



Online Learning Initiatives in Alberta Schools



The Alberta Teachers' Association

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ISBN 978-1-927074-63-3

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For the Alberta Teachers' Association

Contents

Preface	1
Executive Summary	2
Introduction.....	3
Rationale for Study.....	4
Complexity of the “Classroom”	6
Research Questions.....	9
Method	10
Findings.....	14
Devices and Software	14
Smartphones	15
Google-ization	18
Social Media	20
Technology Support	22
District-Level Support.....	23
School-Based Pedagogical Support	24
Professional Growth	25
Communities of Practice	25
Professional Development.....	26
Resource Sharing.....	27
Security/Privacy and Surveillance	28
First Nations, Métis and Inuit Considerations.....	31
Pedagogy and Technology.....	32
Lessons from “alternative” schools.....	32
Lessons from the classroom	34
Access to Digital Technologies.....	35
School Access	35
Home Access	36

v

Constant Technological Change.....	37
Participants' Advice	39
To Teachers	39
To School Leaders.....	39
To Teacher Preparation Institutions	40
To the Alberta Teachers' Association.....	40
Conclusion	41
Research Recommendations.....	41
Appendix A: Participants' Advice	44
Appendix B: Interview Schedule	50
Appendix C: Recruitment Advertisement.....	53
References.....	54

Preface

Classrooms in Alberta are increasingly defined by more diverse and complex student populations. As this complexity grows, teachers and principals are exploring a variety of new ways to meet the many needs of today's more inclusive classrooms. Among the many ways Alberta teachers are looking to support our more complex student populations are a variety of online education initiatives that range from software programs to digital classroom platforms used in blended learning environments, to fully online courses.

A thorough exploration of the impact of flexible and digitally mediated learning environments on the work life of Alberta teachers was last done by the Association in 2011, and resulted in a comprehensive research report entitled "The Impact of Digital Technologies on Teachers Working in Flexible Learning Environments". To update this study, and explore the new emerging impacts (both positive and negative) of a wide spectrum of digital technologies being used in Alberta's K–12 classrooms, a 2018 case study research project was initiated, with the findings contained in this report.

The key findings outlined in this latest 2018 research report speak to a range of emerging issues, such as the growing concerns around the use of student-owned smartphones and the proliferation of Google for Education tools in Alberta schools (along with their related privacy and security implications). It also sheds light on the resilience of Alberta teachers as they form communities of practice around digital technologies. The researchers also took an opportunity to document the unique experiences of teachers working primarily with First Nations and Métis students and how they are utilizing and accessing a variety of digital technologies and platforms.

The research activity was directed by Dr Philip McRae, Associate Coordinator, Research with the Alberta Teachers' Association (ATA), and led by researchers Dr Terry Anderson (Professor Emeritus Athabasca University) and Donald McPherson (University of Alberta). It was enhanced by review and advice from field members Frank McCallum (Alberta Distance Learning Centre), Terri Reid (Black Gold Regional Schools), and Alberta Education's Dr Daylene Lauman. It was supported by Dr J-C Couture and Dr Lindsay Yakimyshyn of the ATA. The collective attention, support and analysis provided by all these individuals is greatly appreciated.

The Association will continue to research and advocate for the conditions of professional practice required to create teaching and learning environments that advance the goal of public education: to educate all Alberta children well.

Dennis E Theobald
Executive Secretary

Executive Summary

This qualitative study, funded by the Alberta Teachers' Association and guided by the Association's Online Learning Initiatives Research Advisory Group, explores the effects (both negative and positive) of the increasing use of digital technologies in Alberta's K–12 classrooms. For the study, the researchers interviewed 19 teachers working in various educational ecosystems. The interview schedule was developed through discussion with the research advisory group, which included representation from Alberta teachers. Following the interviews, conducted in spring 2018, the interview data was coded into emergent themes. As much as possible, these themes are presented in this report in the voice of the teachers who participated in this study.

Below are the key themes that emerged:

- The concerns surrounding the use of student-owned smartphones
- The near-ubiquitous use of Google for Education in Alberta schools and the privacy and security implications
- The challenges involved in the use of both publicly available and school-based social media
- The decreasing use of dedicated computer labs
- The issues involved in supporting teachers, both technologically and pedagogically, in the effective use of digital technologies
- The concerns and potential educational uses of student and teacher monitoring technologies
- The experiences of teachers working primarily with First Nations and Métis students, in particular relation to access to technologies
- The emergence of communities of practice in addition to formal professional growth opportunities for practising teachers
- The benefits and the challenges of encouraging teachers to create and legally share open education resources (OERs)
- The challenge of accessing digital tools and connectivity in both schools and homes
- The implications of the constant technological change that confronts educators
- The changing nature of pedagogy due to the use of digital technologies in both classroom and online contexts

Following description and analysis of these themes, this report outlines some of the advice from teacher-participants to their colleagues, school leaders, teacher preparation institutions and the Association with regard to effective use of digital technologies (see Appendix A).

The report concludes with potential avenues for further research and study in relation to the themes and issues that emerge here.

Introduction

It is hard to imagine a teacher in Alberta today who does not have direct and immediate access to the Internet, or a student who does not spend a part of their day interacting with connected technology. Twenty years ago, the personal computer and the Internet were being introduced into classrooms across Alberta. Now, digital tools are ubiquitous in the classroom and teachers face the challenge of integrating these tools into their personal and professional lives.

There is little doubt that the Internet and the applications and services it supports affect not only students and teachers in classrooms, but all of us—as citizens, consumers and members of various communities. These effects both conserve and waste time, enhance and degrade the quality of our work environments, and create new moral, equity and wellness issues. Teachers are presented with the opportunity to use a growing number of networked digital applications, yet often lack the time and resources to determine the value of those applications. Thus, teachers might benefit from knowledge sharing and collaboration that would create opportunities to learn from the teachers who are devising ways to make those tools benefit their students.

This qualitative study aims to paint a textual picture of Alberta teachers' responses to the challenges and opportunities posed by the digital technologies they use with their student populations. As well, this report attends to teachers' professional responsibilities, and the practices and resources needed to provide teachers with effective support to implement digital technology.

The report first illustrates the complexity of the environments within which the study participants practise their profession. The rationale for the study, the methodology used in collecting and analyzing data, and the presentation and discussion of the major themes that emerged are then outlined. The report concludes with recommendations for professional practice and further research.

The term *digital technology* refers to “all types of electronic equipment and applications that use information in the form of numeric [ie, usually binary] code” (Gruenbacher 2018). For the purposes of this study, *digital technology* encompasses all of the “devices, methods and systems” (Dictionary.com) that can be accessed through computerized devices. This terminology is in common use by practising teachers, as well as by many researchers in this field. The term *online resource* refers to any digital resource that is accessed through networked devices. *Online education* or *online course* will refer to instruction and assessment that is delivered primarily or exclusively through a networked platform.

RATIONALE FOR STUDY

Teachers acknowledge that emerging technologies present the education system with significant opportunities and challenges (Greenhow and Askari 2017). These opportunities and challenges affect students, parents, school jurisdictions and governing bodies in a variety of ways. Assessing the effect of digital technology on teachers and their conditions of practice is an ongoing research and advocacy priority for the Alberta Teachers' Association (ATA). In 2010, the ATA undertook a provincewide study that addressed teachers' working conditions in flexible learning environments (ATA 2011). This study surveyed face-to-face (classroom) teachers who used some digital technologies as well as teachers who taught in "primarily digitally mediated environments" and in blended learning environments and outreach schools. The 2011 study found that teachers felt "their conditions of professional practice were deteriorating with respect to workload, role expansion and lack of personal and professional boundaries." They also noted that the role of the teacher was expanding to include providing technical support and being available to parents and students at any time (p 6).

The study also identified increased demands on time and large class sizes as reducing "the amount of time and level of assistance that teachers can give to individual students" (p 6). However, the 2011 study also found that "teachers and administrators were overwhelmingly positive about the potential of technology to render the timing and pacing of instruction more flexible"(p 6). The report notes that, at the time it was written,

Hand-held or portable computing devices used by students, cloud computing and online professional development are on the cusp of being used frequently and being deemed useful (or not). As a result they bear watching. (ATA 2011, 6)

The Association's 2011 study looked at the types of technology that were being used and perceived to be pedagogically useful. At the time, interactive white boards, digital marking/reporting tools and learning management systems were reported as being both frequently used and useful. These tools were being used in learning environments in which class size was increasing and its composition was changing. Teachers identified a lack of student "physical and emotional readiness" and a decrease in "academic readiness" as factors that were affecting teaching conditions.

A second study of Alberta teachers (ATA 2015) found that teachers continue to believe that digital technologies enhance their teaching and learning activities. However, teachers also report "somewhat or significant increases in the number of students who demonstrate the following exceptionalities: emotional challenges (90 per cent), social challenges (86 per cent), behaviour support (85 per cent) and cognitive challenges (77 per cent)" (ATA 2015).

As this complexity grows, teachers and administrators are exploring a variety of new ways to meet the needs of today's diverse and inclusive classrooms. Often teachers use, or are encouraged to use,

digital technologies to enhance the educational experience for their students. However, this can be costly, pedagogically challenging and controversial.

The majority of Alberta parents and grandparents who responded to a survey (ATA 2018) indicated that, while digital technology is having a positive impact on themselves and their children, “their child’s use of technology has a negative impact on physical activity.” Further, almost a third of respondents also suggested that “it increases their child’s anxiety” and “has an impact on emotional health.” The 2018 study signals concerns about children’s increasing use of digital devices and applications. At the same time, researchers and teachers alike are aware of the educational advantage of using them.

Underwood (2009) reports that, in Britain, “classes with online learning, whether completely online or blended, on average produce stronger learning outcomes than learning face-to-face alone” (p 3). The number of students enrolled in fully online courses continues to grow worldwide. Barbour, Grzebyk and Eye (2014) report that the number of American K–12 students engaged in online learning increased from between 40,000 and 50,000 in 2001 to more than 2 million in 2014. In Canada, Barbour and Labonte (2016) report that nearly 300,000 K–12 students (5.7 per cent) were studying online. In addition to these growth numbers in the use of full courses or programs delivered exclusively by distance education, the use of online resources, including social networking sites, open educational resources, collaborative creation tools and learning management systems, has also expanded.

There are very few schools in Alberta that do not make use of online resources. Yet, use of technology requires commitment of time, access, training, support and ongoing funding. As Saxena (2017) argues, “integrating ICT [information and communications technology] requires a harmonious synchronicity of content, teacher knowledge, compatible theoretical framework and suitable pedagogy, all at the appropriate stage of knowledge acquisition.” Online education has been found to be particularly effective when used by students for “credit recovery”—when they take a course for a second time or during a semester in which the course is not offered at their school (White 2017). However, online and other forms of distance education have also been associated with higher rates of noncompletion (Barbour and Mulcahy 2006). Thus, the use of online and blended education has been shown to have benefits, but also significant costs.

This study was designed to further explore the complexities and provide increased depth of understanding on a topic that concerns the teaching profession, students, parents, school jurisdictions and governments. It presents a cross-section of Alberta teachers’ responses to the challenges and opportunities posed by complex student populations, as well as descriptions of teachers’ use of digital technology and online educational resources in Alberta public schools.

Complexity of the "Classroom"

All K–12 teaching and learning environments can be described as *complex* rather than merely *complicated* (Davis and Sumara 2006). Whether in face-to face, online or blended teaching and learning environments, Alberta’s teachers are grappling with unprecedented levels of complexity. This arises from a host of cultural, demographic, educational and economic factors. Teachers are differentiating instruction for emotional and physical needs, identifiable learning needs, gaps in literacy, language barriers, family dynamics, cultural backgrounds, geographical distances and regional differences. In these ever-changing ecosystems, teachers are attempting to meet student and community needs with both tried-and-true instructional methods and the latest digital technologies.

Study participants reported a range of complexity in their classrooms that shows a vast array of student needs, administrative requirements, parental expectations and other demands on teachers. In an urban elementary school, a teacher participating in the study “had 26 kids, two of the children that were on the autism spectrum ... Another child had some severe anxiety concerns ... Plus the ELL [English language learner] factor.” A high school teacher commented that such complexity would be seen as “normal for anybody who is teaching” even though “outside of the school people would not see this as normal.” This normality is expressed by a junior high school teacher who said that “every class has [students] with special needs. They are integrated into the classroom. Teachers have to make sure [students’] needs are taken care of individually.”

For students who need specialized services and supports, a working, written document, often called an Individual Program Plan (IPP), records specific goals for students. When asked how many students were on IPPs, a rural high school teacher reported that “our counselling staff told me the provincial average [for IPPs] is about 9 or 10 per cent and ours is closer to 20 per cent.” However, the number of students with formal IPPs is not the only indicator of the complexity of a classroom. A rural high school teacher stated that, along with students on IPPs, there were “individual students that should be [on IPPs] but the funding to test the students [and] the supports that we used to have in place just don’t seem to be there anymore.”

Culture, language and geography also factor into the description of complexity in Alberta schools. Complexity does not end with a mere listing of identifiable special needs or categories such as behaviour, literacy, reading levels, family dynamics, medical conditions and so on. Be it a northern First Nation, a southern agricultural area, a central inner city or a high-income neighbourhood, each community has unique challenges. An urban elementary teacher stated that she had only two students in her class who were not from families with a South Asian heritage; a rural elementary school teacher had only one non-Indigenous student in her class. While an urban teacher reported that in her class 40 per cent of her students spoke English as a second language, a small town teacher

said, “In the 20 years that I’ve been here I think I’ve had maybe three students designated as ESL (English as a second language) students.” However, in that same class where everyone spoke English, there was a student who “missed all of Grade 2, another one missed all Grade 4 and a third one missed all of Grade 5 . . . real significant gaps in the learning that should have taken place.”

Many of the teachers in this study did not see such complexity as particularly negative, but considered it as a reality of their job. They were willing to manage resulting challenges and had a positive perspective of their students. One elementary teacher said, “I have an amazing group of students this year. They’re low academically. There’s a lot of [social and economic issues]. But they are wonderful students and they work really hard. What they lack in their skills they make up for in hard work.”

Moving beyond the face-to-face classrooms represented above, the student population and task of meeting individual needs becomes even more complex. One online junior high school teacher’s experience reflects this:

When I first started here I was amazed at the students . . . I have kids from such different backgrounds. And some of them have severe anxiety going to school . . . Some of them are sick and they can’t attend. I have kids that are [high-level] athletes. And I have those kids that just aren’t okay being in a brick-and-mortar school. They’re just misbehaving and can’t attend regular school but often really excel at doing it on their own. And I have gifted students and students that are below grade level. And I have students that are overseas and I have students in other provinces that are taking the Alberta curriculum. So the variety of kids I have in the student body . . . Definitely it’s complex.

This description is not unusual for teachers working in online and outreach schools. These schools serve students who, for a wide variety of reasons, cannot or choose not to attend brick-and-mortar schools.

Of emergent interest in our interviews was the number of teachers reporting that *anxiety* was a reason that many students were having difficulty attending school. A typical response from our outreach and online teachers was that “Many of our students that come to the outreach are high-anxiety students—they can’t be in a regular classroom . . . and they’re not attending.

Most of our outreach students are at-risk students. You know, I have some students that don’t have homes—they are couch-surfing.
(Outreach teacher)

In our district we have secular schools, Christian schools and Islamic schools. And often students end up with us because it wasn’t working at their traditional school or they had needs outside of school where they couldn’t attend school, whether that’s medical work, whether that’s family life. So we have [a] very complex student body. (Outreach teacher)

Usually that's the biggest thing." Another outreach teacher stated, "I would say there are as many kids on anxiety IPPs as there are on literacy IPPs. These kids are just under so much pressure." Some participants speculated that that the use of social media and playing video games may be related to the increase in the number of students dealing with anxiety, potentially adding a layer of complexity for schools that regularly use online media and educational games for instruction and assessment.

Working in this context of complex learning environments, participants in this study were asked to report on their use of digital technology.

Research Questions

Our study was guided by four major research questions:

1. **How are digital technologies (ie, devices, methods and systems) being used to support complex student populations in three K–12 educational contexts?**
 - Context 1: Programs that provide instruction and assessment only through online platforms (distance education)
 - Context 2: Programs that provide some of their instruction and assessment through online platforms and some through face-to-face contact (blended learning)
 - Context 3: Programs that primarily use face-to-face instruction, but enhance learning through the use of digital technology and online media
2. **What are the perceived benefits and challenges of using digital technology in each of the above contexts?**
3. **What types of professional support are perceived as most effective or most needed by practising teachers?**
4. **What advice or promising practices do teachers offer for the use of online resources?**

Method

This study employed a qualitative approach, recognizing that teachers' experiences, stories and insights are at the core of effective teaching practice and that open-ended interviews would allow participants to express their thoughts, concerns and solutions most thoroughly. Rather than attempt in-depth case studies of a handful of schools, the researchers engaged in a broader study, with the intention of interviewing about 18 to 20 teachers. Selecting this small number from the teaching profession in Alberta itself presents challenges and limitations in terms of analysis. However, the study required participants who were responsive and willing to fully engage in this project.

SAMPLING PARAMETERS

Participants were selected from different types of communities in north, central and southern Alberta. Rural, urban, mixed rural-urban¹ and First Nations communities were to be represented in the sample. Researchers aimed to have deep conversations with classroom teachers, online educators and blended education teachers and, within each of these educational ecosystems, expected to find a complex range of student needs, given that this is the “new normal.”

SAMPLE SELECTION

For the study, a random, stratified sample of 600 active Alberta teachers was drawn from the Association database. These teachers were e-mailed an invitation to engage in a face-to-face or online interview (see Appendix C) with the researchers. Approximately 50 teachers replied expressing initial interest. To ensure the voice of the blended and fully online teachers (who make up a much smaller proportion of Association members than classroom teachers), the invitation to participate was also extended to teachers listed on the mailing list of blendedED, an annual symposium of Alberta's blended and online teachers. From this group, 11 additional teachers expressed interest.

In total, 53 respondents from across the province were sent a more detailed description of the study, including a form for informed consent to participate (Appendix B). These respondents were invited to meet with the researchers for an interview; 19 teachers expressed interest in further participation and the interviews were arranged.

¹ Mixed rural-urban districts include those with larger schools located in towns or small cities near larger urban centres, but also contain smaller schools in rural locations.

Teachers who were disinclined to use digital technologies in their classroom may also be unlikely to volunteer for an interview on this subject. Therefore, the self-selected sample of teachers were most likely those who had experience with and opinions about our research topic. In addition, for the purpose of the study, the sample contained more fully online and blended teachers than would be expected if Alberta teachers were proportionally represented.

Despite these limitations, there are potential advantages of appreciative inquiry forms of research in which there is an explicit focus on studying what is working successfully (Anderson, Thorson and Kelinsky 2016; Cooperrider and Srivastva 1987). Thus, this study acknowledges and appreciates that most of the respondents generally have positive experiences with the technologies they use and, hopefully, would have put thought into the educational use of digital technology and thus be able to provide depth of knowledge and experience. Further, the questions aimed to spark discussion to ultimately increase learning opportunities for both students and teachers (Hammond 2013).

The figures below provide details on the study sample.

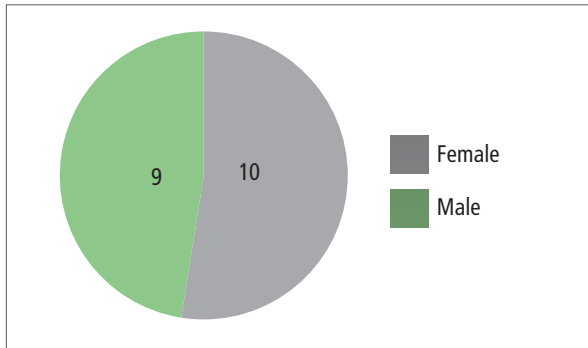


FIGURE 1. Gender Distribution

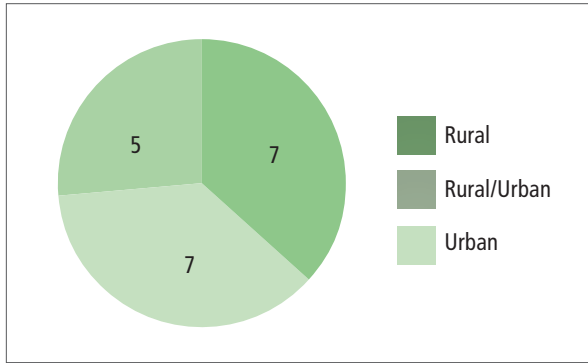


FIGURE 2. Geographic Location of Teachers

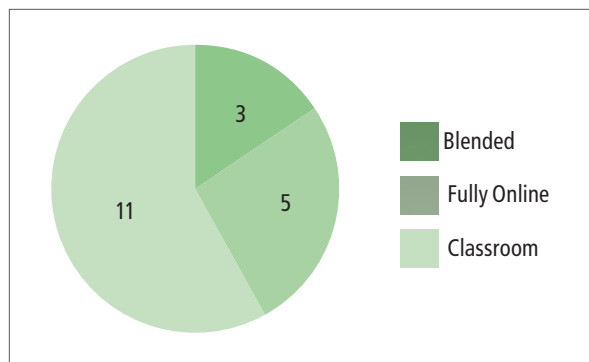


FIGURE 3. Delivery Method

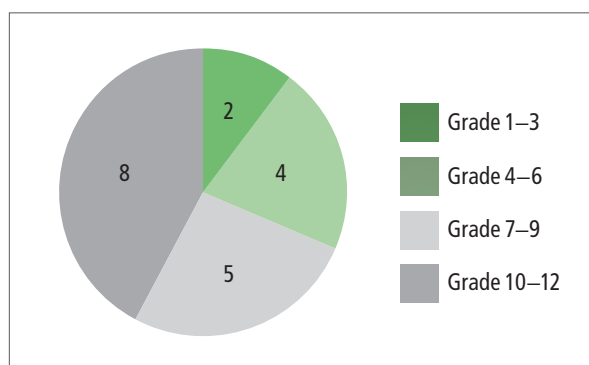


FIGURE 4. Division and Grade Distribution of Participants

INTERVIEW FORMAT

The interviews, which took approximately 45 to 60 minutes, followed a semistructured format that was cued by a list of 10 broad questions developed by the researchers in consultation with the project’s research advisory group. The participants were invited to talk freely about any of their practices, concerns and suggestions related to digital technology use. They were also asked for any advice they might have for others involved in Alberta’s education system. A summary of this advice is included in Appendix A.

Most of the teachers requested to participate using a telephone or an online video application. The researchers interviewed 4 of the 19 teachers in person. Both researchers were present for all but four of the interviews. Generally, one researcher led the interview while the other recorded and asked supplementary questions. The use of online video applications enhanced the social presence and likely the cognitive engagement of the participants. Being able to see rather than merely listen to each enriched the interview experience (Lo Iacono, Symonds and Brown 2016).

DATA ANALYSIS

The 19 interviews were recorded and then transcribed using a machine transcription service. This produced a legible text transcription of the interviews from the audio recordings. Each transcript was reviewed and edited by the researchers to ensure that the transcript accurately reflected what each speaker had said. The time to complete this editing varied greatly with the quality of the original audio recording.

The text transcriptions were then coded and qualitatively analyzed using an online qualitative analysis program. The researchers used first open, then axial and finally selective coding to generate the emergent themes from the data (Strauss and Corbin 1990).

ETHICAL CONSIDERATIONS

The study was submitted for review by the Research Ethics Board of Athabasca University, and permission was received to proceed with the study in February 2018. All participants were e-mailed informed consent forms and all consented to participate freely in the interviews.

LIMITATIONS

Although this study works to sample widely, given the parameters of the study, the views expressed by the participants or the ensuing analysis of their comments does not represent the entire scope of opinions of all K–12 teachers in Alberta. As mentioned above, there is a certain amount of selection bias in this particular sample. Nonetheless, the findings of this study contribute to the discussion on the use of digital technology in schools.

Findings

Each of the emergent themes extracted from the interviews was derived through discussions between the researchers immediately after interviews, review of recordings while editing transcriptions, and analysis of the transcripts. This report foregrounds the themes that had particular relevance to the use of digital technology in K–12 education and to previous research on this subject. The observations from participants, outlined below, highlight the diversity and complexity of Alberta’s classrooms through the lens of the digital technologies in use.

DEVICES AND SOFTWARE

Digital technology marries the affordances of hardware devices with the efficiency of networked interconnection. In this study, teachers reported using a host of different technologies, including legacy computer labs, iPads, Chromebooks, student-owned devices (eg, phones and laptops) and specialized Career and Technology Studies (CTS) technologies. Each tool comes with champions, later adopters and reluctant users.

A wide array of learning management tools are employed in Alberta schools, particularly in blended and online contexts. Most jurisdictions use a suite of software with gradebooks, multimedia content, quizzes, discussion forums and so forth; commercial learning management systems (eg, Brightspace, BlackBoard); and/or open-source systems (eg, Moodle, Google for Education). The use of one particular system is often mandated for all teachers at the district level. Such mandatory use, of course, raises the issue of the need for teachers to *buy in*, both pedagogically and administratively, to the inherent properties of a (often commercial) technological system. In a survey of Alberta teachers undertaken in 2014, 93 per cent of respondents reported that they had no input into the choice or implementation of tools selected by their division (Alberta Teachers' Association 2014).

There are arguments for prescribed use, usually focused on costs of licensing, support for the program, security of data, location of servers, and capacity for teachers to share and support each other on a common platform. However, compliance with the use of specific platforms is sometimes mandated to the extent that teachers are not allowed to use programs that have not been approved by their jurisdiction. Some teachers identified this as problematic as it inhibits teachers’ use of their professional judgment in choosing the most appropriate tools for their students.

As more educational applications move to the “cloud” and are run on web browsers, the capacity for school districts to restrict student and teacher use of external applications is reduced. This increase in professional freedom, however, is accompanied by an increase in potential privacy issues or commercial exploitation as teachers and students relinquish their contact information and the

traces of their activity to commercial providers. This speaks to the need for professional development opportunities and support for teachers navigating this.

Despite the potential for compliance issues, the study participants indicated that they were able to use (with appropriate training and support) any system that had been adopted by their school or district. Some also indicated having expertise in moving content and courses between systems.

Smartphones

“At some point it becomes a distraction instead of a tool.”
(Social studies teacher)

Smartphones are now ubiquitous in workplaces, on public transportation and in homes. However, as in workplaces, homes, theatres and cars, rules and acceptable standards of use are necessary to ensure that these tools are used appropriately in schools. These rules and standards of use for smartphones are being created and updated constantly in Alberta's schools.

Smartphones have been associated with distraction, lack of focus, inappropriate use and peer confrontations (Alberta Teachers' Association 2018). Early on, some schools responded to these concerns by banning cell phone use, tightly controlling Wi-Fi and devising other technical blocking solutions. These were usually augmented with school- or districtwide policies on acceptable use.

One respondent, a junior high teacher, pragmatically states, “I have computers in the classroom but they are kind of older, so [students] use their own phones all the time.” While this gestures toward the problem of schools purchasing technology that quickly becomes obsolete, it also underscores the growing opportunities at hand for students equipped with powerful smartphones, though, as this teacher notes, “Not every student has a phone.”

The most common rule for use of smartphones in school among our participants was that students use their phones only for school-related activity. One junior high teacher notes

In years past it has been somewhat of a novelty, but now so many kids have [cell phones]. By the time they hit Grade 7 and 8, they have had a cell phone for four years already. . . . It doesn't interrupt the flow of the class . . . and sometimes I'll ask them at the beginning of class, “We are going to do something today. If it's in your locker please go get it because we are going to use it.”

Another teacher agrees:

Maybe I am really casual about them, but I think it's impossible to say you can't use [smartphones].
(Outreach teacher)

At some point it becomes a distraction instead of a tool. (High school teacher)

Here's how I use them in my classroom—"If you have a question or can't spell a word, look it up." Instead of using me entirely for the answer—giving them the skills to actually find the answer instead of me just giving it to them. I think it's more useful. There's going to be that technology around. So might as well teach them to use it properly. (High school teacher)

Another participant observes emotional attachments to devices, as well as the challenges that some users experience when they do not have access:

The attachment to the cell phones that we're seeing with kids, and adults to some degree, it is almost—if it's not in their sight, they're panicky and anxious. So there's a lot more of a cooperative environment happening . . . just kind of going back to even basic rules [of respect] that you had before cell phones . . . "Keep your phone face down and on silent" kind of thing. And when you're in more open working environments and certainly if you need to check the time or [a parent's] text, but you're not dwelling on the machine. (High school principal)

Another teacher notes the difference in school policies related to smartphones:

We're not supposed to use them [smartphones]. We don't allow them at the elementary level. When I was in [my previous school division] we had a "bring your own device" policy and many of my students in Grade 5 brought their phones and iPads and we used them all the time. (Elementary teacher)

Among our participants, only elementary schools still had firm policies restricting smartphones. Most teachers in upper grades reported a relaxation of school or district rules, with more responsibility placed on individual teachers. One high school teacher stated that the teachers have shifted from fighting against phones in class to "managing the phones."

Participants indicated that they were given considerable right to exercise their professional judgment in setting smartphone policy. Some teachers are stricter about student access to smartphones, thus creating a diverse digital ecosystem. However, this diversity also requires teachers to state and enforce their own solutions. Most of the participants interviewed believed that technological blocking or outright bans are not effective and create as much challenge for teachers and policy enforcers as they provide benefit. One teacher described using professional judgment to appropriately restrict use:

For me, it's establishing firm rules right from the start. It's a tool. It's there to help you. There are certain times when I will say you can use your cell phone for this. I have no problems

If you take the police/policy route, kids, especially teenagers, don't react very well to that. (High school teacher)

First you have expectations. If you have rules in place they will follow them . . . (Elementary teacher)

doing that because that's so much better than looking things up in a dictionary or through books. But there are other times when there's no place for phones and I let the kids know at those times, "If you are abusing that privilege then I'll hold your phone until the end of the class period." (High school teacher)

Questions of smartphone access and potential distraction for fully online or blended courses is the student's (and perhaps their parents') challenge. However, participants noted considerable benefits of smartphone use for educational purposes. In particular, teachers described flexible use of video, reading and other literacy aids, some of which are linked to online courseware. These videos can be accessed from desktop computers, as well as from smartphones. One outreach school teacher, teaching in a blended environment, describes their use:

[Students] have to go and watch a lot of videos or go to websites. So they're using their cellphones or computers ... But the majority that I see are using their cell phones. On the other hand, the videos are a huge distraction as soon as students turn on their phones. It's very hard for them to turn them off. And they've got pop-ups coming on. And because these are all independent learners, I'm not walking around saying "Turn that off. Turn that off." ... It's a really good practice for self-regulation. You quickly find out who can do it and who needs to work on it. ... And then sometimes I have them do an experiment at home and take a video of it and they'll show me the video. They'll either text it to me or show it to me on their phone the next time they see me. (Outreach teacher)

Another outreach teacher describes use of multimedia in a senior high school English class:

The other technology we really encourage the students to use is their phones. This is part of the literacy role that we use their phones for ... *Night* is a book they have to read in English 30. There is audio of that book being read to them, and we highly encourage kids to listen to it as they're reading it, because they get both auditory and the visual at the same time. Even for good readers we strongly encourage them to use it. ... It's been a way of keeping their attention—a better way of you getting focused. (Outreach teacher)

It became clear that digital literacy is taught and learned through a balanced use of these devices:

It's always difficult to sit in the middle. This is a part of their world and we need to teach them to be respectful and responsible with technology ... either you're on [one] side letting them have everything or on the [other] and having them lock up their devices in a container when they walk in and using nothing. I am trying to make my way to the middle and try to teach safe, respectful, responsible use. (High school teacher)

So you can't take [technology] out of school ... but you can coach [students] on how to properly use it—and keep working on it. It is just another discipline in the classroom. "[This is] how you do this properly." (High school teacher)

In summary, participants described the presence of mixed and sometimes conflicted attitudes, rules and behaviour in regard to smartphone use in Alberta schools. Certainly, teachers are aware of the potential distraction issues associated with these tools. However, they are also cognizant of ways that smartphones and other networked technologies can be used effectively in their classrooms. An experienced teacher and administrator puts the “smartphone problem” into perspective:

How we learn to support our teachers and educate our kids, it’s not an instantaneous thing. It’s time and it’s more of a behaviour issue. It’s [about] helping kids grow and be responsible in all aspects of their life with their technology use. (High school principal)

Google-ization

American school librarian Kelly Ahlfeld (2017) warns that we are creating

[a] culture that trades privacy and control for price and convenience. The allure of using cloud-based storage for creating student content is too powerful. Teachers can look at their students’ work from anywhere, broken devices need not mean lost work, and powerful collaboration and information retrieval are easy with cloud-based computing.

Alberta schools are in the midst of rapid “Google-ization.” Throughout North America, schools and individual teachers are adopting Google for Education Suite (also known as G-Suite) for course delivery. They are using Google apps for student composition, special needs and creativity, and using Google Chromebooks for hardware access. Google has become the first choice of most of the schools in our sample.

The flexibility of these tools appeals to schools and teachers. The quote below illustrates this flexibility:

I use Google forms and Google sites to do my construction stuff. [Previously] for orientation and safety training on machines, I have them set up where they need to watch a video, read some material and then do a quiz or a test on paper ... Beginning this year, I changed it all to digital so that they can have their test results and feedback immediately. That’s all compiled into a spreadsheet and I can just look and see which kid scored what on the safety test. The practical test follows that, before they use the machine. (Junior high teacher)

This teacher is challenged with ensuring that every student understands the critical safety issues related to operating shop equipment. However, the logistics of instruction and testing are challenging. The creation and distribution of short videos, organization of quizzes, and then deployment and record keeping are all handled by the Google Suite—at no cost to the school. This is also an example of using digital tools to automate an aspect of instruction and assessment. These tools hold the potential to enhance an individual teacher’s professional freedom by supporting the development and deployment of customizable educational resources, without the need for graphics, video and instructional design staff (employed in earlier iterations of digital resource development).

These tools also facilitate teaching and learning in complex classrooms in which there are students with very different levels of reading proficiency. A junior high teacher describes this situation:

Google Read&Write will read and write for students. [For] students with any type of learning difficulty, just having something read to them has been shown to make a huge difference. I use that with several students ... The test isn't about reading and writing—usually it is about, “Do you know the information that I hope you know?” Having that type of technology helps to differentiate for those students who can't read and write well—or even at all sometimes.

Although many of the blended and online schools use dedicated learning management systems such as Moodle, Blackboard or Brightspace (formerly D2L), many also know that their students have Google accounts. Thus, teachers can easily connect for individual or small-group work using real-time web conferencing supported by Google Hangouts.

The Google communication and creation tools are used for group work in online courses, but also in the classroom. A teacher describes such collaborative work:

We were preparing for a classroom debate on nature versus nurture, in psychology. I put the students into groups of five or six. They sat down together to generate ideas, and then I sent them to the lab in their designated groups to come up with a Google Doc where they could build their arguments ... Then they were able to build on their research and create the rebuttals ... So using a living document was really nice ... I was surprised just how quiet the classroom was when they were working because it was all “live chat” through the Google Doc. (High school teacher)

Google tools are also finding school applications beyond instruction and learning, as described by an outreach teacher:

We use Google Hangouts for our emergency preparedness, so if there's a fire drill or lock-down or a shelter in place, all of us teachers grab our phones and then we would start a Google Hangout. Basically it's text, not video, but saying who we have and where we are and that we're safe. (Outreach teacher)

Perhaps the most important reason for choosing Google is the cost. As Google states in its own promotional material, “Google Classroom is free for schools. Best-in-class security is also included at no additional cost” (Google for Education). As Google tools become more commonly used in the out-of-school lives of teachers and students, the increasing exposure to and competence with these tools impels ever greater use. Finally, the low cost of Chromebooks, with data storage in the Google Cloud, allows such devices to easily be shared, maintained and supported, with significant reductions in technical support demands.

Google's Chromebooks have been deemed by many of our participants to be increasingly useful, while costing less than competitive products. One noted that

We have Chromebooks and we have laptops. We don't use the laptops anymore—ever. They're just older. When we got the first generation of Chromebooks, we hated those. Now we've got a generation of Chromebooks that are touchscreen and they are the first thing we go to. (Outreach teacher)

A number of teachers referred to the demise of the dedicated computer lab (see the “School Access” section). While it can be seen as easier and less disruptive to roll in a cart of Chromebooks than to shepherd a class of students down to a scheduled lab, this decision is not always made in consultation with those affected by the change.

So we use Chromebooks—primarily the choice our administration has made. We used to have four stand-alone computer labs. And that seems to have gone the way of the dodo bird, and our administration feels that Chromebooks are the way of the future. Whether students agree or not [is another] matter. (High school teacher)

Marshall McLuhan (1988) argued that every medium comes with both new solutions and new problems. One of many challenges is being able to rationalize the business motivation of Google and its “free” products. One Google motivation might be the ability to harvest data from millions of school users. Google, like many other educational technology suppliers, has pledged not to sell or share student information with external advertisers (see <https://studentprivacypledge.org/>). However, they are constantly monitoring user behaviour to improve the product, which may also help them gain greater understanding of teacher and student behaviours. As well, the competence with Google tools, gained by both students and teachers, spills into use in out-of-school applications, thus expanding the market for Google's commercial enterprises into a new generation of Google product consumers.

The culture of Alberta schools is changing to the point where most of this study's participants readily accept the increasing use of “free” products such as Google for Education as the new norm. These tools have the advantages of cost, communications efficacy and even pedagogical usefulness. However, they also could give rise to what Zuboff (2015) refers to as “surveillance capitalism”—the use of data gathered through extraction and analysis to create products that are then sold to generate profit.

Perhaps it is time to thoroughly study the implications for schools and for society of use of these “free” products. The future will likely reveal other non-Google products competing for use in Alberta schools. However, none of these systems has enjoyed the extended use and powerful interconnectivity of the current suite of Google for Education applications; therefore, caution and ongoing study and critical review by parents, schools and governments are warranted.

Social Media

Social media has become central to communications and permeates the lives of teachers, students and parents. While providing an avenue for news distribution, social activism, shopping and much more, social media also presents new challenges. It affects our privacy and our ability to manage

time. It also increases our capacity to disrupt (either intentionally or inadvertently) the lives of others. Therefore, there is a need for each of us to develop ways to manage this resource effectively.

Many Alberta schools maintain popular social media accounts, but these seem mostly used for promotions and administrative announcements, as opposed to instructional activity. Parameters around social media use appear to be key. In particular, the role of social media in teacher–student communication requires critical thought and attention. One elementary/junior high teacher observed that “You need that separation. I’ve had plenty of kids try to add me to [their social media platform] and I just declined them and then explained, ‘I’m your teacher. I’m sorry I can’t do this’ ... and they’re usually okay with that.”

Only one participant used a common social media platform to connect directly with students. He used it to coordinate school trips and other activities associated with his music program. While he valued the platform as a mode of communication, he stressed the need for setting ground rules for appropriate use:

I have a dedicated [social media] site for my music program. It’s a closed group. We had a set of guidelines that were set out at the beginning of all this. ... I was one of the first few teachers in the district to actually open up a [social media] account for the students. [This platform] has facilitated communication to alumnus and to parents. You get a good response and people are able to share. But I moderate it, and that’s where the rules apply. (High school teacher)

Some schools attempt to reduce distraction and misuse potential for students by blocking selected Internet sites on the school’s Wi-Fi network. However, one teacher noted that they were not interested in policing their students and added that the use of data plans by many students means that access is still possible, despite Wi-Fi blocking. Over and over again, participants stated that their task was to help students learn to use media effectively, to learn to control distraction and to use the media in ways that are socially appropriate and useful.

Teachers are also very cognizant of the need to help students (and their parents) to acquire the literacy skills necessary to be able to use these media effectively and safely. One commented

Well, that’s a tough fight because [some of] our parents are very active on social media. But there are a lot that probably don’t even have the access. I mean, one of the things that I would love to do is to have a social media night with parents. “These are the apps you need to be watching for—that you need to be checking [on] your child. And you need to have your child’s password.” They need to make sure that they’re not putting themselves into any danger. (Elementary school teacher)

Despite the growing number of concerns with commercial social media and the misuse of our personal data by some of these services, these platforms hold the capacity to build and support communities, families and networks of like-minded citizens. Some participants noted ways in which their schools are

exploring more secure types of social media to enable both students and teachers to share their work, announcements, assignments and media projects among a private group of students and their parents.

One teacher described an educational social media program:

[This social media product] is brand new to our school this year. The students and the parents have accounts that are created. We can post stuff to the kids through a student journal. Or we can take pictures of their work and send it to parents or we can send it to the whole class and parents can go on and “like” it. So it’s kind of like Facebook but kind of not ... For homework, agenda books have gone by the wayside. We all have homework on the [white] board at the end of the day so a teacher just has to take a picture of it through the app—it uploads and all the parents see it. (Elementary/junior high school teacher)

Another participant related her efforts to introduce a private social network to her school:

I had to give a case to my principal to use that particular app. She did some research and I did some research, and we went back and forth for months. She was concerned about the implications in terms of privacy and all that. But this is an app that is used across North America, and so I felt that once she saw the potential use she was more comfortable. However, she did consult with the people at school district level. We did write up a separate kind of policy that parents have to sign. But now our whole school uses [this platform]. (Elementary school teacher)

As this anecdote suggests, obtaining permission to use any new application is the first step in implementation. However, the ongoing support for such a platform is also key, as this teacher had to support the educational use of the application: “I was the [social media platform] ambassador for our school. I took over 30 hours of training. My role was to be the trouble-shooter for the school ... I did a lot on site to help” (Elementary school teacher).

The place of social media platforms in schools needs to be carefully considered, because such platforms have implications in terms of privacy (see www.equalityproject.org), distraction, commercial exploitation and teacher workload. At the same time, participants clearly underscored the valuable potential of such platforms to support communication with students and parents.

TECHNOLOGY SUPPORT

This section is an overview of teachers’ comments regarding the support they have for the digital technology used in their schools. The ATA’s 2011 study found that access to technology support was an issue for many Alberta teachers. Access to functioning hardware is but one component of effective educational technology; the way the technology is used is equally important. An outreach teacher explains, “So when someone says there’s too much technology, I inquire what technology they’re using and if they are using it appropriately. So I would never say there’s too much or too little. I’d want to know how they are using it.”

District-Level Support

Digital technologies are complicated and require (to varying degrees) technical support from users, but also from technicians and occasionally from programmers. All of the study's participants received centralized district-level technical support. These services are becoming more formalized with the use of service tickets that manage the time and resources available for support tasks. This means that teachers and school administrators often must submit formal requests and wait for a technician to be dispatched from a central location. In addition, some districts schedule regular school visits by technical staff. In some rural regions, visits from technical support staff are less frequent, though many districts are equipping their hardware with the capacity for remote diagnosis and control of classroom computers. In general, respondents reported being reasonably satisfied with the central support they experience in relation to hardware issues.

Effective use of educational technologies, however, requires more than support for the hardware. Given the rapid change and availability of new educational software, there is also a need for professional development:

We have all this technology but we need somebody to show us how we can use that technology in our teaching. So for me, what I try to do is say, "How can I use this technology? What is in my curriculum that allows me to use that and bring that in?" (High school teacher)

This need for pedagogical support is being met by a variety of responses.

Some districts employ a specialist teacher or consultant who travels to local schools providing inservice training and helping teachers resolve pedagogical challenges. This person conducts research on various programs, makes suggestions or tests various technology solutions. One elementary/junior high teacher explained that

There [are] a few people who are not teaching who will find materials for teachers. We don't have many because our district is small, but there are people who can keep their pulse on that sort of stuff. If something pops up or we say, "Hey, can you find something like this?" Then they are there to help.

Another teacher described the role:

We have a "lead tech" teacher. He's a former classroom teacher. He's out once a month and you could book a time with him and say to him, "I want to do a project on the rainforest. Help me out." ... I also asked him about podcasting through Google rather than using an iPad. You know, what tools can I use for that? So I give [him] a heads up, he'll research [it] and then when he comes to school I meet with him for 45 minutes. And then he can show me what he's got. (Elementary school teacher)

As can be expected, the quality of service provided by these districtwide specialists varies considerably by the size of the district, other work demands and individual skill sets. The researchers observed that those central support specialists who roll out a prescribed set of professional development events were held in less regard than those who were able to directly respond to the day-to-day concerns of classroom teachers.

Perhaps the most effective central/local model observed appeared in jurisdictions that employed one district “tech lead” who coordinated a network or community of practice for school-based tech leads. This community met regularly, face to face and/or via web conferencing. They supported each other by sharing challenges, successes, emergent needs, and other technological and pedagogical concerns and collaborative solutions (see “Professional Growth” section).

School-Based Pedagogical Support

Participants reported that some schools appoint a teacher to serve as a technology leader. This role varies considerably depending upon the time allocated to this person, the skill set they are able to share and the requirements of teachers. People in this role can sometimes be exploited because the lead teacher can be asked to service and troubleshoot machines, software applications and networks.

Participant comments on this matter are as follows:

When our division first started a push with technologies in the classroom, I had an 80-minute prep every day to look at these technologies and then to teach other teachers ... Teachers knew that I had a prep at this time and so they would say, “You know what, I’d like to try this in my classroom.” So I would go and look at this and say, “OK, this is what we can do with that.” Then I would present it to them. Then I would be there in the classroom with them as they present the lesson. If there were any difficulties, then I was there, as the other person, to help them out ... Now I don’t get any release time. Now, it’s if they see me in the hallway, “I have this issue—can you help me with it?” (High school teacher)

I am no longer the lead tech. There is always someone in the school that takes that on. Thankfully it is not me ... I used to be known as “that guy” but I try to hide that so I don’t end up with “Hey, can you come fix this, can you fix that?” (Junior high school teacher)

Last year we had a Google summit, and we learned all these things that would be awesome in my classroom! But there’s been no sustainability of what we’ve learned ... when you get in your classroom and start to do things, you start to forget those things. For example, a teacher will start doing a mapping assignment. “I learned something about Google mapping at the summit. How do I do that?” Then it’s, “Hey [name] how did we do this?” “Well I’d love to help you but I’m in class right now.” (High school teacher)

I’m supposed to be the tech lead in my school. So I constantly get students and teachers coming to me for tech [help]. That’s not really what the role is supposed to be. But I get a lot of

teachers coming to fix their devices. But it's not my job ... Last year, I was given one period a week for "tech," and this year they didn't give me any, because they needed me to teach more. That doesn't stop people from coming to me, though. I'm a pretty helpful person so I don't turn them away. (High school teacher)

Each school has a learning coach. We can send them stuff, and she's got specific time where she will look for these materials ... So usually that's where it goes first. If it goes anywhere else from there, there's a learning coach team that will get together because there's one coach from each school. I think they meet maybe once a month just to chat about [current issues]. (Middle school teacher)

Certainly, the opportunity to learn and to assist colleagues can be a career enhancement and even be enjoyable for some teachers. However, school and district leaders must take care not to exploit or to "burn out" these valuable members of staff. While most of the classroom teachers seemed willing to share expertise with other staff, there was also a sense that they often not given the time, support and recognition for their contribution. This was less of a concern in the online and blended worlds, where the time spent developing course materials was considered an essential part of their work.

PROFESSIONAL GROWTH

Because of the rapid changes in new technology and the need to comprehend how these changes can be both understood and utilized, teachers are in continual need of growth opportunities, collaboration with colleagues and mechanisms to share resources. Participants shared a number of approaches for keeping up with constant changes in the use of technology.

Communities of Practice

Outreach and fully online teachers sometimes have the flexibility to work from home, though usually they are required to spend at least part of each week in their school workplace. As expected, some participants referred to advantages of the home office, including reductions in travel time and freedom from distraction. At the same time, some noted the collegial advantages of working from a school-based office:

So at my school we have actually four teachers that work in the same room. So we have a lot of face-to-face time that we can bounce ideas off of or check things or test an app. So that's really helpful. (Online teacher)

Teachers from smaller outreach schools often do not have the access to a site-based community of colleagues for professional support. However, many teachers also know how to use online networking opportunities. For example, one teacher said,

So someone will pop online or send a message, "My student is struggling with this. Does anyone have an idea what's going on?" And that's a really great way to all of a sudden say,

“Hey, I have a student struggling with the same thing. Let’s check if it’s a system error or something like that.” So it’s not automated, it’s not very slick, but it works. (Online teacher)

With all of the participants experiencing frustration when digital technology does not work as expected, one teacher’s advice might be valuable:

We have a 10-minute rule. If you can’t figure something in 10 minutes, ask! That’s a really important rule for everyone. You can spend hours beating your head not solving a thing and someone else can say. “Oh yeah, I saw that problem last week and here’s what you do.” (Online teacher)

Participants’ responses indicated that, in an era of digital teaching and learning, many of the traditional venues for teacher development and support (notably teachers’ convention, specialty councils and informal help in staff room or school meetings) are still relevant. Moreover, these traditional opportunities are being supplemented by inservices and specialty workshops, both online and face to face.

Professional Development

The participants in this study had concerns and comments about their own professional development and growth opportunities. All teachers attend an annual teachers’ convention, and most of the sample found the learning offered at the convention beneficial. Participants also valued the networking opportunities and realized that teachers’ convention is but one of many face-to-face and online professional growth opportunities. Related comments include the following:

I’m going to HPEC [Health Physical Education Council] and I won’t even be able to fit in in all the sessions I want to do. Because there are just so many good ones ... I think [teachers’ convention] is for everyone rather than people who specialize. But it seems like with this HPEC conference there’s going to be some digital things anyway, which seem to be somewhat interesting. (Elementary/junior high school teacher)

I have no problem going to professional development outside of my budget. I went to a nerd camp a couple of summers ago and it was fabulous. It was probably one of the best professional developments I’ve ever had. (Elementary school teacher)

So my feeling about convention has changed over the years ... I still go to the sessions, but I don’t go with the same purpose in mind. I go for the networking. I am with people and talk about teacher things because sometimes you don’t have time to have conversations about the work. (Elementary school teacher)

Most of the teachers interviewed also attended specialty professional development conferences or seminars such as those sponsored by organizations such as Association specialist councils or BlendED. Fully online and blended teachers expressed the potential to enhance the annual teachers’

convention by expanding its focus to attend more deliberately to alternate learning environments. One rural outreach teacher commented, “We’re pretty selective in our [professional development] so we have some Google experts and then we go to BlendED—a good chunk of us every year simply because so many conferences are classroom based.”

Some participants are given the opportunity learn about vendor products through sponsored workshops or online certification programs. One secondary school teacher remarked, “The big thing in our division is just Chromebooks and Google applications. And they offer teachers [opportunities] to get certified.”

Of interest is the model that some software vendors use to train and expose teachers to their products. Rather than expend funds on trainers or professional development experts, they focus on developing curriculum for professional development sessions. Then the school (or the division) hires or assigns trainers to facilitate or teach these sessions. This becomes a very cost-effective customer training model for the software company, as most of the costs are borne by the schools.

Some of the outreach and distance education teachers mentioned that the demands of online teaching have helped them as teachers and as digitally literate professionals. One fully online teacher recounts their learning:

When I started here I was a hands-on, very organic teacher ... Letting my students discover stuff. And you can't do that at a distance. So I had to learn how to do stuff using technology. This has probably been the best [professional development] that I have ever had being here and learning all the different ways to contact kids. all the different ways that I can communicate with students ... I had to learn a lot of new stuff. So my professional growth plan last year was actually to master new technologies. (Online junior high teacher)

Whether engaging in professional learning on their own or with colleagues, there was a clear desire for continued and more specialized professional development opportunities.

Resource Sharing

Unlike the days when teachers based their courses on textbooks, teachers now have many alternatives that can be used to supplement or replace print material. Many teacher-made materials are digital and can potentially be shared, remixed and augmented to create new resources and full courses that are adapted for local contexts. However, participants noted that sharing is not always easy due to copyright or jurisdictional issues. An online teacher said, “We’ve produced a ton of stuff for courses ... I would love to share this. Right now we’re in limbo.”

This issue speaks to the challenges associated with sharing of resources among public educational institutions. There have been many attempts and some success developing open educational resources (OER) repositories in postsecondary systems, (see, for example, the Merlot.org collection).

Yet there are many cultural, copyright, economic and personal barriers to overcome to support the development of an “open” educational context (Weller et al 2015).

Participants referred to a promising initiative, Alberta Moodle Hub (<http://hub.rockyview.ab.ca/>). Most of the 24 school districts involved in the initiative use the Moodle learning management system that allows for relatively simple upload and download of Moodle courses, which can be customized to meet local needs or supplemented as necessary. Other learning management systems seem to support the import and export of full courses as well; however, in practice, many systems have trouble importing content designed in competitor programs. Yet, one participant was able to download a Moodle course from the Hub and then reformat it for delivery in another system:

While we create our own courses, we are a part of the Moodle Hub out of Rocky View. When you create a course you upload it to the Hub and then you can pull off anyone else’s courses. For example, my English 30-1 course is a mix of LearnAlberta content, Moodle and other stuff. I downloaded two other courses from other teachers that they created and made a “Frankenstein” of all my favourite stuff and then just work through it with students and test and modify them. There’s still a lot of content creation but there’s also a lot of finding great resources and adapting them. (Outreach/online teacher)

This teacher also noted how his school division (and he, as an individual teacher) is committed to OER sharing:

We’ve gone a long way to mak[e] sure our practices [are to] share everything regardless of what you get back. We push for OER and really dedicate what we’re doing in terms of helping all students, even if they’re not in our school or district . . . We do go to conferences and we find people who say “Well, I spent 400 hours. Why would I share?” And our responses are always, “You could have spent 40 hours!” If you share, someone else will share. (Outreach/online teacher)

Another outreach teacher described their approach to acquiring resources: “We don’t pay; we try not to pay for resources. We find resources that are open and shared and free. That is our goal.”

Open use demands knowledge of copyright issues and, especially, the need for teachers, school divisions, governments and other copyright owners to properly license their materials (likely using Creative Commons licences) and to honour the terms of these licenses.

SECURITY/PRIVACY AND SURVEILLANCE

As noted earlier, use of digital technologies creates traces of the users’ activities. These traces are being used commercially to customize advertisements, to track consumer behaviour and, most recently, to influence political behaviour. These traces have been used by employers to monitor and assess employees’ behaviours (Chory, Vela and Avtgis 2016). In education, the traces have been used to allow teachers to monitor and intervene in student work in a new field known as *learning analytics*. Learning analytics was

defined by Society for Learning Analytics Research (SoLAR) as “the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs” (Siemens 2011). There are potential benefits, because teachers are provided with insight into student behaviours. However, there is, as Wittmann (2018) notes, the potential for promotion and creation of a surveillance society in which the actions of both teachers and students can potentially be used for forms of “maladministration.”

The technologies themselves also allow direct communications between and among students, parents and teachers. These communications can be abusive and harmful, or supportive and encouraging. Thus, researchers were interested in hearing the concerns of teachers relating to monitoring of both themselves and their students.

The sample reported a low number of incidents of inappropriate use of digital technology. Of course, most had heard about cyberbullying, the dangers of password swapping and other forms of digital misbehaviour, but most had very limited or no direct experience of these problems. An elementary teacher describes her approach to dealing with inappropriate student digital behaviour:

With kids [I say], “This is a school e-mail [account].” I have had issues with kids sending nasty e-mails. I have logged into their account and seen them. I think it is my job to teach kids about being safe on the Internet ... I also think that if two kids were having that conversation out loud at recess and I heard about it, it is my duty to do [something] whether it is on the Internet or the playground. (Elementary teacher)

The traces of student–teacher and teacher–parent communication are useful for teachers working with large numbers of students—and especially in fully online contexts where the communication may not include any face-to-face interactions. One online teacher describes the benefits of her searchable archive of e-mail communications:

Every communication that we have with the student, we log, whether it’s just a welcome e-mail or math help or anything. I have close to 180 students right now, so it’s hard to keep them all in my mind because I don’t see them. And sometimes I only have one or two questions from one student and [from] another six or seven a day. So we log everything so that I can go check. I can actually talk to their school-based facilitator or I could talk to their parents. And it’s all documented and logged on top of that. In my course, if you have a submission it gets logged in. All their marks and all their comments get logged into a system so they are able to see it in a grade book. (Online junior high teacher)

Another online teacher notes

For example, when a parent comes and says “This has happened to my student,” and we can pull up record after record after record, “Here’s every interaction I had with your child.” It is either recorded as video or is preserved in my e-mails. “Here’s their logins, every assignment I’ve ever

marked from them and all my feedback.” So as long as you remain above board you have nothing to worry about. The tracking is more help than anything. (Online/outreach teacher)

All of the teachers in our study use a school-issued e-mail system for work-related communications. They are aware that their online behaviours can be tracked. However, none of the participants said that they were particularly concerned about this monitoring of personal communications. They expect only reasonable use of tracing. One teacher said, “I don't feel that they monitor it—although it's there. They can monitor it. I don't feel that they do.” Another teacher remarked

I'm a teacher that's really big on accountability. So I think that any administration should have the right to go in and look at and see it what I'm doing ... But at the same time I don't feel that they do that. I don't feel that that they're looking ... it's all very student centred. (Online teacher)

Some teachers do, however, feel the pressure of maintaining online student records, test and assignment deadlines and rubrics, and other administrative components of education. In the past, this was usually confined to maintaining paper records that could be accessed by school and district administration. However, increasingly, teachers are being asked to maintain homework systems, social media and announcements in systems that are accessible by administrators, students and their parents. While this type of teacher–parent–student communication can be very useful, it raises the issue of dependence on the media such that those who cannot or do not wish to access digital media can be excluded.

As reported in the section on Google-ization, the use of cloud document storage has become common in Alberta schools. These services increase the risk of sensitive or potentially harmful content becoming more publicly accessible than planned or desired by either students or teachers. One classroom teacher states

One of the concerns we've talked about as English teachers [is] when they are using Google Docs, if a student puts something pretty sensitive in there, I think that would be a concern. Even though Google Education is supposed to have more privacy ... I think it's still a concern if it's on Google [because] it's on an American [server]. (Outreach teacher)

Some participants were beginning to use more sophisticated learning analytics tools in the classroom. As an example, a teacher describes their use of an analytics program that provides a teacher dashboard for monitoring student progress:

The kids found out rather quickly that they have to do everything that's required of them before they can move on. If they try to move on then I get a little flag that pops up on my dashboard that says this student hasn't done this yet. So that's been quite beneficial. (High school teacher)

The above quotes indicate cautious optimism from most of our participants about the potential to enhance the teacher and learner experience. They also indicated awareness, but not great concern, related to the capacity for administrative surveillance. Both students and teachers seem to be gaining in awareness and confidence with digital technologies.

FIRST NATIONS, MÉTIS AND INUIT CONSIDERATIONS

First Nations, Métis and Inuit students are studying in almost every Alberta school and thus are engaged in using digital technologies. Two participants in this study were teaching in schools that have a student population with over 95 per cent Indigenous students—one was in a public school serving a First Nation reserve and the other was delivering online education across a wide geographic area. Some other participants also noted having small numbers of First Nations students in their classrooms.

Many of the quotes that follow are from a single voice. This participant had a great deal of first-hand experience and was articulate about some of the concerns in the area in which she worked. As she emphasizes, the challenges and successes in one community may be vastly different from those of another: “Wherever you are teaching [it is] extremely important [to get to know the culture] because every community is different the way they do things” (Outreach teacher).

Although urban populations are increasing, most First Nations students live in smaller rural or suburban locations (Statistics Canada 2016). Low student numbers and semi-isolated locations challenge the capacity of governments, community leaders and parents to provide the full range of educational services. Thus, there has been and continues to be an interest in using digital technologies to deliver or enhance educational programming in these communities. A northern outreach teacher said, “The biggest reason for the program is to catch those students where there were no high schools in the communities—to keep them within their communities.”

Distance education, based on the first generation of printed study materials, has been used in small First Nations communities for decades, often with high rates of noncompletion. Teachers now are presented with additional mediated delivery technologies.

Engagement [involves] trying to find the right mix. As I said, video works great but you can't use video for everything. So it's trying to find the right mix of video and audio and print to engage them and to keep them going. I find they are very shy when it comes to asking questions. So I really have to prod them. Sometimes it's quite difficult—you know, I'm a hundred miles away ... It's not that easy. (Outreach teacher)

A few teachers in schools with only minority numbers of First Nations or Métis students mentioned challenges communicating with parents who often live in more remote communities. In these areas, Internet can be more expensive and less accessible than in urban locations. This becomes particularly challenging if schools implement homework programs, parent/student/teacher social media or report cards using online media. Further, the opportunity for teachers to assign or expect students to be able to complete assignments using technologies is often compromised.

The dedication and commitment of teachers who were working with First Nations and Métis students was evident. An increasing number of teachers come from Indigenous communities; some have graduated from programs such as the Aboriginal Teacher Education program at the University of

Alberta. Their dedication is expressed by their willingness to make connections with communities and make themselves available for students:

After spring break we're going to have a poetry tea. Invite parents in ... We're [also] writing a grant to purchase books so every child can take a book home for the summer, and we'll get the parents to come in and help them choose the book with their child. (Elementary school teacher)

Oh, I don't get much of a holiday because I run it 12 months out of the year. I'm always available for them and usually it drops off considerably in the summer, of course. There are still a handful of students that still want help. (Outreach teacher)

You're not in a position where you can say, "Do this work at home" or "Have your parents look at this"—you just couldn't do that. They're basically restricted to what they can do on site during school hours. (Outreach teacher)

Although the sample of teachers serving Indigenous communities was small, we recognize the commitment that teachers in our sample showed to working with Indigenous leaders, parents and students.

PEDAGOGY AND TECHNOLOGY

Teachers have been dealing with various forms of new technology since the creation of formal schooling. The printing press, the blackboard, spirit duplicators, film projectors, overhead projectors, portable calculators, interactive white boards—the list goes on ad infinitum. We can imagine a time when some teachers may have asked, "What happens when every student has their own textbook? They won't need teachers any more!" We know many said, "Using calculators will ruin mathematics education!" However, progressive educators have always taken each new form of media and found a way to include it in their pedagogical practice. As McLuhan (1957) stated, "The educational task is not only to provide basic tools of perception, but to develop judgment and discrimination with ordinary social experience." If "new" media exist and are being encountered by our students, it is incumbent upon teachers to find ways to help students negotiate the boundaries around them.

Many teachers (and students)—who encounter these media in their day-to-day lives—are also looking for ways to use the latest technology for educational purposes. The question is, with the speed of introduction and change, how can any individual teacher stay on top of both the technology and its associated educational issues and practices? There are many things to be learned from those educators who are applying and evaluating digital technology in their daily practice.

Lessons from "Alternative" Schools

In many of the so-called "alternative" educational settings represented in this study, teachers have been given the time to develop and field test both fully online and blended courses that incorporate

various kinds of digital media. The criteria for choosing any media, traditional or digital, seem to be based on whether it works for their students. Some schools continue to use textbooks and paper assignments because those media continue to enhance student progress, while other schools have eliminated paper altogether. To create and evaluate resources, many of the schools in this study take a collaborative approach to course development. The collaborative approach works “as long as you have people throughout the process, from the bottom to the top, who are looking at it as, ‘let’s make things better’ instead of, ‘let’s make things easier [administratively]’” (Outreach/online teacher).

Programs and courses created in these schools are sometimes called hybrid or, more amusingly, Frankensteined. They have one thing in common: they are put together by incorporating, augmenting and modifying existing open courseware to increase student flexibility, engagement, understanding and, importantly, course completion.

Many of our participants said that they would take what they learned while working in these technology-rich environments back into other educational environments:

I always think when I go back or if I go back—definitely I like the idea of having independent learners and not having them dependent on me for every little piece. I would probably bring back a lot of this hybrid kind of concept and having them working at their own pace and where they are. [However] the nice thing about having them [in a classroom] is I can catch them right when they need that support, right? (Outreach teacher)

When I came here from traditional school, I had no clue how much you could do with technology and my learning curve was huge. I learned everything! I wanted to be on top of it and I was like, “This is amazing!” If, or when, I do go back to a brick-and-mortar school, that will be something that I will bring with me. (Online teacher)

[Online programing] enables students to work at their own pace. A lot of students need extra time for things but there [are] still a lot that don’t. Some of the technology allows students to be independent while you are working with each different kind of group of kids. So even kids that don’t need extra time still need attention. It’s a way that students can be working on something and you’re meeting the needs of the other ones. (Outreach/online teacher)

There is much to be learned from the teachers who are involved in educating those who, for whatever reason, choose a non-classroom delivery method. These teachers have developed pedagogical approaches that can help all students. One online teacher suggests having a “pilot to have teachers that are interested in new technologies shadow someone that works in distance education.”

To learn from the alternative educators, we may first have to learn more about their educational contexts. An outreach school teacher expressed his frustration with some misperceptions in regard to blended and online teaching:

So one of the things with teaching online, a really difficult thing we've had to overcome is people not seeing it as teaching. So whether that's, "How did you get that job? That sounds great!" or "Wow, this job is killing me, I should transfer to a job like that!" Or "Do you guys have to have the same education?" Or, "Do you have to do all the marking and the planning that I have to do?" ... So we really try to educate everyone we come across. But you know we don't come across enough people to really show [what we do]. (Outreach/online teacher)

Lessons from the Classroom

All of the classroom-based participants are using digital technologies daily in their classrooms. Many were experimenting with new applications on a regular basis and sharing what they learn with others. For others, digital technology is part of the culture of the school. Other teachers have a tendency to wait until someone else field-tests a new program before using with their students: "I would consider myself somewhat of a resistor. I have to be very convinced that it actually is beneficial and that it is not just using it just for the sake of using it" (Elementary teacher).

The same teacher who describes herself as a "resistor" is having her students submit responses to math problems in video format, collaborate through shared documents, create artistic presentations with Chromebooks and engage in inquiry projects online. At the same time, she sees the importance of using low-tech pedagogy:

We also teach our kids how to get books ... kids like to go search for the nonfiction books. They like going to the library; it's not a struggle to get them reading ... It's also okay not to use [technology]. Kids know how to use computers. Even if you are not using all of the technology, your kids are still going to be able to learn ... They need to concentrate on social skills. They need to know how to say please and thank you and things like that. And fine motor. I have kids that don't know how to cut or tie ... at the Grade 5 level! (Elementary teacher)

Classroom teachers and outreach teachers who see their students in person have the option of continuing to use print resources and low-tech hands-on learning methods with their students. Nearly all of our participants felt free to exercise their professional judgment with regard to choice of learning tools and activities. They use teaching and learning methods based on teaching style, use of instructional time and the needs of students. The exception to this was the use of districtwide systems such as gradebooks and learning management systems that some teachers are required to use. Not all of the participants in the study sample were happy to comply with this single-system approach. Some mentioned that the systems they were required to use were either too time consuming or restrictive.

One of the advantages of the classroom, where daily attendance is the norm, is the capacity for group hands-on experiences and projects. Here is how two outreach teachers try to engage students in similar experiences:

We don't do a lot of experiments. So we either use a video. In [Chemistry] 30 we'll use a video of a titration. That is one disadvantage of being an outreach school. But for, say, the voltaic cell, we will we have that equipment and you do a one-on-one, side-by-side with that student. Like some of the dissections ... We'll do that as a whole school! "OK we're having an eyeball dissection day." And anybody that wants to can do that. We use the experiments more as a fun kind of thing to do. (Outreach teacher)

I typically will see my students once a week, because most of them are working on print booklets ... I also run labs. So a lot of my students will come in once every two weeks to do a lab. So between the handing and assignments and the labs and then the other contact I have with them is through texting [using the Remind app]. And Science 30s, I'll bring them all together [on a weekday] evening and do labs. And in workshops, like robotics, they're working together—they like that face-to-face collaboration. Not all of them, but they don't mind it if it's a small group of eight people. If I have small groups, they like the collaboration and will do a little bit on Google Docs or something like that. (Outreach teacher)

Whether participants were classroom, online or blended program teachers, many indicated that they were trying to "blend" the pedagogies of both the online and face-to-face ecosystems. Further, many show a willingness to adapt, experiment, hybridize, personalize and take pedagogical risks—all in the interests of improving the educational experiences of their students.

ACCESS TO DIGITAL TECHNOLOGIES

In the Alberta 2018 context, it is easy to assume that all have easy access to computers and Internet. The study respondents tell of unprecedented access to powerful learning technologies, but also challenge the assumption that everyone has equal access to these technologies.

School Access

As devices become more portable, more powerful, more functional and more personal, the need for centralized computer labs has decreased. A teacher from a large urban high school noted

We've got three full labs of PCs. Two are dedicated labs to CTS. And then one is saved as an open lab situation for other classes to book in. Our learning commons area has approximately 40 PCs available for students to use and sometimes classes are booked in there. With our recent evergreen [funding] we did have a fourth computer lab but we converted that over into a regular classroom space. And we have about 100 mini laptop computers that are on class size carts so that you can take the technology to the classroom.

Only one participant taught in a school that had participated in Alberta Education's Emerge One-To-One computer trials (Alberta Education 2010). This elementary school had expanded the earlier one-to-one trial to have the whole school operate in a one-child-to-one-computer context. Unlike

the computer lab or the laptop cart model, this school had students purchase or lease a device (mostly Chromebooks) for the entire year. These machines went home with the students and provided a consistent platform for student creation and communication. As the Emerge final report noted, the one-to-one model has many advantages, but also introduces maintenance and equity challenges. Maintaining the many school-owned machines poses a challenge for school- or district-based technical support, which has been reported to avoid supporting student-owned machines. This can lead to yet more technical support issues for teachers.

In many schools, student ownership of a smartphone is becoming ubiquitous and, as these become more useful for educational applications, will likely accelerate the trend toward student-owned personal computers, thus reducing the need for both computer labs and carts.

Nonetheless, computer labs are still—and in some cases must be—used in technology classes to support the high-end, industry-standard software used for some Career and Technology Studies (CTS) programs. One technology teacher, not being able to obtain the necessary hardware, had switched to using newer, cloud-based technical programs that were “good enough” and could run on student-owned hardware. Another CTS teacher worked with school and parent-group budgets to ensure that higher-end equipment would be available. A teacher in a “one-to-one” school explains

I had to get some help from parent council to get some new desktops. These programs can't work on what students bring in and what the curriculum asks us to cover for certain courses. I said to my [administrator], “I can't teach these tech options any more, so you'll have to find me something else.” That was jarring to them. So I got the 10 desktops in my room now with the programs that I need to run the Com Tech program.

Access to software at school is as necessary as access to hardware. Some participants observed increasing problems in accessing the thousands of educational resources licensed and aggregated under Alberta Education's LearnAlberta.ca repository. One online teacher commented

I try [to] avoid Flash now ... and a lot of the stuff on LearnAlberta is Flash based so you can only use it on certain computers at our building and it's really picky. That is one thing that drives me nuts—the stuff on LearnAlberta. There's a lot of good stuff but now it's becoming inaccessible. (Outreach teacher)

An online teacher also noted that the perceived barrier to password-protected sites (eg, LearnAlberta) limits home use by students and parents. As well, commercial software licences are quite costly. Some of our teachers indicated they frequently used certain excellent educational resources that other teachers and students could not access because their districts or schools could not afford or chose not to pay the licensing fees.

Home Access

Participants reported a variety of different contexts within which they make decisions related to expectations for home-based accessibility of digital technology for both students and parents. In schools in more wealthy urban subdivisions, home access is nearly universal. One teacher said, “At this school they all have Internet at home.” In these schools teachers are encouraged (and in at least one case required) to post assignments using either private social media, or specialty school–family communication programs. These systems are designed to encourage parents to follow and support the work of their children in school.

However, most participants could also provide examples of students who—for technical (eg, lack of bandwidth), economic or cultural reasons—could not access computers from home. One online teacher noted that not all parents are comfortable logging into school-based systems:

They can log in using their son[’s] or daughter’s login information to see how many times they [the students] have gone in. But I get a lot of parents not wanting to do that. They call me or they e-mail me instead. (Online teacher)

In a more remote area, an outreach/online teacher stated, “I’m not in a position where I can say, ‘Do this work at home’ or ‘Have your parents look at this or that’ because of access issues ... They’re basically restricted to what they can do on-site, in school hours.”

Another teacher related

Some just don’t have Wi-Fi because they can’t afford it. Some computers are always broken. “The dog ate my homework—my computer’s down.” And maybe 10 per cent don’t have phones ... Or their phone is smashed and not working. Every kid has a smashed phone. (Outreach teacher)

Thus, home access still creates challenges for homework assignments. Teachers attempt to alleviate this challenge through a variety of methods, including not assigning any homework.

Access at home is, of course, mandatory for fully online students. Students and their parents who enrol in online programs generally accept that they must have home access, and problems are often limited only to issues of access to resources (such as Flash-based programs, as noted earlier) and to specialized software. Some participants also noted that many outreach centres provide student access and blended solutions for working through fully online courses. Access to both machines and occasional face-to-face teacher support at the outreach school can work very well, but is, of course, restricted to those in close proximity to the school.

Constant Technological Change

Several participants described the challenges they face when the technology changes. Such change can make current and often successful teaching solutions no longer functional.

The costs of changing technology are both economic and social. Continuously outfitting schools with current digital technologies consumes school resources. (One music teacher observed that it is much harder to get money for a tuba than for a set of Chromebooks.) Socially, new systems tend to require a learning curve investment that time-strapped teachers may be reluctant or unable to expend. Thus, careful school leadership is required to balance the need for continual upgrading and development of promising practices.

Though jurisdictions and individual schools are spending funds on hardware and support systems, Alberta's schools are marked by varying degrees of both school and home access to digital technologies. The teachers interviewed demonstrate remarkable adaptation to the challenges of access in their particular educational ecosystems.

Participants' Advice

Each interview concluded with an invitation for participants to offer any advice for fellow teachers, for school leaders, for teacher preparation institutions and for the Association. As expected by the nature of the work and interests of many of the participants, as well as the focus of the interview questions, much of this advice related to digital technology and its use in schools.

The main themes from these recommendations are reported below. Further, direct quotes from the interviews have been extracted and analyzed according to emergent themes (see Appendix A: Participants' Advice).

TO TEACHERS

The most frequent advice from participants to their teacher-colleagues related to the need to take risks in their exploration of digital technologies. They also provided valuable tips related to how to learn, how and when to ask for help from others (including students), and how to experiment, and a reminder to be aware that learning any new skill or tool usually requires initial effort. They remind their colleagues to note the benefit after competence is reached in order to evaluate the time and energy commitment to using a new educational technology or activities.

For me, technology is really about access to information and even access to a person. Build that relationship. [Don't] be scared to use that technology to supplement your teaching and the learning of your students. (Teacher)

TO SCHOOL LEADERS

Advice from participants for school leaders focused on the need to support teachers and to provide the necessary time for teachers to invest in their own professional exploration and learning. As noted earlier, the level of support provided for the pedagogical application and testing of new tools varies greatly in Alberta schools. While some of these matters might be addressed at the school level, others might be best addressed at district level. Most of the teachers interviewed enjoyed considerable support from leaders in their school. This likely correlates with the high level of engagement using digital technologies in their classrooms.

I have such a great administrator and a really supportive district—that support means a lot ... I think that that's what makes me willing and more adventurous, because it's like, "OK, I've got that support." (Teacher)

TO TEACHER PREPARATION INSTITUTIONS

Participants noted the need for preservice and graduate education programs to expose teachers to new technologies being used and piloted in Alberta schools, as well as to new pedagogies and new ways to assess learning.

I would love to see preservice [education] be able to explore some of these alternative teaching environments. Because, really, these alternative learning environments are what the future is.
(Teacher)

TO THE ALBERTA TEACHERS' ASSOCIATION

Finally, participants were asked for any advice for the Association. The most frequent comment indicated appreciation for professional growth opportunities, especially the specialist councils. The online and outreach teachers also noted the need for the Association to keep a close eye on the different workplace issues that affect teachers in these contexts.

So I think the ATA can support us by being advocates: getting the message out about what we are dealing with ...
being an advocate, being a vocal supporter of what our kids are going through – and also a vocal supporter of how we use technology. (Teacher)

Conclusion

Just as Alberta's classrooms and online teaching environments are complex, so is the topic of using digital technologies within those ecosystems. As with other such qualitative studies, this study has explored this topic by engaging with those who employ and see the effects of digital technology in education. The reader can use the experiences described here to reflect on the use of digital technologies in the classroom, in general and in their own professional practices.

The conversations with such a broad range of Alberta teachers were both enlightening and encouraging. The participants embraced the challenge of incorporating digital technology into their practice, while being cognizant of the many issues surrounding the use of such media. This report foregrounds the voices of practising teachers and should therefore be treated with the respect one would show any professional who is engaged in improving their own practice for the sake of those they serve.

At the same time, the words of the study participants, while representative of many, do not encompass the opinions of all teachers in Alberta. As well, included in this report are only the transcript excerpts that are relevant to the topic of digital technology use in complex educational contexts. Other topics of discussion that arose during the interviews were also relevant to current educational issues and, given this, continued conversation between policy-makers and practising teachers in Alberta concerning on all facets of K–12 education is recommended.

RESEARCH RECOMMENDATIONS

Outlined below are research recommendations that related to the issues and opportunities that emerged from the conversations with Alberta teachers.

First, an overarching recommendation is warranted: that universities, governments and teachers' associations continue to fund the type of research that targets the daily practice of teachers in a variety of teaching and learning ecosystems. The knowledge of working teachers, who are continually field testing and improving pedagogy, is a rich but rarely tapped resource. A deep, qualitative understanding of educational practice can be achieved only by continuing to listen to the voices of those with first-hand knowledge of the complexity of the educational process.

The issues below are evolving and/or of sufficient complexity that the researchers recommend further consideration and study.

Access to Technology

With many students, particularly in Divisions III and IV, owning and using their own devices, and with the costs of technology decreasing, access to technology seems to be improving. Models for one-to-one student-owned educational computing should continue to be piloted and assessed, while ensuring that there be provision for subsidized access as required.

Learning Technology Leaders

The role of teachers who are designated (whether at the district or the school level) to fulfil the role of “learning technology lead” needs to be examined more deeply. These teachers play critical roles in the adoption and effective use of new technologies and pedagogies, yet their contributions and their own professional learning opportunities and challenges are not well understood.

Smartphones

Smartphone use is increasing in Alberta classrooms, but there are a wide variety of acceptable use standards for students. It is unlikely that there will emerge a single and consistent policy for student use in all schools. However, efforts to uncover and promote promising practices and example policy at both school and individual classroom level would help reduce any inappropriate or ineffective use in Alberta classrooms.

Privacy and Security

The use of free and cloud-based educational software raises many questions related to privacy, security and data ownership. A study investigating the broader effects of the use of such digital technology in Alberta classrooms would equip educators with the information they need to make decisions regarding the use of these tools.

Learning analytics programs that monitor and recommend interventions will become more common in Alberta schools. These systems have potential value, especially in large classrooms and online. However, they rely on the type of data that is most easily gathered and not necessarily the most pedagogically important. Further, they nourish opportunities for and a culture of surveillance of both teacher and student activity. Further research is warranted on the pedagogical benefit of these tools as well as the psychological, legal and privacy impact on students and teachers.

Anxiety

An aspect of research particularly important for the connected generation is the investigation of the potential link between the use of digital technology and anxiety. This topic emerged more than a few times in the interviews, leading to more questions than answers about the connection between mental health and technology. Research on this topic would be highly beneficial to practising teachers as well as to educational policy-makers.

Communities of Practice

Communities of practice (COP) that provide both online and in-school support for teachers exploring use of new pedagogies and technologies have proven valuable in other industries and jurisdictions. Yet, nurturing and supporting these COPs over time and distance is challenging. Further research could be done to identify and support COP models that have emerged and are working effectively to support teachers.

Open Educational Resources

The use and distribution of open educational resources (OER) have been shown to be very cost effective at postsecondary level. Research on a pilot project in Alberta postsecondary system demonstrated the effect on OER development in use (see <http://albertaoer.com/about-us>). However, much less is known about OER use in K–12 schools. An active program of action research in which teachers acquire, use, modify and share OER resources promises to reduce textbook costs while allowing teachers opportunity to customize and alter their learning materials in response to local needs.

The MoodleHub supported by Rocky View School District is a promising example of OER distribution. The researchers recommend that a study be commissioned to determine the costs and benefits of this initiative and to explore its use in both classroom and online learning contexts.

K–12 Online and Blended Education

Online and blended teachers engage in unique teaching contexts that can be both educational and stimulating, but can also be isolating. In addition, work intensification issues in these contexts are not clearly understood. The researchers recommended research be undertaken to better understand challenges and their effect on teacher well-being that are associated with teaching in these contexts.

Appendix A: Participants' Advice

TO COLLEAGUES

The most frequent theme related to keeping up with the rapid change in technologies. This should be viewed not as a goal itself, but as a way to enhance learning and relationships with students and, perhaps, to make teaching more enjoyable.

Stay on top of the technology and keep coming up with ways that you can help students buy into learning, how to appropriately use it. (High school teacher)

For me, technology is really about access to information and even access to a person. Build that relationship. [Don't] be scared to use that technology to supplement your teaching and the learning of your students. (Outreach teacher)

I would say jump in with both feet. Because there is so much out there and it's so much fun. (High school teacher)

Many of the participants regularly help both their students and their peers acquire new technology-related skills. In the process, they gain expertise as both users and teachers and share some of their insights below.

"If it works, it works, and if it doesn't, it doesn't!" And I hope that [philosophy] shows the kids that we don't have to be perfect and we'll muddle through it. (Outreach teacher)

How you teach people adaptability skills is to not write down the steps of how to do something. I think that's the biggest thing that people get stuck on ... It's learning function as opposed to steps. (Outreach/online teacher)

You don't have to fully know how to use an app to be able to use it. But I think there's also a misconception that students all know how to use stuff intuitively in the classroom. Sometimes you have to [teach the] skills. (Outreach/online teacher)

It's silly to pretend that you know more than the kids because a lot of the time the kids will know more. The kids can teach you and their peers. And so I think that willingness to say you don't know it [is important]. If you want to pretend you know it all and stay on top, you're going to get stressed out and burnt out because things change so fast. You can't know everything and be on top of everything, right? (Secondary teacher)

It doesn't hurt to try. And I think kids need to see things that fail too. So I don't mind trying anything because I want to see if it might make [things] better. So I'd say experiment and try, and don't be worried about failing because you'll learn from that. (Outreach teacher)

Many participants, especially those who were currently teaching in fully online or blended learning, celebrated the opportunity for their own learning in these milieus. In addition, they often reflected on how their teaching would change if they returned to a classroom setting.

Another thing that is really important to us, and we like to share, is that what we're doing is a really amazing learning experience for a lot of teachers. If someone's taught in the same classroom in the same building for 25 years that 25 years is actually just one year times 25. Would six months trying something different totally change your teaching practice? (Outreach/online teacher)

Despite the advice offered, in the complex classrooms in which Alberta teachers work (both on and offline), making generalizations about best practices is premature. However, examples emerged of adaptations and successes that many of these teachers are enjoying.

Teachers need to know when and where to use [technology] and how often. And that it's a fine balance—it really is. I don't think there is any answer in terms of best practice ... I think it's really dependent upon the nature of your students and the nature of your school board and the complexity of your classes. (High school teacher)

TO SCHOOL LEADERS

Most participants enjoyed positive support from their administrators to engage in innovation. This likely drew them to digital technology use and to volunteer to help with this study.

I have such a great administrator and a really supportive district—that support means a lot. For example, I've committed to do this online PD but now we've got three teachers out of the building today and I'm like, "OK, so it's probably not going to work. I can reschedule." And my administrator right away said, "No I think that's really good. You can do it [the PD] in my office." They're totally supportive. So, you know, I think that that's what makes me willing and more adventurous because it's like, "OK, I've got that support." (Outreach teacher)

However, they also had advice for school leaders.

It's really [inefficient] to reinvent the wheel. So I would go back to that mentorship thing. If we can connect teachers, you're going to avoid a lot of frustration. Identify those individuals that are doing good stuff. Know that they are doing best practices and then take advantage of that because it's going to pay off monstrous dividends. (Online teacher)

Let them try. I mean if they try and incorporate something, it works or it doesn't work. Make sure that young teachers feel like they have the flexibility in their own classrooms to go out on learning and to try something. (Outreach teacher)

As more students take advantage of blended opportunities to enrol in one or more courses, while enrolled full time in a classroom-based program, coordination challenges arise. Leaders may be tempted to establish strict policies that attempt to resolve any issues related to the different schools and jurisdictions that are registering and teaching these blended students. However, as our participant argues below, establishing administrative processes in complex and changing contexts requires equal amounts of good will in order to be successful.

There are many concurrent schools that we work with, so we have different people and different policies. And so there's a bit of a coordination catastrophe that is set to break down at any point. Maybe a catastrophe would mean that we had to formalize the process. But for now the informal setting up of a contact visiting schools whenever possible, and just building relationships has been effective. (Outreach/online teacher)

Teachers, like most citizens, are well aware of the ways in which digital communications can be shared, stored and then used inappropriately or out of context. The fear that some component of a teacher's communication will come back to haunt them and cause administrative concern is real for at least one teacher who commented:

I'm expected to use my school e-mail for the business I conduct at the school but who's not to say that [someone] won't send me something one day that is suggestive? Even if I do get rid of it, I still received it ... So, is there a chance that I'm going to get in trouble for that? ... Would that have breached my contract? (High school teacher)

Finding time to do and to learn what they wish to learn in addition to what is required to be done, is a challenge for all teachers. A teacher suggested that time is like money—it can be spent in small amounts all the time or it can be borrowed or saved and expended all at once.

If I super invest my time at the beginning to learn something, and over my career that gets a lot easier and more efficient. In the end, I'm saving time. (High school teacher)

Another teacher asked

Where is the time? Time is very valuable. We don't have enough of it as teachers to do a really exceptional job. So finding ways to provide time is the biggest thing. That's the biggest issue. You have all these initiatives, and teachers have great ideas. But you don't have any time to really put them all through or fix your assessments or go back and fix assignments. (Secondary teacher)

Support from administrators is critical to innovation and success in digital technology adoption, just as it is in all other educational endeavours.

TO TEACHER PREPARATION INSTITUTIONS

The teachers interviewed had a number of suggestions for institutions that offer teacher education programs. The primary advice was to give preservice teachers an opportunity to experience fully online or blended learning educational contexts so that they are better able to experience learning in alternative formats.

I think that the learning and the growing in the technology field was so tremendous for me that I would love for other teachers to be able to share in that. (Online teacher)

Another online teacher suggested that there should be a distinct route (or at least a full course) devoted to teaching online. Of course, they also recommended that this course should be taught online.

I think mentioning [blended and online education] at the university would be huge. And so we really think just some [programming] along the lines of, "Teaching is changing. Here's what it can look like" ... It's stunning how something like this takes regular teaching skills and applies them; but there's almost a wall. It's so difficult to see how something applies online. And so definitely a course that demonstrated here's how you work with distance and online and here's how you blend in a classroom—I think that would be invaluable at universities. (Outreach/online teacher)

And I don't know if there are new strategies. They are still the same way as they were. It's just a different tool that you're managing, but the behaviour is really similar to what it's always been. I don't know if you really need a specific technology—just managing kids and keeping them engaged in the lesson ... in a lot of ways that really hasn't changed. To be a good teacher you manage your space and environment. (Secondary principal)

I would love to see preservice be able to explore some of these alternative teaching environments. Because really these alternative learning environments are what the future is ... And I don't think that's being recognized because they don't do placements in online schools. I would love to have a student teacher at the outreach school—that would be amazing. I've never had a student teacher in my 15 years of teaching and never even worked beside one. (Outreach teacher)

All of the participants recommended maximizing the exposure to both technology and the effective pedagogical use of these technologies in preservice programs. However, they warn about teaching any particular software or device, except to use it as a current example of tools that will change throughout the students' teaching career.

I don't think they can train teachers in a specific thing like a Smart Board or Google. But I certainly think they should have exposure to lots of different kinds of technology. (Outreach teacher)

I don't think, if I was in postsecondary now, it would be super beneficial for me to learn how to do Google Classroom or get Google certified. I think you have to know where to look and who to ask. It's always changing. (Secondary teacher)

One participant working with First Nations communities noted the importance of exposure to these communities and cultures.

Wherever you are teaching, that's extremely important, because every community is different the way they do things. So I don't know whether [the university] might want to do a field trip or something like that, or have Elders come in from different communities to tell them what went on right now, because it's extremely important. (Outreach teacher)

Given the speed of technological change in schools, participants recommended a number of ways in which digital technology literacy and skills could or should be developed by our universities for preservice teachers. Obviously, general-exposure classes, both in university and in practicums, are important ways for teachers to round out and polish their digital skills.

The design of learning and assessment activities is changing. This requires that universities address the issue of learning and assessment in a digital era.

My challenge for the last few years has been developing and building assessments that involves using Google in a limited manner. What I mean is that if the task or the assessment or the project given to the kids is too simple or too straightforward, they'll just Google it. So now I'm attempting to build assignments and build projects where I require them to think—where the kids are required to do more thinking and use Google as a [conceptual] tool instead for just for the answers. So now the question is really how to use the information to come up with a thoughtful, coherent and articulate response to questions. In previous years, we would have asked that differently. (High school teacher)

TO THE ALBERTA TEACHERS' ASSOCIATION (ATA)

Most of the participants were pleased that the Association, which sponsored this research project, was investigating digital technology use by practising teachers.

Well it's good. It's good that somebody is sticking their noses where it really is going to do some good ... This is the way the world is moving and to offer that support is fantastic. (Online teacher)

One teacher also expressed gratitude for the Association's advocacy work on behalf of teachers dealing in the very complex context of both classroom and online learning.

So I think the ATA can support us by being advocates; getting the message out about what we are dealing with. I mean, not even literacy gaps, the anxiety These kids are just under so much pressure. So being an advocate, being a vocal supporter of what our kids are going through—and also a vocal supporter of how we use technology. And for some kids, really, the answer isn't technology. For some kids that just adds another layer of anxiety. (Outreach teacher)

Many participants (and especially those in blended and fully online worlds) perceive themselves as being very much a minority among Alberta teachers. This is reflected by their comments on the lack of focus on the unique issues they face in professional development sessions at such events as teachers' conventions.

It's not like we're being deliberately not focused on, but we're small and we're new. We have questions that we don't have answers to. And they don't know that we have them. We've had some great ATA people working with us and they said, "Yeah, that's weird and we don't know how that's going to work." (Online teacher)

Despite the small number of non-classroom-based teachers, two different participants reflected positively on the Association's championing of establishing hours of instruction.

So in the current contract for teachers they count any time that you are assigned to be at your site. It doesn't matter if you are supervising or teaching or simply in meetings. If you are required to be there, that is time. And there's a certain cap on the amount of time a teacher is allowed to have. But for an online teacher we have no idea what that looks like. (Online teacher)

Oh, I think the hours thing was really interesting. The "maximum work hours" was HUGE this year. Because we have always worked [certain] nights (and I love [those] nights, they're fabulous) ... But we [used to work] every single day [as well] ... Now we're a teacher like any other teacher and we have shortened hours ... So why treat us any different than any other teacher? (Outreach teacher)

Many of our participants had participated in ATA-funded or organized professional learning opportunities. As expected, most of these teachers had positive experiences, both from the content and from the networking opportunities. Overall, they hope that the Association will continue providing professional support to teachers.

Appendix B: Interview Schedule

Interviewee: _____ Consent Given: E-mail / Voice / Written

Date: _____

Type of interview (in person, telephone, etc.): _____ Final Report: Yes / no

Community (rural, urban, etc.): _____

Years of Teaching: _____

Grade levels/subjects: _____

Teaching environment (online, face to face, etc.): _____

Interview Questions (bullet indicates topic for supplementary questions):

1. Tell us about your teaching situation:

- Complexity?

- Demographics of school?

- Special programming/focus?

2. Are you using digital technologies (or online courses)? (If no or seldom, why not?)

- Which ones?

- For what purpose?

- To address these dynamics in your classroom?

- Access in and out of school?

- Cell phones?

3. What are the student/teacher benefits you perceive from the use of these digital technologies (or online courses)?
 - To whom and for what?

4. What are some of the key challenges (social, emotional, learning, etc.) associated with student/teacher use?
 - Privacy/security (Learning analytics, datafication, terms of use, access, surveillance)

 - Distraction

5. Tell us about the support(s) and professional growth opportunities you experience in regard to digital technologies (or online courses).
 - Separate question to probe technical support, leadership support, community support

 - Preservice preparation suggestions/recommendations.

6. Do you feel you can use your professional judgment and have autonomy in the use of digital technologies (online courses)?
 - Compulsion coming from whom (students, parents, school leaders, self)?

 - Job satisfaction

7. To what extent do you use digital technologies (online courses) for collaboration between and with student/teacher?

8. Do you have any advice or promising practices for others you can share?
 - For other teachers?

 - For preservice educators?

- For school administrators, districts?
- For the Alberta Teachers' Association?

9. Anything else you wish to share?

10. Would you like a copy of the final report?

Appendix C: Recruitment Advertisement

Digital Media Use in Alberta Schools – Alberta Teachers' Association (ATA) Case Study Research

Alberta teachers acknowledge that digital media use presents the education system with both opportunities and challenges. Assessing the impact of emerging technology use on teachers is an ongoing research and advocacy priority for the Association. Therefore, the Association has commissioned a study to examine Alberta teachers' responses to the use of digital media with complex student populations.

The Association has contracted with Dr Terry Anderson (Professor Emeritus at Athabasca University and former Canada Research Chair in Distance Education) and Don McPherson M.Ed. (retired teacher and sessional instructor at the University of Alberta) to conduct this study. The Association has also established an advisory committee for this study chaired by Dr. Phil McRae, Executive Staff Officer with the ATA. The study has been approved by the Research Ethics Board of Athabasca University.

The researchers are interested in conducting a 60-minute (approx) confidential interview with teachers who regularly use digital media in their instructional contexts. We are interested in teachers who teach anywhere along a continuum from fully distance education to face-to-face classrooms. These interviews will take place at a location convenient to the participants or via telephone. The interviews will be conducted during March and April 2018.

The study seeks to answer the following research questions:

1. How are digital media being used to support complex student populations in different K–12 educational contexts?
2. What are the perceived benefits and challenges of using digital media with complex student groups?
3. What types of professional growth opportunities are perceived as most effective and/or needed by teachers using digital media?
4. What advice or promising practices do teachers offer for effective use of digital media?

We hope you will be interested in helping the Association advocate, support and assist teachers by volunteering to participate in this research study.

If you are willing to participate please complete the contact form at <https://goo.gl/forms/2yjsvhyIzlFraPMY2>

If you have questions in regard to this study, please contact the principle investigator Dr Terry Anderson, at terrya@athabascau.ca or 780-425-5950, or Dr Phil McRae, at philip.mcrae@ata.ab.ca or 780-447-9400.

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