“Access to technology is the major challenge”: Teacher perspectives on barriers to DGBL in K-12 classrooms

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Abstract
In this article, we report on a study of 32 teachers and their implementation of a digital game designed to support the human and physical geography curriculum in grades 7 and 8 in the province of Ontario, Canada. The purpose of the paper is to analyze and robustly represent the experiences of teachers who participated in the study, most of whom had never before constructed an integrated learning experience utilizing a digital game with one of their classes. By centering teacher voices, which often do not appear in research on digital game-based learning (DGBL), we hope to provide insight into some of the real challenges of incorporating digital games into classrooms.

Keywords
Digital game-based learning, professional development, barriers, teacher voices

Introduction
As we enter the third decade of the 21st century, one very real challenge in school environments continues to be how to support the uptake and use of the powerful but commonplace...
technologies that exist outside of school, harnessing them to augment teaching and learning. Since the beginning of the 21st century, digital game-based learning has been framed as one potential medium to support what has been broadly referred to as 21st century competencies, or more colloquially, the 4 Cs: creativity, collaboration, communication and critical thinking (Dede, 2009; Frydenberg and Andone, 2011; Voogt et al., 2011). Playing video-games in the classroom “provide[s] authentic assessment that supports various 21st-century skills, such as problem solving, critical thinking and innovation” (Garneli et al., 2017: 4). As one particularly enthusiastic account put it: “Play will be to the 21st century what work was to the Industrial age” (Bateson and Martin, 2013: viii).

Research examining the relationship between digital games and student learning is wide in scope, though complicated by myriad terms employed for digital games used in the context of learning, which include computer games, educational games, videogames, and serious games (Tobias and Fletcher, 2012). Digital game-based learning (DGBL) refers to harnessing digital games’ entertainment value for educational goals; (All et al., 2014). Studies have pointed to the potential of videogames to create playful and immersive environments that provide a higher level of engagement and motivation for students than traditional methods of instruction (Connolly et al., 2012; Gee, 2005, 2007; Prensky, 2006; Shaffer et al., 2005; Squire and Jenkins, 2003; Steinkuehler et al., 2012). Games have also been shown to support diverse learning styles (Kebritchi and Hirumi, 2008), to encourage peer learning and social interaction (Danby et al., 2017), and to promote active, rather than passive, learning (Bogost, 2008).

Research into DGBL has centered on the use of specific games to suit disciplinary areas, with studies focusing on language arts and media literacy (Gee, 2003, 2005, 2007; Salen, 2007; Squire, 2011), the sciences (Annetta et al., 2009, 2010; Corredor et al., 2014; Jaipal and Figg, 2009; Magnussen, 2007) and mathematics (Divjak and Tomic, 2011; Shin et al., 2012; Yong et al., 2016). Other studies have looked at how specific games support subject-area learning: how Where in the World is Carmen San Diego, Treasures of Knowledge, Quest Atlantis and GeoNet align with the primary school social studies curriculum (Brysch et al., 2012), Dimenxian with middle school algebra (Kebritchi, 2010), and Plant Life Cycle, secondary science (Muehrer et al., 2012).

Despite the positive conclusions of this research, the incorporation of digital games into K-12 curricula remains relatively limited (Kenny and McDaniel, 2011) and tends, in places such as the United States for example, towards drill-and-practice, trivia, and puzzle games (Takeuchi and Vaala, 2014). Given this limited adoption, there is an ongoing need for empirical research that examines the nuances and particular challenges of implementing games in a variety of classroom contexts (Annetta, 2008; Kebritchi, 2010; Linderoth, 2012; Young et al., 2012) beyond the small body of research that already exists in this area (see e.g. Tüzün, 2007; (Hébert et al., 2018;; Hébert and Jenson, 2019). More specifically, teachers’ experiences using digital games in their classrooms are often not taken up, including the barriers they face in optimizing DGBL. In focusing primarily on digital games and their benefits, “research has, to a large extent ignored the more practical and self-evident problems inherent in the use of computer games in educational settings” (Egenfeldt-Nielson, 2004: 18). A comprehensive understanding of these barriers is important for ensuring not only that the benefits of DGBL are translated into practice, but that teachers receive the support required to make DGBL a possibility within their classrooms.
Purpose of the study
In this article, we report on a study of 32 teachers and their implementation of a
digital game designed to support the human and physical geography curriculum in grades
7 and 8 in the province of Ontario, Canada. The purpose of the paper is to analyze and
robustly represent the experiences of teachers who participated in the study, most of whom
had never before constructed an integrated learning experience using a digital game with one
of their classes. By centering teacher voices, which often do not appear in DGBL research,
we hope to provide insight into some of the real challenges of incorporating DGBL
into classrooms.

In the next section, we review the literature that focuses on the integration of digital
games into classrooms, including barriers to implementation and where possible, studies
that centre on the voices and experiences of teachers. Next, we describe the study, its design,
and the game used. Data collection involved asking teachers about their experiences with
technology and videogames, and their perceptions of an idealized DGBL classroom. We
focus in on the voices of teachers for much of this article, highlighting their critical, thought-
ful engagement with DGBL. To conclude, we explore how these teacher-based insights
might well provide a more robust framework for developing and supporting DGBL in K-
12 spaces.

Related literature: Barriers to DGBL integration
Teachers have been labeled key figures in digital-game based learning, charged with choosing
whether and in what ways digital games are taken up in the classroom (Beavis et al., 2017; De
Grove et al., 2012). Conversely, teachers are frequently cited as a primary barrier for integra-
tion, with their reluctance attributed to a lack of comfort with games and understanding of
their benefits for learning. Dickey (2015), for example, maintains that “the process of inte-
gration [sic] technology in the K-12 environment has been a long [one] due to some resistance
on the part of teachers” (p. 486). Shaffer et al. (2005) offer a rather exaggerated account of
teachers’ suspicions of games:

Even if we had the world’s best educational games produced and ready for parents, teachers, and
students to buy and play, it’s not clear that most educators or schools would know what to do
with them….Games, with their anti-authoritarian aesthetics and inherently anti-Puritanical
values, can be seen as challenging institutional education. (p. 110)

And yet, importantly, these declarations of teacher reluctance are largely unsubstantiated,
typically offered as sweeping claims in a larger discussion about DGBL, rather than as a
focused investigation of the real-life barriers teachers face to integrating digital games into
their teaching practice (Attwell and Hughes, 2010). Marklund and Taylor (2015) argue that
faulting teachers for a lack of uptake of DGBL is a tired argument that has, in fact, been
disproven by contemporary research:

A past explanation for this disconnect in the game-based learning community has been that the
broader community of educators are averse to games. Recent studies, however, have indicated
this to be a false assumption as the majority of teachers in the EU and the US are positive
towards the idea of using games as educational activities. (p. 359)
For other researchers, teacher reluctance is simply one barrier that must be considered in conjunction with others. Becker (2007) notes that while some teachers might be “uncertain” or “suspicious” over “yet another new technology” that they “have little time to learn,” even those teachers who are motivated to use games in the classroom face a number of challenges, as “there are few places to turn to find out about which existing games can be used effectively, even fewer resources for finding out how to use these games once they have them, and fewer still if they wish to build their own” (p. 479). Wastiau et al. (2009) make a stronger claim about DGBL challenges for teachers: “when teachers are using computer games as class material, they will often find that the pupils will, in some areas, be more skilled than they are. A redefinition of the role of teacher is required” (p. 19). These accounts stress the need for more nuanced discussions of the barriers teachers face to taking up DGBL in the classroom.

One example of research that focuses on these barriers is Rice’s (2007) literature review. He begins by arguing both that teachers might not understand the differences between “arcade-style” games and “more complex role-playing, graphically dense, and cognitively viable modern games,” and that school personnel, familiar with a “general perception in the populace that video games foster violence” may be hesitant to “adopt anything using the term video game as an instructional tool for classroom use” (p. 252). That said, he identifies additional barriers beyond educator reluctance, including lack of access to high quality educational games, alongside the realities of the classroom: out of date hardware, a lack of connection between the curriculum and games, and the division of the school day into short periods that make DGBL challenging.

For others, barriers to DGBL often center on implications for game designers, shifting the conversation away from the classroom. Tsekleves et al.’s (2016) review paper offers eight challenges divided into two overarching thematic categories, educational and technical and financial barriers. Educational barriers refer to difficulties with: 1) aligning the game to the curriculum; 2) supporting assessment; 3) making sure that games are providing learning opportunities for students, rather than being exclusively a source of “fun;” and 4) ensuring that learning through the game can be “transferred” to real-life situations. Technical and financial barriers include: 5) technical challenges “associated with the design and development of serious games;” 6) maintenance, referring to the “variety of gaming platforms available that game developers and publishers consider when creating and distributing a game as well as the effort associated with the support of existing games;” 7) production costs “associated with all aspects of game development;” and 8) “promotion and distribution of games through [] various media distribution channels” (p. 168). Similarly, Kebritchi’s (2010) literature review of barriers to game adoption, which includes a small case study of teachers’ use of the game Dimenxian in the classroom, identified four key barriers: lack of alignment with the curriculum; limited understanding of when to use the game in the classroom and to what end; “knowledge transfer issues” pertaining to how learning in the game connects to learning in the classroom and beyond; and basic “technical issues” (p. 265). While ensuring that good quality games are produced for DGBL that teachers can actually use is important, this cannot be the sole focus of research on barriers to DGBL. What is often overlooked are the barriers teachers face once the decision to adopt digital games has already been made, with attention drawn to the inner-workings of governments, schools, and school boards, who make curricular, policy, programmatic, spatial, and
budgeting decisions that directly impact classrooms, but remain largely beyond teachers’ control.

Moving in this direction, Egenfeldt-Nielson (2004), whose data was derived from observations of two teachers implementing a history game in their classroom, named two key technical/practical barriers: challenges with consistently supporting students’ learning given school schedules—specifically time with the game being limited to single school periods of less than an hour, and gaps in instructional time, such as when students meet infrequently for particular subjects and/or have reduced access to devices for gaming; and limited access to and support with computers, which for Egenfeldt-Nielson is a widespread issue identified more broadly with doing research on digital technologies in K-12 classroom spaces.

A more recent study conducted in Australia by Beavis et al. (2017) examines DGBL from the perspectives of both teachers and students. The edited collection carefully details the ways in which teachers with a range of DGBL experience approach the use of games in their classroom, documenting through individual case studies, the choices that they make as pedagogical experts, and focusing on both the value of using games, including the pedagogical challenges (and sometimes barriers) that they instantiate. Relevant to the study that follows, the teachers they worked with and interviewed talked about both the pedagogical challenges and opportunities for using digital games in classrooms, and some expressed appreciation that the project had legitimized their experimentation with games as learning environments.

In general, literature that examines the practical barriers teachers face while in the process of implementing a game to support DGBL in the classroom is still scant, and more work is needed that centers teachers in such studies. In the next section, we describe the study, identify participants, provide an overview of the workshop, and methods for data collection and analysis, before moving on to the findings and discussion.

**Study design**

**Participants**

For this study, 32 teachers from nine school boards and 24 schools across the province of Ontario, Canada were recruited to participate; recruitment was facilitated by the Council for Ontario Directors of Education, a partner agency involved with the project. Fifteen of the teachers were men and seventeen were women. Teacher time in the field was as follows: nine teachers had less than 10 years of experience, 19 had 10–20 years of experience, and four had spent more than 20 years in the classroom. Classified as junior/intermediate teachers in the province, all taught either grade seven or eight, or a split class of grade seven and eight students, with the exception of three teachers: one responsible for a grade nine class, one a grade six/seven split and the third, a six/seven/eight split class. Six of the schools were situated in urban environments, thirteen in suburban, and five in rural.

**Professional development workshop**

Teachers were invited to attend a two-day professional development (PD) session focusing on digital game-based learning through *Sprite’s Quest*, a 2D platformer game that sought to reinforce concepts related to human and physical geography. Two games in the *Sprite’s Quest* series were played in this study: *The Lost Feathers*, targeted at grade 7 students, and
Seedling Saga, targeted at grade 8 students. Both are available for download on tablets through iTunes and Google Play. The web-based version of the game is only available through school boards’ sites, with access typically facilitated for teachers by a board-based technician. The goal of the professional development session was to support teachers in incorporating Sprite’s Quest into their own classrooms. A two-day PD session period provided time for teachers to become familiar with at least one version of the game, and engage in the planning necessary to meaningfully integrate it into their lesson planning.

Regarding to the content of the PD session, teachers were first given time to play the games. After a largely unstructured play period, facilitators provided researcher-created walkthroughs (a largely narratively driven account of the games with screen shots to reinforce major events) for both of the games (Flynn-Jones et al., 2017) to aid them in navigating the games. Next, they were guided through the teacher and student activity guides that accompanied each game and that were used as a foundation for the in-class unit. Working in school-board-based groups, teachers designed a focused unit around one of the two games, and presented it to the group at the end of the two-days.

Data collection and analysis

Surveys

Teachers were given a short survey to complete at the outset of the study. The survey contained a mixture of multiple choice and open-ended, short answer questions. The multiple choice questions were intended to give researchers some general background information regarding teachers’ comfort with and access to various forms of technology. The more open-ended, short answer questions provided space for teachers to identify experience with and training around using videogames and other technologies in the classroom, and to articulate their perceptions of the impact of using digital games on students and the classroom, pressure they experience to use videogames to support learning, barriers to and supports for using videogames, and what they hoped to learn through participating in the PD workshop (see Supplementary Appendix A). Multiple choice questions were analyzed quantitatively, using the software R. Short answer questions were coded using open-ended, thematic coding (Boyatzis, 1998; Braun and Clarke, 2006; Clarke and Braun, 2017), with types of barriers identified, and responses organized accordingly. Given that multiple responses could be provided for open-ended questions, when percentages are used, they refer to total number of responses rather than number of participants.

Interviews

Teachers were interviewed at the end of the study. Interviews provided an opportunity to obtain additional information about each teachers’ background and experience teaching and the schools in which they were working, and focused primarily on specifics around how the unit unfolded—including pedagogical decisions and teachers’ perceptions of student learning and engagement. They also spoke about their experiences during the workshop, what they learned through their use of DGBL, barriers to and supports for using digital games, and what they had to do to make using Sprite’s Quest in their classroom possible (see Supplementary Appendix B). Interviews were 25–80 minutes long. They were transcribed and then coded thematically using the software NVivo, paying
particular attention to the types of barriers teachers were describing. Once again, percentages refer to the number of teachers who experienced a particular barrier rather than the number of responses.

**Thematic findings and discussion**

**Experience, confidence, training and interest in/commitment to DGBL**

From the self-report survey at the beginning of the study, we learned that teachers were well equipped technologically at home, and most reported high competence using computers generally. For example, all of the teachers who participated in the study had access to either a desktop or laptop computer at home. Regarding computer competence in particular, the vast majority (90%) self-reported high levels of confidence using computers both at home and at school. Their comfort levels were also fairly high in using the computer to communicate with others (73%) and learning to use new software (73%). Lower levels of comfort were reported for fixing the computer if problems occur (58%) and using new software (49%), the latter suggesting that while teachers were somewhat confident learning about and being guided through new software, they had less faith in their abilities to navigate this software on their own.

For digital games specifically, the vast majority were not game players, and had little experience with games outside of the classroom. Asked what devices they had access to and used regularly, 26% of the participants said they regularly played on a game console. Slightly more than half (51%) reported having a child at home who plays videogames, suggesting that some teachers might have at least some exposure to videogames by being in proximity to someone who plays.

On the short answer section of the survey, 62% of teachers noted that they had used games prior to the study to support learning in the classroom. The most popular games listed were *Prodigy Math Game*, *SimCity*, and *Minecraft*. Six percent had used games in the classroom as entertainment not connected to learning. One teacher, for instance, explained that he “set up [his] PlayStation 2 and Playstation 3 on special days and during recesses” and another, that her students could play games “when finished work on snow days.” Another six percent cited hardware and software not classified as games (e.g. Kahoot and SMARTBoards) as their experience using games in the classroom, while 26% indicated that they had never used games in the classroom before. Regarding professional development, 91% of the teachers had never received any training on using videogames in the classroom prior to attending the professional development workshop.

While the teachers did not overwhelming classify themselves as game players, that more than 60% had tried using a digital game in the classroom demonstrated an overall interest in and commitment to DGBL. And even though none of the teachers had used *Sprite’s Quest* specifically in the classroom before, after attending the workshop and subsequently using the game in their classrooms, 91% said that they would utilize the game again to support student learning. That the vast majority of teachers would use a digital game again after obtaining training on and gaining experience with incorporating it into their teaching practice demonstrates, for us, significant buy-in from teachers for DGBL. Most of the teachers viewed the game as a meaningful resource for engaging students in their learning. One teacher remarked: “I would definitely do something like this again, especially with a subject like geography or history. It’s really tough to make [these subjects] super exciting, so having
that extra piece of technology or a videogame would at least excite the kids about it more.” Another teacher explained of her students’ experience with the game, “I think it was something really interesting for the kids... it opened their eyes... to another part of the world that they didn’t necessarily know much about... I do believe in trying to engage kids where they’re at, [and] let’s be honest, they’re at videogames and technology.” Beyond engaging students, the game was viewed by teachers as a means for challenging themselves with respect to their own pedagogical practice. For example, one commented that it was “fun to try something new... I just love learning new things and I love putting new things into the classroom.” Another explained her own need to push herself to try new things in the classroom: “teaching as long as I have, sometimes you need to change things up, as you need to learn something new, or a different approach.” A third teacher echoed this desire to “take risks, which you might not do on your own, for sure. We get into [our] comfort [zone]. I felt I grew from [participating in this project].” In the next section, we discuss the barriers teachers reported to using games as part of their pedagogical practice.

**Barriers to implementation**

Teachers were asked about barriers to using technology generally and digital games specifically in the classroom, both prior to the workshop and again after they created and implemented a DGBL unit. This data offers a rich and rather detailed overview of the barriers to DGBL that move beyond teachers’ reluctance, with the second set of responses in particular highlighting what teachers faced when trying to meaningfully incorporate *Sprite’s Quest* as part of their classroom practice.

**Access to hardware and WiFi bandwidth**

Before using *Sprite’s Quest*, teachers reported that access to hardware was one of the biggest barriers to using digital technologies and games in the classroom, totaling 70% of responses. Of these, lack of access to devices was the primary issue identified (28%), with teachers noting that “devices are not always available when needed,” and that there are “not enough devices to go around consistently.” Limited access to technology can mean that teachers need to be creative about how to acquire devices for DGBL. Some teachers rely heavily on external funding to fill in gaps left by provincial and board-based funding. For one teacher, this resulted in applying for “grants, fundraising and begging to obtain more iPads [and] tablets.” Drawing attention to concerns around equity and funding, for another teacher in a less affluent community, lack of supplemental support was an issue, as there is “no parent council fundraising for these types of items.” Similarly, we would argue that relying on bring your own device programs for DGBL can be largely ineffective in school communities where students by and large do not have access to devices at home that can be used during school time. In situations where teachers want to assign work for students to complete outside of the classroom using digital games, access at home can also be an issue, as was the case for six percent of the teachers in our study. As one teacher explained, “I work at a school where most students can’t afford devices.” Another attempted to address this issue by seeking donations: “I sent out an email to a whole bunch of random organizations, saying ‘if you have any old cellphones that you don’t want...donate them to me.’... there was a set of thirty-five cellphones donated.”
For teachers who did have access to devices, some of them were too out of date to support DGBL. Eight percent of responses listed inappropriate technology as a barrier to DGBL, citing “unreliable notebooks, “obsolete gear,” “touch screens wearing out with so much use” and “slow computers” as examples. For others, BYOD policies can create issues around a lack of compatibility across platforms (e.g. having a game that is available to download on all the (at times different) types of devices provided by the school and those students bring from home). Three percent of teachers identified device compatibility as a barrier to using digital games in the classroom.

Beyond hardware access, other technical barriers were more structural. Twenty-two percent of responses cited infrastructure as an issue, including reliable and consistent high-speed internet access (e.g. “the WiFi is not always up and running,” “WiFi signal can also be an issue,” and “bandwidth limitations”) as well as network and licensing concerns (e.g. “purchasing enough game access” and I “want to use [a specific game] but need to figure out server issues”). For another 3%, electricity access prevented them from using digital games regularly in the classroom, either with too few outlets to charge devices, or students not bringing to school the appropriate cables to school when BYOD policies are in place.

After trying to implement the DGBL unit in their classrooms, teachers stressed anew that access to hardware remained the biggest barrier, with 70% of teachers reporting challenges. Teachers offered a number of specific examples of juggling lab time and computer carts with others in the building to use Sprite’s Quest: “Since there’s so many kids in the school and so many teachers and only two iPad carts, it’s a little bit difficult to always be able to book them out;” “booking the computer lab was hard as there’s only a slight number of free periods that are open;” “I had to book out 20 out of the 30 iPads that we have available in the school in order to make sure that all the kids had technology on the days we did these lessons. Sometimes it’s flexible, sometimes it’s a little awkward. That was probably one of the biggest difficulties of [this] project;” “I have 2 computers in my room only. We had a netbook cart, which is a little unreliable... Part of [the challenge] was getting a lab time book, because I wanted to do it with my one rotary class as well, which is the one I don’t see regularly;” and “we would have to book the computer lab downstairs. It’s pretty much booked for the whole year, everyone’s slotted in. So you pretty much had to time everything to when you already had your booking if you wanted a full complement of computers to use.” For another teacher, being in a portable classroom meant that she could not access computer carts, and the period she wanted to use the computer lab coincided with the provincial standardized test; the staff room, though less than ideal, was the only space she had access to for playing the game. She explained:

As ridiculous as this sounds, it’s really tough to get the kids transitioning from the portable into the staff room with the technology, because they’re excited they get to use the iPads. Then, moving with all the things into the staff room, they often forget things in the portable. The staff room that we have to book out is the only place where there’s one photocopier for the whole school, so there’s teachers constantly coming in and out on their planning time to photocopy. That disrupts the class, because they’re excited there’s someone new; they want to see what they’re doing. If it’s a teacher they know, they’ll say hi.

Lack of access to hardware means that teachers are often limited to using the game within specific blocks of time, presenting challenges for integrating the game comprehensively into a unit. And for some teachers who work on a rotary schedule, where certain subjects are
taught by particular teachers on specific days and at precise times, lack of availability of devices can mean that they cannot use the game with their students at all. As one teacher noted, “I don’t have the flexibility in my schedule. I can’t just say, oh well I’ll do it this period, because I only see them in certain periods.”

Beyond getting their hands on a class set of devices, other teachers recounted their frustrations that the game would not run properly on devices such as netbooks (e.g. “the netbooks are pretty old and slow” and “we found out, as we tried to log on, that a number of [the netbooks] didn’t work properly or didn’t support the flash drive”), or identified difficulties with getting students to bring devices from home (e.g. “in my class, we’re allowed to bring your own device to school. Students don’t seem to really respond to that; I maybe get 5 out of the 29 that bring their own” and “sometimes parents don’t want them to bring them, if it’s for whatever reason, safety or they just don’t want them to bring it in”). Again, when access to devices is limited, teachers may have few backups if devices malfunction or simply are not there.

Finally, nineteen percent of teachers involved in the study faced infrastructure problems while trying to use Sprite’s Quest, which included issues with bandwidth, and students logging into the game simultaneously. For one class, the problem was easily rectified by the board when a WiFi router was moved into the classroom, which the teacher said, “when we were trying to get 48 kids on the internet all at once… that helped a lot while we were doing this project.” For others, they struggled to get students connected, and learned to stagger log on times. As one teacher elucidated:

The problem was logging on. We literally could only log about 4 students on at a time… If we all tried to log in at the same time… the kids would just sit there and the little spinning window would just sit there and continue to do that. So we learned after a couple of times that if we logged in about 4 people at a time it still took about 10 minutes to 15 minutes to get everybody in, but once we were in everything flowed. It was just logging in.

Paired with the aforementioned time limitations of 40–45 minute period blocks, spending 10–15 minutes logging on to devices will restrict the learning that can occur through the use of the game.

As regular and consistent access to up-to-date hardware and appropriate high-speed bandwidth are often necessary preconditions for using digital games in the classroom, what is reported in this section is a set of practical barriers to DGBL that remain largely beyond teachers’ control, given lack of access to funding. And at the same time, despite these barriers, we see teachers being resourceful in their attempts to support DGBL: turning to parent councils and community organizations to supply devices, negotiating time in the computer lab or with the computer cart, and developing strategies when bandwidth is less than ideal.

**Knowledge of/familiarity with games and DGBL**

Prior to using the game, the second highest reported barrier was lack of experience with and knowledge of digital games and DGBL, with 23% of responses in this category. Of these responses, eleven percent were classified as lack of knowledge. For some teachers, knowing what games could be incorporated into the curriculum, or in other words, where to start, was a primary challenge: “finding games with rich content, finding games with curriculum connections” and “games that relate directly with the Ontario curriculum.” For others, their “own lack of confidence” was the issue: “I just don’t know enough about videogames” one
teacher wrote, and another, “I have limited experience.” More specific worries included not having the “skill set[s] to use the game effectively” and not being able to “answer a question my students [might] have.” The other 12% of responses in this category called attention to students as a potential barrier, specifically, their ability to connect games with learning and to stay engaged during DGBL: “When using technology as part of our program,” one teacher said, “it is often that some students link playing videogames on phones/on their own tablet/desktop [with recreational time, and do that] instead of completing assignments.” This worry extended to teachers’ capacity to “track [] appropriate student use” and “manage []... the students.”

Interestingly, after participation in the workshop, only one teacher identified knowledge and familiarity with games as a barrier, explaining: “I need to be better at gaming. I have a difficult time getting through levels, so that always became an obstacle for me.” In fact, a number of teachers were able to speak fairly confidently about their roles in relation to supporting DGBL. One teacher noted how he framed himself as a learner alongside students, suggesting:

I need to be able to literally remember what it’s like to play and to play with kids and learn with the kids. If you’re open to doing that, then you could make that game a heck of a lot harder and give no information about it, and we’d still be able to do an awful lot with it.

Another teacher, highlighting his own learning through play commented:

I’m not tech savvy, but I’m pretty good at picking up on a game or picking up on tech if I really need to. I do a lot of exploring on my own, so I’m pretty sure that I wouldn’t need a lot of support, and I believe that if you don’t, if you’re not willing to try [the game] out on your own then you’re not going to learn it anyway.

And a third was able to speak rather confidently about how he might set students up for success during DGBL:

Kids approach games the way that we want them to approach math questions with an open mind and be resilient and have fun with it. If teachers have that in mind when they’re given a game like this to use, that’s the greatest asset they could have. All the support in the world, I don’t think, can make up for a lack of those. I don’t need extra tech support.

Likely, concerns around perceived lack of experience with DGBL were alleviated, at least in part, as teachers became comfortable with *Sprite’s Quest* through the professional development session. Moreover, PD facilitators stressed that teachers need not be experts to support students through DGBL, and that some of the learning about digital games can occur alongside students. It is possible, then, that as teachers’ general confidence around how to approach DGBL pedagogically in their classrooms increased, their own knowledge was no longer perceived as a such a barrier.

**Structural barriers**

Prior to the workshop, a small number of teachers (4%) viewed the provincial curriculum as a barrier to innovation in the classroom. One teacher said, “The burden of meeting curriculum expectations sometimes convinces me that I don’t have the time to explore/experiment...
with unfamiliar technology.” For another 3% of responses, lack of support from the school board, administrators and colleagues was a concern.

After teachers used Sprite’s Quest in their classroom, the second highest reported barrier for nearly half (46%) of the teachers was support from IT services. Here, a key issue was a lack of autonomy around installing apps on devices or uploading the game onto the board-based learning sites, coupled with slow response times for installation. At one school, the IT technician is about 100 km away, making it difficult to receive “just in time” support. For another teacher, gaining access to the game “was a long process considering I made requests as early as the end of February when we had our first workshop and it wasn’t until middle of April that things were 100% solved... so that kind of was frustrating.” Another teacher noted rather restrictive technology policies within the board, stressing that participation in the study facilitated a quick installation, otherwise, the wait time would have been substantially longer:

We have these iPads, but then the board restricts what we download as apps. In the beginning we could download whatever we wanted, whatever we felt would best fit our school’s needs to really tailor to our clientele. Then the board cut that all off, that freedom all off. They completely control what is downloaded. This really frustrated me and concerned me, so I talked to our principal, I said, “We need to get this downloaded so my kids can get on this game so we can start learning through Sprite’s Quest.” Fortunately, this project was possible from our director. He got on the phone with her and she made it possible for IT to get them downloaded. Within a couple days, they were all downloaded, fortunately. Otherwise, this would be a low priority ticket and it would have taken a couple months to get activated, which is always the case with our board and technology and problems like that. There’s always lag times and issues.

For teachers who are regular members of a school population, and whose access to IT technicians is not facilitated by a university study, a substantial delay in access may mean that a teacher abandons a digital game for a more readily accessed tool. And it is easy to see how much advance planning would need to go into a DGBL unit with lengthy installation wait times and with such board oversight; within such a system, few teachers would make a last-minute decision to try out a new digital game, especially one yet to be vetted and sanctioned by the board’s IT department.

**Game-based barriers**

As none of the teachers who participated in the study had experience using Sprite’s Quest, none of the barriers initially identified related to the game specifically. After teachers introduced Sprite’s Quest into their classrooms, 22% identified elements of the game as barriers. These mostly centered on logistics pertaining to accessing the activity guide that accompanied the game. The student activity guide was not integrated into the game, and was available only through the web-based platform/board-based e-learning site. This meant that students who accessed the game through iPads were not able to simultaneously reference the activity guide, without access to a laptop, something that was unrealistic in many classrooms. One teacher explained, “It’s just the logistics of it all. To book out the iPads and the computers at the same time probably wouldn’t have made the other teachers in the school very happy. It would have been a little bit excessive in terms of booking up too many resources at the same time.” Some teachers resorted to printing out the activity guide,
which was less than ideal: “I did not have the students record any information electronically, I had them do it by hand, where I would much rather than being able to give electronically.” As a number of school board have also adopted Google Classroom as their learning management system, that the activity guide could not be integrated with the platform also presented challenges for teachers: “I had difficulties connecting the e-learning site to Google classroom which is where we do most of our work.”

Beyond the logistical issues of accessing the guide, a number of teachers were frustrated that the accompanying teacher guide did not provide answers. This presented challenges for teachers assessing students based on the activities, when the types of responses the designers of the activities are looking for are not entirely clear:

A lot of the terms and concepts that were in the game I was familiar with [But]… I’ve been teaching geography for a lot of years and there were even things that I wasn’t sure what [the game designers] were getting at … They weren’t a straight forward inference kind of thing … If I had some kind of guidebook or something to refer to that would have been a major help.

Another teacher explained, “I think an answer key to any program, whether it’s in math, or language, or whatever, I think it’s always good to have that kind of framework so that you know what you’re working towards and having your students work towards.” Others were keen on being provided lesson plans, and an online forum where teachers might connect with one another, and provide tips and strategies. For one teacher, walkthroughs filled some of these gaps, enabling her to navigate the game:

If somebody said “Okay just log into Sprite’s Quest and go,” I probably wouldn’t have been able to find my way through all of the parts. That walkthrough was really kind of important to see okay what are the kids going to be seeing as we go along, just because I had trouble managing the game myself.

We offer this feedback not as a means of improving Sprite’s Quest, which is not an aim of our research. Rather, this set of game-based barriers shed light on the importance of designing DGBL tools for teachers with the actual, rather than ideal classroom in mind, and in consultation with practicing classroom educators. With a recognition that students likely have access to few devices, and with the intention of retaining immersion in the game, activities might be integrated into the game platform, or designed in such a way that a student need not exit the game to access them. Answer guides should accompany assessment tools/activities if intended to be used in the classroom, and walkthroughs can serve as a launchpad for teachers who might not otherwise feel comfortable navigating a game initially on their own.

**Conclusion**

This study offers evidence against the misconception that teachers are the barriers to DGBL. Certainly, we are not suggesting that all teachers are keen on incorporating digital games in the classroom, and recognize that it is possible that the teachers who decided to participate in a study on DGBL already had an interest in learning about digital games. But their willingness here is significant given that, by and large, the teachers who participated in the study were not gamers outside of the classroom, and none had used Sprite’s Quest prior to this project.
In centering teachers’ voices, the study also paints a fairly bleak picture of teachers’ struggles in classrooms as we enter the third decade of the 21st century. That 70% of teachers struggled for access to technology to support this DGBL unit, and almost half had difficulties getting the game loaded onto devices is troubling, especially considering these teachers’ privileged positions: school-based administrators and boards were aware of (and in fact, authorized) their participation in this study. In some respects, this experience represents the roll out of educational policy writ large; administrations enthusiastically endorse practices while failing to address systemic barriers that make implementation difficult or even impossible. Bring Your Own Device programs, for example, may be effective cost-saving measures, but are not viable in communities where parents cannot afford devices. Digital games will not and frankly cannot be integrated into teachers’ lesson and unit plans if classrooms do not have access to devices. And, as the teachers in this study pointed out, this access needs to be regular and consistent for DGBL to be integrated meaningfully, otherwise games can only be incorporated as additive, or one-off activities. Hardware issues aside, supports for teachers need to extend beyond simply providing access to technology. This includes buy-in from administrators. That one quarter of the teacher responses we received indicated that they felt that initially they had no support for DGBL in their schools is telling. The Ontario government’s recent cuts to education, which include an increase in class sizes, do not bode well for the future of DGBL within the province given teachers’ expressed needs (Thompson, 2019).

More professional development opportunities do serve as one means for supporting teachers. Though almost none of the teachers who participated in the study had received DGBL professional development before, the fact that after attending the workshop the vast majority of the teachers said they would use the game in the classroom again is significant. Further professional development might also aid teachers in developing a DGBL pedagogy, one that continues to help allay teachers’ fears around classroom management and not having all of the answers (or requiring an answer guide). Professional development can support teachers who might be interested in using digital games, but are not quite sure what DGBL might look, sound, and feel like in their classrooms.

More than this, though, we need to think rather expansively about how schools are being organized in such a way that undermines not only DGBL, but the development of 21st century competencies more generally. As one example, forty to forty-five minute subject-specific blocks of time are especially limiting when considering the time required to take out and login to devices (and to logout put everything away again before the period ends). Aside from practical challenges, the way the school day is structured also discourages DGBL that is cross-curricular, and where students across classrooms and grade levels can work collaboratively toward common learning goals. And games need to be designed with the practical realities of classrooms in mind, with attention not only to clear curricular connections, but ease of integration with assessment and learning management systems. That said, the willingness on the part of the teacher participants in this study to attempt to integrate a new game designed expressly for learning can perhaps serve as a barometer for teachers’ interest now and in the future, despite these barriers, in engaging with this important 21st century media.

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Notes

1. https://itunes.apple.com/ca/app/sprites-quest-the-lost-feathers/id972933557?mt=8 (The Lost Feathers); https://itunes.apple.com/ca/app/sprites-quest-seedling-saga/id973216081?mt=8 (Seedling Saga); https://play.google.com/store/apps/details?id=com.cforp.ELOGR7&hl=en (The Lost Feathers); https://play.google.com/store/apps/details?id=com.cforp.ELOGR8&hl=en (Seedling Saga).
2. For more detailed information about both Sprite’s Quest and the professional development session, see Hébert and Jenson, 2019; Hébert, Jenson and Fong, 2018.

Supplemental material

Supplemental material for this article is available online.

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