think Assistive Technology software used in my class is effective in the student's learning process.	4.25 (0.62)	90.7
I would feel comfortable learning about new Assistive Technology devices if provided with opportunity to do so.	4.53 (0.51)	100
I generally feel comfortable using computer-based technology (e.g., computers, smart boards, tablets).	4.16 (1.08)	87.6
I would feel comfortable choosing the appropriate Assistive Technology software for students with learning disabilities to use within the classroom.	3.72 (0.81)	62.5

Training. Participants estimated that the number of college or university courses in which AT was taught in detail was approximately one (*M* = 1.27; *SD* = 0.70; Range: 1-3), with 86.4% of respondents noting only one in total. They reported that the number of workshops/in-service training events in which they had participated in the last five years was less than two (*M* = 1.84; *SD* = 1.31; Range: 1-6), and career-long professional development workshops/in-service training events focused on AT was less than four (*M* = 3.41; *SD* = 3.17; Range: 1-10). Participants responded that they most commonly receive training from either school-based technology consultants, conferences, or other school professionals (e.g., Speech-Language Pathologists; Table 2). These findings suggest that participants are receiving some support from other professionals, potentially on an ad hoc basis, but that specific formal training opportunities were limited.

Table 2

Sources for Professional Development / Training in AT (N = 32)

	n	%
Technology consultant from school or school system	16	50.0
Other school professionals working with students with disabilities (e.g., SLP, OT, PT)	15	46.9
Attendance at conference(s)	15	46.9
Attending a class at a university/college/other institution	5	15.6
None	5	15.6
From a commercial vendor	3	9.4

Satisfaction. When asked about their satisfaction with the current AT available at their school, participants were primarily neutral (neither satisfied nor dissatisfied), or $M = 2.97$ (out of 5; $SD = 1.06$), with more dissatisfied/very dissatisfied (28.2%) than satisfied/very satisfied (25.0%). A majority (75.9%) of participants reported that students who require AT receive training on how to use it, and mean satisfaction with the training that students receive for using their AT was neutral, or $M = 3.32$ ($SD = 0.65$). Only 40.9% of participants responded that they were satisfied with student training, and no participant indicated being "very" satisfied. When asked about the current level of AT training available to them, 46.9% of participants were dissatisfied/very dissatisfied ($M = 2.63$; $SD = 0.98$).

Usage. When asked whether they believed that students in their classroom with AT software were using it properly, the majority of participants responded "somewhat" (67.9%), with 19.4% responding "yes" and 12.9% responding "no." Overall, participants pointed out system deficits leading to a lack of capability and comfort with the proper use of AT: primarily, a lack of training. For example, "[students] are learning based on knowledge of teachers who may have received limited training." They reported that educators and students need detailed, ongoing training rather than being provided with some basics that don't appear to transfer to complex classroom implementation. As one participant commented, "many times it is simply delivered and we are all forced to figure it out as we go." Similarly, a lack of access to both hardware and software related to AT was strongly emphasized and described as non-existent, expensive, and/or limited. Lack of access is exemplified in this comment, "lack of access to devices and software is perhaps the biggest stumbling block (for both student-owned and school-owned devices)." One participant summarized this latter issue as:

> The software is not always readily available. Access is sporadic and often due to the lack of resources. I believe the students are lacking the opportunity to use it consistently and as a result lack the knowledge and experience to be fully versed in its usage and function.

The results reveal a secondary emphasis around a layer of reluctance by teachers and students reportedly due to a lack of effort, confidence, self-regulation, or perceived stigma. As one participant shared, "assistive technology [is] still a little to foreign in the school setting leading students to feel more separate from peers than empowered by the technology."

Identification of Available Technology

Types available and in use. Participants responded that high-tech devices (e.g., hearing aid and/or assistive listening device, word prediction programs, keyboard alternatives) are the most commonly available items (n = 26; 81.3%), with low-tech devices (i.e., light pen to enhance writing area, pencil grips, adaptive desks) a close second (n = 22; 68.8%). The least commonly available tools are medium tech (i.e., IRISPens; n = 7; 21.9%). The most commonly used high-tech devices are text-to-speech devices with portable computers and word prediction programs with over half of participants (n = 22; 68.8%) indicating their availability. The most commonly used medium-tech devices, though much less commonly used overall than high- or low-tech devices, were either portable keyboards or tape recorders/recording devices. The most commonly used low-tech devices are writing organization/planning aides (e.g., brainstorming sheets, flow charts) with over half of the participants using these (n = 17; 53.1%). Refer to Table 3 for an overview including specific devices within each category.

Table 3

High-, Medium-, and Low-Tech Devices Used (N = 32)

	n	%
High-Tech Devices:		
Text-to-speech devices	22	68.8
Portable computers	18	56.3
Word prediction programs	17	53.1
Hearing aids/assistive listening devices	9	28.1
Keyboard alternatives	5	15.6
Other (iPads)	2	6.3
Medium-Tech Devices:		
Portable keyboards	7	21.9
Tape recorders/recording devices	7	21.9
StickyKeys	0	0
IRIS Pens	0	0
Low-Tech Devices:		
Writing organization/planning aids	17	53.1
Modified pencils/pencil grips	14	43.8
Adapted desks	10	31.3
Adapted chairs	10	31.3

When participants were asked which AT software they would use if it were made available to them, one participant responded that there was no need for such technology, while others noted that they were unsure of what to request because they didn't know the options well. Many participants, however, simply suggested anything "that could be beneficial to the students and aid in learning" or "that allows my students to be successful and more independent." One participant expressed, "we would use whatever was available. With the current student needs we cannot afford to be picky." Features noted by more than one participant included support for reading (e.g., speech-to-text), writing (e.g., text-to-speech), listening, and word prediction. A number of participants were enthusiastic about iPads and Kurzweil.

Identification of Specific Service Needs

Team involvement. A majority of respondents (87.1%) reported that AT needs were considered by the Individual Support Services Plan (ISSP)/IEP teams in their school. Participants indicated that, overall, AT is supported through a decision-making process involving parents, teachers (e.g., instructional resource teachers, guidance counsellors), and/or school leadership (e.g., principals) and may include the Department of Education (e.g., access to alternative materials). Others noted that its provision is related to a need that is assessed; for example, through a diagnosis, an exceptionality, a deficit, a need, or specific programs (e.g., modified or alternate):

> The process takes into consideration what will best allow a student to learn and to demonstrate their learning. If assistive tech can help with accessing learning materials for example or with expressing and sharing understanding, then our [the participant's] teams looks at including it in a child's plan.

At the same time, 58.1% of respondents had never requested an AT evaluation for a student.

Training needs. The majority of respondents expressed interest in receiving training in the area of AT at 78.1%, 15.6% did not know and would think about it, and only 6.3% reported that they were not interested at all. In contrast, only 21.9% of respondents felt adequately prepared to provide AT support to their students. Additionally, 68.8% felt somewhat prepared, 6.3% felt poorly prepared, and 3.1% felt they were not prepared.

Identification of Learning Preferences

Types of training. Participants expressed numerous preferences around methods for future learning about AT (they were able to "select all that apply"). Hands-on instruction was the most commonly selected preference (n = 19; 59.4%), with workshops/conference attendance a close second (n = 18; 56.3%), and experimentation with technology and very close third (n = 17; 53.1%). The least preferred choices were formalized courses (i.e., for university credit), with receiving "just in time" training or "as needed" almost equally non-preferred (Table 4). The participants demonstrated they were interested in learning about AT in many forms, identifying hands-on opportunities to try out the technology as the most valuable and preferred way to learn more to help their students.

Table 4

Preferred Types of Instruction (N = 32)

	n (%)	Preferred method for learning*		Preference for this form of PD*	
		M (*SD*)	% Like/ Favourite	*M* (*SD*)	% Like/ Favourite
Hands-on instruction in group setting	19 (59.4)	3.32 (0.60)	93.5	3.34 (0.55)	96.5
Attending workshops or conference sessions	18 (56.3)	2.90 (0.85)	73.3	2.93 (0.90)	74.0
Experimentation with the technology	17 (53.1)	3.30 (0.60)	93.4	3.22 (0.58)	92.6
One-on-one individualized instruction	12 (37.5)	3.29 (0.59)	93.6	3.15 (0.72)	88.9
Online modules or tutorials	11 (34.4)	2.53 (0.78)	56.7	2.37 (0.84)	44.4
Using a self-paced, written tutorial	7 (21.9)	2.61 (0.83)	53.6	2.5 (0.91)	53.8
Receiving "just in time" training or "as needed"	4 (12.5)	2.29 (0.71)	35.7	2.35 (0.80)	38.5
Formalized courses	3 (9.4)	2.22 (0.75)	33.3	2.15 (0.78)	30.7

Types of software. When asked about AT software where further information and/or training would be helpful, a majority of participants selected Kurzweil (Cambium Learning Group, 2014) or other text-to-speech software (*n* = 23; 71.9%), Dragon Naturally Speaking (Nuance, 2016) or other speech-to-text software (*n* = 18; 56.3%), and Co-Writer (Don Johnston Inc., 2017) or other word prediction software (*n* = 15; 46.9%). Other software selected by participants for which further information/training would be helpful included Inspiration (Inspiration software Inc., 2017) or other organizational software (*n* = 13; 40.6%), and Ultrakey (Bytes of Learning, 2017) or other keyboarding software (*n* = 12; 37.5%). In addition, two participants added wordQ+speakQ (Quillsoft Ltd, 2017; 6.3%) as another software for which they would find further information/training to be helpful.

Identification of Potential Barriers

Lack of training. Lack of training was the most commonly perceived barrier, followed by technical difficulties, lack of funding, time, and limited device options available at participants' schools. Less often reported were student resistance, and parent resistance (Table 5). The majority of participants at 68.8% agreed/strongly agreed (*M* = 4.03 out of 5; *SD* = 0.90) that the lack of training that teachers received in using AT is a major barrier for students in their classes. Further, 65.7% of participants agreed/strongly agreed (*M* = 3.72; *SD* = 0.68) that they think there will be challenges to overcome in accommodating students who use AT in their classes.

Table 5

Identification of Potential Barriers to Using AT in the Classroom (N = 32)

Barrier	*n*	%
Lack of training	27	84.4
Technical difficulties	24	75.0
Lack of funding	18	56.3
Limited device options available at participants schools	17	53.1
Student resistance	11	34.4
Parent resistance	5	15.6

Gaps in knowledge/skills requiring pre-teaching. Though a few participants did not perceive any gaps requiring pre-teaching, most participants provided comments that demonstrated their perceptions of gaps. Prior to AT training itself, numerous participants noted the necessity of building a strong foundation, first, in learning about LDs, unique information processing needs, and how AT can support these needs. For example, "some training on LDs would be required. They are as varied as my students." Not all school-based roles necessarily have an extensive experience with this topic area (e.g., principals) and this cannot be assumed. One participant expressed this well as: "I think there should be a combination of training stating how a student with LD can benefit from this type of assistive tech and how it can be implemented in the classroom."

In terms of the assistive technologies, participants report seeking a combination of refreshing, re-teaching, practice, and also the knowledge about not only what is new and relevant, but what is available locally. One participant explained: "just training in use of some of the resources available. Also, the availability of resources. If I had access my students and myself would be using it on a regular and continuous basis."

Gaps in available equipment. Almost all participants reported gaps in equipment. Many responses were simply affirming this gap, but others referenced a combination of hardware (e.g., classroom computers), software, and peripherals. One participant noted that, "basic use of some devices would be an asset." Of particular note is that participants are concerned that they did not yet have an awareness of AT-related tools to make their requests more specific: "I'm sure there are many products that are out there that I am not aware of." Overall, it appeared that educators were seeking not only the availability of such equipment, but knowledge of what is available to be well-informed and specific about their selections. "Depending on the training offered, actually having the device or software could be an issue. We have many things in place, however, I am sure there are other forms of assistive tech that could be availed of and that specific needs [might] arise in the future."

Discussion

The primary question for this study is: Do teachers in rural NL perceive the need for training in assistive technology software for themselves and for their intermediate-aged students

with language-based learning disabilities? The simple and resounding response—as noted-above—is yes. However, there are layers and intricacies in this positive response. The reported attitudes are clearly positive. Teachers believe that AT is important; it makes sense that these attitudes would be reflected in the school community. Nevertheless, this study reveals a mismatch between attitude around AT (i.e., positive/strong/high), participants' knowledge (e.g., "some"), and the availability of ongoing training for educators. Ongoing training that develops current skills for effective classroom integration of AT in this fast-moving, ever-changing technology field is essential. This needs assessment clearly demonstrates that there is a demand for training in AT in rural Newfoundland—similar to what has been noted in other jurisdictions from pre-service teacher training onward (Alkahtani, 2013; Laarhoven et al., 2012; Morrison, 2007).

The barrier between attitude and practice appears to be training; however, one-time professional development is not adequate to address training on evolving AT devices. Professional development is ineffective if the extended supports are not in place once the teacher is back in the classroom (Beach, 2012; Schlager et al., 2003). Thus, we propose in-service and ongoing training and supports for educators and students (Li et al., 2002). The participants believe that educators and students (especially educators) need detailed, in-service training that transfers to complex classroom implementation and reflects the fast-moving field of technology. Further, they desire foundational information around why AT is needed (i.e., print-related processing difficulties), as well as hands-on, workshop/conference attendance, and experimentation. Available training opportunities that are accessible to those in rural areas and responsive to this ever-changing technology field may, therefore, bridge the gap between the positive attitudes towards the use of AT and the limited practice of supporting students with their AT needs in the classroom.

Recommendations

The above perspectives align with Kolb's Experiential Learning Theory (Kolb & Kolb, 2008), a holistic approach to learning based on our own experience, cycling through abstract conceptualization, active experimentation, concrete experience, and reflective observation. Kolb and Kolb (2005) regard learning as a constructivist process of knowledge creation, as opposed to a passive state of knowledge transmission. Time, space, and conversation for collective learning, knowledge development, and problem-solving, where all contributions matter, is essential to learning (Billingsley, Israel, & Smith, 2011; Kolb, 2000; Kolb & Kolb, 2005). Based upon this needs assessment, some tentative recommendations could be made. For example, a remote training program could be recommended to implement AT training for rural schools within NL. Rural schools within NL invariably rely on digital technology and distance education for their students (Barbour, 2005), online digital training is potentially suitable for such training—and not beyond the norm. Nam, Bahn, and Lee (2013) assessed special education teachers' beliefs about the usefulness of AT within the classroom and the factors that contribute to the use of AT in the classroom. Nam and colleagues concluded that ensuring that training is in place, fostering a supportive atmosphere, and devices/programs that have a clear purpose and effectiveness can help increase the acceptance of AT in the classroom. One of the important outcomes of this needs assessment is to recommend support for provincial educators in moving beyond the somewhat adequate support they identified as their current experience regarding AT use in

Newfoundland and Labrador classrooms. The following recommendations are suggested as a direct outcome of this needs assessment and related literature in the field.

1. Teacher Training
   Teacher training was the most clearly expressed gap in service provision, conceiving, developing, and providing both teacher candidates and certified teachers with training is an essential set of next steps. This could be accomplished through short-term, team-based training—including instructional resource teachers—using a short-term referral process. An additional formalized, localized role or credential could be developed as a response—or added to the responsibilities of local technology lead teachers (e.g., AT lead), and such additional training could be recognized in an online, open access provincial directory. This could be piloted with short-term, directed funding, perhaps through a university/college school board collaboration; a specialized company may need to be contracted for service provision.
2. Online Training
   In relation to K-12 student education, many changes have been made to support Newfoundland and Labrador's rural and isolated student population:
   In August 1999, the government of Newfoundland and Labrador announced the formation of a Ministerial Panel mandated to examine the current education delivery model and to investigate and recommend "alternative delivery strategies." The premier of the day, Brian Tobin, stated his government's commitment to "doing everything possible to ensure that all children in this province, regardless of where they live, have access to a balanced and high-quality education." "Most alternatives," the Panel would determine, "involve a form of distance learning… delivered by various forms of electronic media via what has come to be known as the 'virtual classroom.'" (Mulcahy, 2017, para. 10-11)
   Clearly, if educational accessibility is problematic for students, it is problematic for their teachers; similar changes need to be accomplished. Inter-provincial or intra-provincial, online, workshop-style training that can be made more widely accessible to remote, northern, and/or rural communities is a necessity if on-site training is unavailable or inefficient. A NL study around rural communities found that technology allowed for ways for community to come together, individuals to take on leadership/supervisory roles, and there was excitement for using it to take courses and learn new skills (Clover, 2007). Such online, facilitated workshops should include careful planning around technology itself as well as its implementation (e.g., set-up of space, carefully chosen facilitator, group dynamics; Davies, Yeung, Mori, & Nixon, 2012). Space for communication (e.g., a collaborative live chat feature) acting, reflecting, thinking and feeling—and to take charge of learning (Kolb 2000) should be included—in a live, didactic manner. Elements such as a responsive chat feature, hands-on practice, live demonstrations, and, if possible, an on-site facilitator with a skill base to support engagement, practice, and redirection. This could include an assessment tool for AT that could be completed collaboratively between the classroom teachers and instructional resource teachers and/or guidance counsellors
3. Focus Areas
   It seems reasonable to initiate such training with a limited number of software programs that are desirable, available, accessible, and familiar: text-to-speech, speech-to-text, and word prediction software, following foundational awareness information about the processing needs and challenges in students with print-based LDs. Since a provincial

license exists for word Q + speak Q (DEEC, personal communication, June 8, 2017), this software is likely the most judicious area of focus. It would also be helpful to have on-site follow-up coaching (Schlosser, McGhie-Richmond, Blackstien-Adler, Mirenda, Antonius, & Janzen, 2000) to ensure maintenance of taught skills.

4. Training Framework
   Consideration should be given to using an evidence-based model such as the Behaviour Skills Training (BST) model (Parsons, Rollyson, & Reid, 2012) to frame training in AT that includes a mastery component for the development of specific skills. The BST model, according to Parsons, Rollyson, and Reid (2012) includes six steps for trainers: describing the skill to be learned; providing a written description of it; demonstrating it; ensuring the skills are practiced; providing feedback; then, repeating practice/feedback until the skill is mastered. As an aside, Nosik, Williams, Garrido, and Lee (2013) noted that in-person BST takes three times as long, but the effects appear to be greater and longer lasting. However, this skills-focused model need to be combined with, and balanced by, a more applied, critical approach, such as a case study.
5. Case Studies
   The inclusion of case studies are important teaching tools. Case students can provide real world context to learners (Cowden & Sze, 2012). Case-based teaching and learning provides opportunities to develop professional skills, and to construct learning, meaning, and sense-making through information-processing, dialogue, insight, and reflection (Bano, Arshad, Khan, & Safdar, 2015; Kantar & Massouh, 2015; Maich & Hill, In Press). Thistlethwaite and colleagues (2012) support the use of case studies, noting that online case-based learning can be effective with attention to the online learning context.

Conclusion

The primary question for this study has been addressed: Do teachers in rural NL perceive the need for training in assistive technology software for themselves and for their intermediate-aged students with language-based learning disabilities? Although this study is limited by its small sample size, it provides valuable information to guide future work and valuable insight into the perspectives of rural educators whose perspectives are often absent from discussions of training opportunities. Rural educators are more limited in their options for in-service training due to their remote locations. Accordingly, five tentative recommendations have been developed from this initial sample providing potential techniques to work towards such perceived needs related to teacher training, online training, focus areas, andragogic framework, and the use of case studies—following further discussions with educational stakeholders. Future research should specifically include rural educators and further examine their training needs to better support students who require AT to succeed in their development. Technological advances not only benefit students, but can also be utilized to better include educators in research. The online survey utilized for data collection in this study is one way to do this; future work could utilize video conferencing options to conduct interviews from this population. As the knowledge, skills, and attitudes of teachers are inextricably enmeshed with students, improving accessibility to teacher training in AT will no doubt benefit the focus of schools—our students—and support the teaching and learning efficiency and effectiveness of our inclusive classrooms.

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