



Playing to Learn: Evaluating the Impact of Teacher Support for the Use of Videogames in Grade 7 and 8 Classrooms



Final Report
November 2016



Playing to Learn: Evaluating the Impact of Teacher Support for the Use of Videogames in Grade 7 and 8 Classrooms

Principal Investigator

Dr. Jennifer Jenson

Professor and Director,

Institute for Research on Digital Learning

Researchers

Dr. Cristyne Hébert

Postdoctoral Researcher,

Institute for Research on Digital Learning

Dr. Didi Khayatt

Professor, Faculty of Education,

York University

Final Report (November 2016)

This research was supported by the Council of Ontario Directors of Education (CODE). The views expressed here are not necessarily those of CODE, but are those of the authors.



Table of Contents

Executive Summary	vii
Part 1: Introducing the Study	1
Timing of Project	
Participants	
Group A	
Group B	
Workshop (Group A)	
Meeting (Group B)	
Part 2: Methods and Data	7
Classroom Visits and Field Notes	
Interviews	
Surveys	
Teacher Surveys	
Student Surveys	
Blogs	
Instructional Materials and Samples of Student Work	
Part 3: Teacher and Student Reported Device and Media Use	14
Teachers' General Device and Media Use	
Game Play Data: Teachers	
Students' Device and Media Use	
Game Play Data: Students	
Part 4: Supporting Teachers in the Use of Technology in the Classroom.....	22
Using Videogames in the Classroom: Current Supports, Required Supports, and Barriers	
Further Supports Needed	
Summary and Discussion	
Access to Technology	
Quick and Ready Access to Games	
Teacher Training	
Knowledge of and Access to Games	

Part 5: Student Learning and Engagement	34
Learning Activities in the Classroom	
Assessment	
Teacher Perceptions of Student Learning: Pre-Study	
Student Learning: Survey Results	
First Round of Analysis	
Second Round of Analysis	
Student Conceptions of Learning	
Student Engagement	
Part 6: Technology and Game Play	58
Technology Use for Game Play: Devices, Multiple Screens, and Learning Platform	
Learning Platform Use Overall	
Part 7: Case Studies	65
Pedagogical Practices that Support the Use of Videogames in the Classroom	
Meaningful Game Play and Game-Based Learning	
Structured Game Play and Game-Based Learning: Focus, Pacing, and Multiple Tasks	
Supportive Game Play and Game-Based Learning: Knowledge and Check-Ins	
Implications for Further Study	
Snapshot of Teacher Successes: <i>Seedling Saga</i> , Keira	
Snapshot of Teacher Successes: <i>The Lost Feathers</i> , Nina	
English and French-Speaking Teachers	
Teachers Who Received Professional Development and Those Who Did Not	
Part 8: <i>Sprite's Quest</i>: Teacher Feedback	79
Feedback: <i>Sprite's Quest</i>	
Feedback: Resources and Activity Guides	
Conclusions: Games as Instructional Resources	85
References	87



Appendix A	89
Appendix B	92
Appendix C	144
Appendix D	155
Appendix E	163
Appendix F	165
Appendix G	173
Appendix H	186
Appendix I	196
Appendix J	210
Appendix K	220



Executive Summary

This report summarizes the findings of the Playing to Learn project from October 1, 2015 to October 31, 2016. Playing to Learn sought to understand how teachers could be best supported in the use of game-based technology in the classroom, including the impact of a two-day professional development session. This executive summary begins with an overview of a rationale for the project, the research questions, and the theoretical framework, before offering a detailed review of the methods and key findings.

Research Questions and Rationale

In a rapidly evolving information mediascape shaped by participatory, mobile, and multimodal digital technologies, attention is the primary currency and engagement its main requirement. Today's students tend to be far more fluent with, and far more attentive to, emerging media forms like digital games than the educational specialists seeking to guide and support their learning. Building from the more general first generation research questions of "how can we use games to motivate students," this proposal seeks to study the classroom ecologies (teachers, students, technologies, resources) that best support and enable games for learning. In particular, this study is concerned with these questions: What supports does a classroom educator need to implement digital games for learning; how and in what ways are games best implemented in classrooms; what and how do students learn differently via game play; and, whether and how digital games support different learners (e.g., girls, boys, EL learners)?

This research contributes to literature on how games are implemented in K-12 classrooms in Ontario and in education more generally. We still know little about the educational benefits claimed for game play, such as whether they transfer to other real world contexts or persist over any length of time beyond the play and evaluation session. The challenge taken up in this proposed research program, therefore, is to address the gap between claims and evidence with regard to game-based learning through a mixed-methods study of the implementation of a digital game and its customized teacher resources for physical geography in grades 7 and 8 classrooms. The central goal of this work is to identify the particular classroom ecologies (teachers, students, technologies, resources) necessary to power a digital game "learning engine" (Gee, 2003). This is essential and timely research greatly needed to inform policy and practice guiding the development and deployment of digital games in formal classroom learning contexts, as well as contributing to a re-conceptualization of theories and practices of game-based learning.

Questions this research seeks to answer include:

- How does a professional learning workshop contribute to teachers' ability to implement the game in the classroom?
- What challenges and barriers do teachers face in utilizing games in the classroom?
- What impact does using games such as *Sprite's Quest* in the classroom have on student learning?

Theoretical Framework

A theme running through discussions about learning and gaming is the idea that games are a powerful educational tool because they are compelling to students who are raised in an increasingly technologically mediated environment. The idea that most youth can be classified as “digital natives” (Palfrey & Gasser, 2008; Prensky, 2001b, 2001c) or that they belong to the “net generation” (Tapscott, 1998, 2009) is built on the assumption that because youth are growing up surrounded by digital technology, they will be more comfortable interacting with current technologies, and they will be better suited to learning new digital skills than someone who was introduced to technology later in life. In order to address the unique skills and needs of this new generation of students, the argument has been made that classroom practice must specifically accommodate the ‘digital affinity’ of the net generation who are connected and creative, and likely know more about new technological developments than their teachers (Jenkins, 2006, 2009). The belief that youth exhibit an inherent digital affinity undergirds the push towards an inclusion of digital games in the classroom. Supplementing a curriculum with games is built on the assumptions that these digitally connected youth are already playing games in their leisure time and that games are somehow more engaging than the books, worksheets, or lectures commonly used as teaching tools (Prensky, 2006; Steinkuehler et al., 2012; Steinkuehler & King, 2009).

While some regard games as an exciting new frontier for classroom education, questions still remain about how teachers can best accommodate students who do not demonstrate the same degree of digital affinity as their peers. For example, how will a game-inspired curriculum engage students who do not want to play? Will students who do not have access to digital gaming technology at home find themselves at a disadvantage when assessed alongside their already playing peers? And what would such a curriculum make of students who are disinterested in games? As Jenson, Taylor, and Fisher (2010) have demonstrated, digital affinity is intertwined with very specific socio-economic circumstances and some students do not enter a classroom with prior exposure to technology in their home or leisure spaces. Worker demographics in important Science, Technology, Engineering, and Mathematics (STEM) fields demonstrate that there is still a ‘digital divide’ and that this divide is marked by gender, race, age, and class (Wajcman 2007; Dorman 1998; Cohoon & Aspray 2006). Despite consistent reports that students are not equally exposed to or equally comfortable with digital technology (Facer & Furlong, 2001; Hargittai, 2010; Holmes, 2011), the presumption of

digital affinity or aptitude of youth continues the push towards the inclusion of digital games in the classroom.

Even as there remains an enthusiasm for “21st century learning,” there is no consensus on what that might look like (C21 Canada, 2012; Media Awareness Network, 2010; Silva, 2008), while schools frequently face criticism for not providing it (Francis, 2012; Lynch, 2013). Sparse, too, is research on how teachers can best be supported in implementing this “21st century learning” in the classroom. While there are many exciting ideas regarding how digital games can find a meaningful place in the classroom, much of this work has focused on the value of playing games as part of ‘media literacy’ or a ‘language arts’ curriculum (Gee, 2003, 2005, 2007; Squire, 2011; Salen, 2007) or for the development of leadership skills (O’Neil & Fisher, 2004; Lisk et al., 2012; DeMarco et al., 2007) rather than how teachers can use digital games in the classroom. With these tensions in mind, this project seeks to study the classroom ecologies (teachers, students, technologies, resources) that best support and enable games for learning.

Overview of Project

Ten school boards agreed to participate in the study:

- Algonquin and Lakeshore Catholic District School Board
- Conseil Scolaire Viamonde
- Halton Catholic District School Board
- Kawartha Pine Ridge District School Board
- Lakehead District School Board
- London District Catholic School Board
- Peel District School Board
- The Northwest Catholic School Board
- Windsor-Essex Catholic District School Board
- York Catholic District School Board

School boards were quite varied, with higher overall representation from Catholic and English boards despite reaching out to a number of public and French boards during the recruitment process. Overall, six boards that participated were Catholic and four public. Nine of the boards were English-speaking and one French-speaking. Geographically, representation was also quite varied: 25 schools in total were represented in the study of which 14 were suburban, 6 urban, and 5 rural. Thirty-four teachers participated in the study.

Research Methods and Data

A mixed-methods approach was used to capture the complexities of how game-based pedagogy was taken up in the classroom and how students were learning. Methods included:

- **Classroom observations:** conducted to obtain a comprehensive understanding of how the game-based learning unit was utilized in the classroom and how students were responding to the game;
- **Teacher blog posts, curriculum materials, and assessment tools:** used to fill in the gaps of what occurred in the game-based learning unit when researchers were not present;
- **Student surveys:** administered to the class prior to and after the *Sprite's Quest* unit to assess student experience and comfort with technology, games and game-based learning;
- **Teacher surveys:** administered prior to the *Sprite's Quest* unit to assess teacher experience using videogames in the classroom including barriers and desired supports and experience and comfort with technology, games, and game-based learning; and
- **Teacher interviews:** conducted after the completion of the unit to evaluate teachers' conceptions of student engagement and learning and to ascertain teachers' notions of supports that continue to be required to use game-based pedagogy in the classroom.

Quantitative analysis was completed using R software and was used exclusively for student survey score findings. Qualitative analysis, conducted thematically, was completed using NVivo software.

Key Findings

Using Technology in the Classroom: Supports and Barriers

Teachers reported that the current technology available to support game use in the classroom is not enough—that the equipment and software within their schools is often outdated and that they needed more technology in the school, greater access to technology when it is being shared amongst multiple classrooms, and reliable access to the internet in order to carry out game-based learning effectively.

After their experience using *Sprite's Quest* in the classroom, teachers also cited the need for timely responses from IT staff for the installation of games and platforms. This finding suggests that while teachers may express the desire to use technology in the classroom—specifically, for the purposes of game-based learning, such as with *Sprite's Quest*—this goal is not attainable if they are not provided with the appropriate technology and supports to use it. Additionally, board-based restraints on how software is installed on devices and how access is granted to D2L platforms can create delays (sometimes insurmountable) for teachers attempting to use new software with their classes.

Professional Development and Time

Teachers interviewed cited the need for more professional development opportunities connected to game-based learning, training on specific apps and games, and training on how to use games in the classroom in a meaningful way, including implementation strategies, creating assessments, and producing learning goals. Time for planning was also cited as a necessity for utilizing new material and pedagogical strategies in the classroom. In our view, part of the need for professional development especially around games correlates to the fact that this is not media that all teachers are familiar with and use on a daily basis. Being given time to literally play games as a new learning resource in conjunction with time to create meaningful lessons related to game play is, at least at this moment, important.

Knowledge of and Access to Games

Teachers argued for a more centralized means of gaining knowledge of and access to games with explicit connections drawn to the curriculum. Many noted, for example, that they would have liked to have used *Sprite's Quest* in their classroom, but prior to this project they did not know that it existed. This calls attention to perhaps a need for a centralized database of games available to teachers along with professional development sessions—such as the one offered through this project—that give teachers both the training and time required to create meaningful pedagogical materials and teaching strategies around game-based learning to use in their classrooms. Findings also suggest that teacher's guides were necessary for the integration of game-based learning activities in the classroom. Guides are particularly important for teachers who are unfamiliar with or new to a game and those less comfortable with games. Guides direct them to meaningful and engaging pedagogical materials and serve to increase teacher comfort with using the game in the classroom.

Benefits to Student Learning

Teachers frequently cited as a benefit of the game the fact that the game was accessible to a group of students with a wide range of learning needs, including students on IEPs, slow readers, and students with ADHD. In this respect, teachers stated that the game leveled the playing field so to speak in that students could access the game in a manner that was meaningful to them. More generally, student scores between the pre- and post-surveys increased for English-speaking students by about 5%. This finding suggests that students were learning both game-based content and general geographical concepts by playing the game. In contrast, French-speaking student scores from the pre- to post-surveys decreased overall, though just slightly, by 1%. While a decrease in survey scores may signal a difference in pedagogy between English and French-speaking teachers, given the small sample size of French-speaking teachers, we are unable to draw a conclusion about differences at this time.

For responses to the more open survey questions where students were asked to identify three things they had learned through the game, over a third of all total responses for both English and French-speaking students were scored as containing significant content learned from the game. We believe this self-reporting from students strengthens the claim that for some students the game was also a learning activity.

Benefits of Professional Development

Teachers who did not receive professional development (67%) were less likely to produce meaningful, structured, and supported game-based pedagogy compared to 39% of the teachers who did receive professional development. The teachers who received professional development were also more likely to have used the teacher resources and student activity guide than those who did not receive it and more likely to have detailed and lengthier units centered on the game than those who did not attend the professional development session.

These findings suggest that professional development workshops are a vital component for creating meaningful, supportive, and structured game-based pedagogy. Moreover, teachers require the opportunity provided in professional development sessions to become familiar with the available learning activities that accompany games. In addition to being led through resources in the context of the workshop, the professional development session serves as a practical means for overcoming one major barrier to using technology in the classroom: time.

Recommendations

Professional Development

- Create opportunities for professional learning around games as a means to support differentiated instruction and learning;
- Ensure that professional development provides opportunities for teachers to become familiar with the game in order to support students in their use of it in the classroom; and
- Ensure that professional development contains explicit game-based pedagogical instruction around scaffolding student learning, aiding students in making connections between the game and the real world, and keeping student engagement high.

Student Learning

- Games are effective at capturing and holding player attention, including games designed for learning. Students should continue to be given more opportunities to play games as part of differentiated learning activities.
- Game-based learning can be disengaging when not scaffolded and made meaningful in the context of learning activities.
- Students need to be assisted in moving between the game and real world contexts as a crucial component of game-based learning.

Game-based Learning

- Develop a method to get learning games to teachers directly. Teachers reported that prior to the study, they did not know about *Sprite's Quest* or the resources that were created to support its use; and
- Construct a pedagogical resource that helps orient teachers to game-based learning.

Project Milestones

Item	Date
Project Approval	August 2015
AEFO announces possible work-to-rule Phase 2 for start of 2015 school year	September 16, 2015
AEFO averts work-to-rule, reaching tentative agreement	September 16, 2015
ETFO places a work-to-rule ban on all extra-curricular activities on Wednesdays	September 21, 2015
Letters sent to boards	September 23, 2015
ETFO bans all extra-curricular activities	October 22, 2015
Contract with CODE finalized with York University	October 28, 2015
Ethics approval York University	November 13, 2015
ETFO ratifies central agreement	November 13, 2015
Boards respond (to ethics)	November 20 – December 11, 2015
Outstanding ethics for school boards	January 2016
Scheduling of boot camp/workshop at York University	January 2016
Creation of project website	January 2016
Bootcamp/workshop at York University (Group A)	February 10-11, 2016
School board one	February 22-24, 2016
School board two	February 29-March 2, 2016
School board three	March 7-9, 2016
School board four	April 14, 15 & 21; May 17, 18, 19, & 24, 2016
School board five	April 18-20, 2016
School board six	April 25-27, 2016
School board seven	April 28-29, 2016
School board eight	May 3-4, 2016
School board nine	May 5, 10 & 12 2016
School board ten	May 9, 11, & 16, 2016
Teacher interviews	March 4 – June 20, 2016
Meeting with teachers who did not receive professional development (Group B)	April 13, 2016
Receipt of student post-surveys from teachers	March – August 2016
Completion of teacher blogs	July 8 2016
Data analysis	July – October 2016
Draft report	October 2016
Preparation of videos	August – December 2016
Preparation of summaries	August – December 2016
Final Report	November 2016



PART 1

Introducing the Study

Timing of Project

Participant recruitment and ethics proposal submission were initially scheduled to take place in September 2015, followed by the workshop scheduled for October 2015, data collection for October 2015 – May 2016, and analysis and report construction completed for August 2016. However, the labour dispute between the province of Ontario, ETFO, AEFO, and Ontario school boards resulted in setbacks with respect to project completion times. In particular, ETFO's work-to-rule and a pause placed on activities by the Ministry of Education (see <https://www.app.edu.gov.on.ca/cee/MonthCalendar/Search.aspx>) impacted participant recruitment, with many school boards expressing reluctance to participate in the study given their interpretation of it as violating the work-to-rule or pause on activities. By December 31, 2015, six school boards had agreed to participate, with the final four signing on to the project in late January 2016.

Participants

Group A

Group A consisted of teachers who received two full days of professional development and planning time. Twenty-seven teachers participated in this component of the study. All were intermediate teachers, each responsible for teaching geography in one or more classes in their school. Additional participants included a principal who taught geography at their school and a technology specialist for a very small, rural participating school board. The specialist was invited to attend the workshop to obtain details of the project in order to best support teachers in the project and because of the very small size of the district. In the end, this segment of the study involved 27 participants from 10 different school boards, representing 20 schools and 19 classrooms (two participants teach in a hub classroom) from across the province. Geographical representation was fairly evenly distributed, with schools in urban, suburban, and rural areas. School board diversity was also represented with participants from French (2), public (12), and Catholic school boards (13). In this group, 54% of participants were male and 46% were female (see Table 1).¹

1. All names have been changed to protect the identity of research subjects.

Name	Gender	School Board	Grade Observed	Years Teaching	Previous Training in Technology	Masters (Y/N/in prog.) and Subject	# of AOs	Teachable (Subject)
Barry	Male	Vrackenbrook	7	11	No	No	6	N/A
Chance	Male	Cambridge	6/7/8	9	No	No	2	History & Political Science
Charles	Male	Capple Ridge	7/8	7	No	No	1	History (Political Science)
Claire	Female	Dodgertown	7	16	No	No	3	N/A
Dante	Male	L'Aconte	7	3	No	Yes (and PhD in geo)	2	Geography and History
Elizabeth	Female	Gravenhire	7	5	No	No	5	Psychology
Hector	Male	Cambridge	7/8	28	No	No	1	N/A
Jackie	Female	Steelhowd	6/7	12	No	In Progress (N/A)	2	N/A
Jeannette	Female	Howdenshore	7	6	Yes	No	4	Industrial Design
Jessica	Female	Dodgertown	7	17	No	No	1	Geography, Family Studies
Jerry	Male	Vrackenbrook	8	17	No	No	4	N/A
John	Male	L'Aconte	7	8	No	No	1	Sociology
Keira	Female	Dodgertown	8	16	No	No	5	N/A
Kelly	Female	Steelhowd	7/8	25	No	In Progress (N/A)	0	Biology
Kimmy	Female	Howdenshore	7	10	No	No	6	Kinesiology
Kylie	Female	Steelhowd	7/8	14	No	No	3	Math
Knox	Male	Stonerock	7&8	15	No	No	2	Drama
Lenny	Male	Cambridge	7/8	39	No	No	0	N/A
Lia	Female	Howdenshore	7	7	No	No	7	Business
Madalena	Female	Totten Heights	8	10	No	Yes (Media Education)	1	English
Mario	Male	Capple Ridge	7/8	15	No	Yes (N/A)	1	Geography
Marvin	Male	Cambridge	7/8	17	No	Yes (N/A)	5	English Literature
Matthew	Male	Gravenhire	8	7	No	No	1	Political Science
Nina	Female	Totten Heights	7	13	No	Yes (N/A)	2	English
Scott	Male	Steelhowd	8	17	No	No	2	English and History
Sarah	Female	Vrackenbrook	7	16	No	No	1	N/A
Tom	Male	Capple Ridge	8	16	No	No	3	Social Studies (Psychology)
Walter	Male	Steelhowd	9	20	Yes	No	1	N/A

Table 1: Information about Participants in Group A

Participants were recruited with the assistance of the Council of Ontario Directors of Education (CODE), which reached out to individual school boards. With the exception of one school board (Cambridge) where teachers were recruited by way of cold calling principals after the receipt of ethics approval, all other teachers were recommended directly by school boards and/or principals contacted directly by members of school boards. No teacher recruitment was conducted prior to institutional and school board ethics approval.

Group B

Group B consisted of teachers who did not receive the two days of professional development. Six teachers participated in this component of the study. All were grade 7 and/or 8 teachers responsible for teaching geography in their classrooms or schools as a whole. Participants were from one single public school board. This school board was selected given its proximity to the university and logistical issues with respect to timing for scheduling both a meeting with the teachers and classroom visits. Participants were recruited by way of the instructional coordinator at the board and represented four different schools with geographical representation from urban (1), suburban (4), and rural (1) schools. In this group, 66.7% of the teachers were female and 33.3% were male. Overall, 17 participants in the study (50%) were female and 17 (50%) were male (see Table 2).

Name	Gender	School Board	Grade Observed	Years Teaching	Previous Training in Technology	Masters (Y/N/in prog.) and Subject	# of AQs	Teachable (Subject)
Cassie	Female	Howdenshore	7	7	No	No	4	Physical Health and Education
Dali	Female	Howdenshore	8	6	No	No	4	History and English
Dennis	Male	Howdenshore	7	15	Yes	No	3	English
Jasmin	Female	Howdenshore	7	1	No	No	2	Health and Medicine
Mary	Female	Howdenshore	7	14	No	No	3	Geography
Tad	Male	Howdenshore	7	16	No	No	4	History and Religious Studies

Table 2: Information about Participants in Group B

Workshop (Group A)

All of the participating teachers in this group were invited to York University for a two-day professional development workshop (see Appendix A for overview of curriculum). Each teacher was provided with an iPad to support their engagement with the game and their data collection upon returning to their classrooms and schools. The workshop centered on six types of professional development:

1) Logistical support: Logistical elements of the project comprised 150 minutes of the workshop that included an overview of the project and a discussion of informed consent and obtaining consent from students. Time was spent answering questions, setting up iPads and the WordPress site that would serve as the platform for the teacher blogs, and obtaining access to e-Learning Ontario and board specific D2L sites.

2) Game play: Teachers played *Sprite's Quest* for 60 minutes of the workshop, familiarizing themselves with both the content of the game and the operational details such as the controls, accessing levels, and overcoming obstacles.

3) Action research: Researchers introduced teachers to action research and discussed how to compose observational notes, take videos and photos during observations, and transcribe annotations using the iPads. Additionally, time was provided for teachers to practice taking field notes and conduct observations, with follow-up discussions concentrating on challenges and suggestions. Finally, teachers practiced uploading documents, videos, and photos to the WordPress site, with researchers offering troubleshooting and logistical assistance. Overall, 225 minutes of workshop time was dedicated to action research.

4) Walkthrough of the game and student and teacher activity guides: Guided instruction was used to familiarize teachers with the various elements of the e-Learning Ontario website. In a period that ran for 75 minutes, teachers were walked through a researcher-created teacher resource overview guide and student activity guides.

Specifically, components of the guide were reviewed in conjunction with a discussion of how the teacher activity guides mapped onto the student activity guides. The researchers also offered a series of suggestions for how to best support students while using the game, including:

- a)** providing guided activities before each level. For example, teachers might help students read a map by calling attention to its various features and answering any questions students might have;
- b)** encouraging students to make note of the facts of geography located at the beginning of the level and that pop up during the playing of the game; and
- c)** instructing students to pay attention to the background during game play (see Appendix B for walkthroughs).

5) Lesson planning: Lesson planning was broken into three distinct phases. For the first phase, teachers met with colleagues from their district to construct both individual lessons and a unit plan around *Sprite's Quest*. This phase of planning required 135 minutes spread over the two days. Many teachers elected to meet with their colleagues outside of the workshop at the end of our formal meeting period on the first day to continue lesson planning, and they arrived the second day with additional material. Teachers posted their unit plans for a gallery walk (see Appendix C for samples of teacher work produced during this period).

6) Assessment brainstorming: Teachers were grouped with others outside of their board to brainstorm assessments they might use in a *Sprite's Quest* focused unit. Assessment ideas were later presented and shared with the group as a whole. This activity comprised 90 minutes of workshop time (see Appendix D for samples of teacher work produced during this period).

Meeting (Group B)

Researchers met participants at the head office for their board. The two-hour meeting addressed the following:

1) Logistical support: Logistical elements of the project comprised the vast majority of the two-hour meeting. A brief overview of the project was given, along with a discussion of obtaining consent from students. The iPads and the WordPress site were set up, and teachers worked to obtain access to e-Learning Ontario and board specific D2L sites. Finally, researchers answered teachers' questions.

2) Game play: Teachers played *Sprite's Quest* for approximately 30 minutes, familiarizing themselves with both the particularities of the game (controls, accessing levels, overcoming obstacles) and game content while researchers were assisting specific teachers with the set-up of WordPress accounts.

3) Action research: Researchers briefly introduced teachers to action research and discussed how to compose observational notes, take videos and photos during observations, and transcribe annotations. Fifteen minutes of the meeting were spent discussing action research.



PART 2

Methods and Data

Geography

Classroom Visits and Field Notes

One or two researchers visited each teacher's classroom. The visits ranged in length from 120 to 200 minutes on a single day or over the span of two to three days depending on teacher availability and scheduling restrictions. During visits, researchers took photos and videos of classroom activity and recorded observational field notes. Observational field notes (Creswell, 2013; Denzin, 1989; Emerson, Fretz, & Shaw, 2011; Kawulich, 2005) centered on the following:

- content of the lesson
- pacing of the lesson
- manner in which teachers kept students on task
- number of students engaged/on task during lesson and game play
- number of students disengaged/off task during lesson and game play
- teacher engagement with students during lesson
- teacher engagement with students during game play
- details of student engagement with respect to the game
- student conversations during the work period
- student conversations during game play
- instances in which students commented on not understanding the lesson content
- instances in which students claimed to not know how to do something in the game
- instances in which students passed off the game to another student
- instances in which a student interfered with another student's game play
- collaboration between students during game play
- students being asked to obtain information from the game in a particular fashion such as using screen shots
- students obtaining information from the game as instructed
- situations where students extract information from the game using a strategy that has not been explicitly taught
- instances of purposive game play
- zombie game play

In instances where clarification was required, researchers asked questions of students and teachers. Otherwise, researchers remained as observers in the lessons and did not participate in their implementation. Teachers also frequently spoke with researchers during classroom visits, detailing student engagement with the game and their impressions of particular activities while also offering feedback about the game and activity guides.

Interviews

Semi-structured interviews (Gubrium & Holstein, 2002; Kvale, 1996, 2007; Warren, 2002) were conducted with each of the 34 teachers. All interviews took place over the phone; they were recorded using the software GarageBand and later transcribed. Interviews were scheduled for after classroom visits in order for researchers to ask for additional clarification if needed about what was observed in the classroom. In most cases, the interviews took place after the *Sprite's Quest* unit had been completed and ranged in length from 23 to 81 minutes. Questions focused on:

- 1. General information:** teacher experience and general background; teaching philosophy;
- 2. The game play unit:** the logistics of using the game in the classroom; reasons for making particular decisions about the game, technology use, organization of the space, pedagogical materials, and evaluation; a teacher overview of the unit; particular students and their experiences with using the game; student learning; student engagement; best and worst days with the game;
- 3. The workshop:** teacher feedback on the workshop and whether teachers would consider engaging in this type of project again;
- 4. *Sprite's Quest* more broadly:** would the teacher have used this game were it not for the workshop; how they would use *Sprite's Quest* in a context without limitations; whether they would use the unit in the future; and
- 5. Using videogames in the classroom:** what types of support are needed to use videogames in the classroom (see Appendix E for interview questions).

Interviews were analyzed using the data analysis software *NVivo*. Analysis was conducted thematically, with the interview questions serving as the focal point. The following coding categories were created:

- best and worst day with the game
- class information
- game play
- learning
- lesson plan execution and activities
- lesson planning
- Ministry feedback
- principal of the world/ideal unit execution
- school information

- *Sprite's Quest* feedback
- student experience
- teacher attitudes
- teacher credentials
- teacher feedback
- teacher training in project
- teaching philosophy
- technology use

Surveys

Teacher Surveys

One set of surveys was administered to all 34 teachers. Group A completed the surveys at the outset of the workshop session. Group B completed the surveys after the group meeting due to time restrictions given the length of the meeting. Teacher surveys contained 48 questions on the following:

- 1. Teacher familiarity and comfort with technology:** devices used and frequency of use; main form of communication; online habits including favourite websites; comfort level with computers; and exposure to and experience with videogames;
- 2. Technology use in the classroom:** technologies used in the classroom; experience using videogames in the classroom; barriers to and supports for using technology and videogames in the classroom; any training received on using technology in the classroom; perceptions of future student engagement and learning in relation to videogames; particular students who might benefit from the use of videogames in the classroom; the ideal classroom environment for videogame use; and
- 3. General:** reasons for participating in the study and any pressures experienced to use videogames in the classroom (see Appendix F for teacher survey).

Surveys were used to triangulate the data on pedagogical approaches, familiarity with and use of technology, and classroom observations of teaching.

Student Surveys

Students were asked to complete two sets of surveys, one prior to the *Sprite's Quest* unit (titled "pre-survey") and one at its completion (titled "post-survey"). Both surveys were administered by classroom teachers. Pre-surveys were collected during the classroom observation period. All 34 sets of pre-surveys were returned to the researchers, consisting of 768 surveys in total. Pre-surveys contained 53 questions. The questions focused on:

- 1. Student familiarity and comfort with technology:** devices used and frequency of use; main form of communication; online habits including favourite websites; frequency of game play; and favourite videogames;
- 2. Conceptions of connections between videogames and learning/education:** what videogames might teach in schools; frequency of videogame use in learning contexts prior to this project; and
- 3. Geographic learning:** specific geographic questions pertaining to terminology, concepts, reading graphs and reading maps. These questions were included to assess knowledge prior to the game play unit (see Appendix F for student pre-survey).

Post-surveys were returned to the researchers via regular mail. Thirty-one sets of post-surveys were returned to the researchers, consisting of 435 surveys in total. Fewer post-surveys were returned than pre-surveys for three main reasons. First, school trips and events resulted in high absenteeism at the end of the year. Second, the mode of delivery impacted receipt. One set of surveys sent by regular mail did not arrive, and the ongoing threat of a mail strike may have impacted teachers' decisions not to send in their post-surveys. Third, survey-fatigue contributed to a lower response rate. Post-surveys contained 32 questions. The questions focused on:

- student perceptions of the game and enjoyment while playing
- student game play habits using *Sprite's Quest*
- student learning generally
- geographic learning (see Appendix H for student post-survey)

Surveys were analyzed in relation to these thematic categories, focusing on commonalities and differences in experience. Pre- and post-survey geographic learning was compared across surveys in order to ascertain if learning occurred as a result of the game. The survey was then coded, including for correct and incorrect answers to the questions about geography, and entered into the software R for analysis.

Blogs

Thirty-one teachers constructed blogs during the game play unit. Teachers were encouraged to post anecdotal observational notes during play, as well as photos and videos of lessons and students. Blogs were hosted on the project site <http://www.playing2learn.ca> and composed on individual teacher pages using WordPress. Blogs were password protected, accessible only to the individual teacher and researcher. Blogs consisted mainly of anecdotal notes focused on:

- comments regarding student learning
- details of technology used in the class
- descriptions of the physical classroom space
- descriptions of the class
- descriptions of student interactions
- descriptions of student engagement or interaction
- feedback on the survey
- feedback on the activity guide
- feedback on the game
- general challenges
- general comments or insight regarding the game and student learning
- overview of the unit and what occurred during the lessons
- reasons for decisions made
- teacher collaborations
- technological issues and/or solutions

In addition to notes, some teachers included photos of student work, photos and videos of the class during game play, and short interviews with students. Blogs were transcribed and analyzed using NVivo. Analysis was organized around the types of comments detailed above and mainly focused on commonalities and differences identified in the anecdotal notes. The blogs were also triangulated with the teacher surveys, student surveys, and observations made by researchers.

Instructional Materials and Samples of Student Work

Teachers were encouraged to submit instructional materials created for the game play unit (e.g., PowerPoint slides, worksheets, debate questions) along with any samples of student work. Materials and samples were either shared with the researchers electronically through email or a cloud software such as Dropbox or Google Drive, or they were sent through the regular mail. Instructional materials were analyzed in conjunction with the teachers' descriptions of lessons in order to understand how teachers used the game and the activity and resource guides. Teacher-created resources were also analyzed to enhance researcher knowledge of how the game was used to support pedagogy, how teachers evaluated the unit, and what kinds of tools might be further developed to support future pedagogy around the game. Samples were analyzed for evidence of student learning.

Data Analysis

The pre- and post-surveys were the biggest data set, with over 700 pre-surveys—received as late as May 2016—and over 400 post-surveys—received as late as July 2016. Given the size of the data set, transcription took quite some time and had to be completed before analysis could begin. Transcription began as class sets were received. Teacher surveys were completed at the February workshop for teachers who received professional development and immediately following the April meeting for teachers who did not receive professional development. These surveys were analyzed alongside student surveys. Qualitative comments were analyzed thematically using the software *NVivo*. Statistical analysis was completed using the software *R*. Analysis of all surveys was completed in October. Turning to the interviews, they were transcribed upon completion using a professional translation service to ensure accuracy. Though the service was fairly quick, a lag time did exist between sending out audio files of the interviews and receiving them back in text format. All of the interviews were transcribed by the end of June, at which point thematic analysis began using the software *NVivo*. Analysis was complete by the end of August. The teachers' blog posts were completed at the beginning of July and were also analyzed using *NVivo*. This analysis was also completed by the end of August. Finally, instructional materials and assessments were qualitatively analyzed, with analysis completed by mid-September.



PART 3

Teacher and Student Reported Device and Media Use

This section reports on device and media use reported by the teachers and students who participated in the study. The data was obtained from the teacher surveys and student pre-surveys.

Teachers' General Device and Media Use

While 34 teachers participated in the study overall, the technology specialist who attended the workshop also completed the survey. Her reported media device use is included as part of this data set, bringing the total number of participants up to 35 for this section of the report. Teachers were first asked to select the devices they have access to at home and use regularly. Pertinent to this study, slightly more than half (57%) of teachers reported using desktop computers (see Figure 1). More teachers reported using and having access to laptop computers: 91% identified as laptop users (see Figure 2).

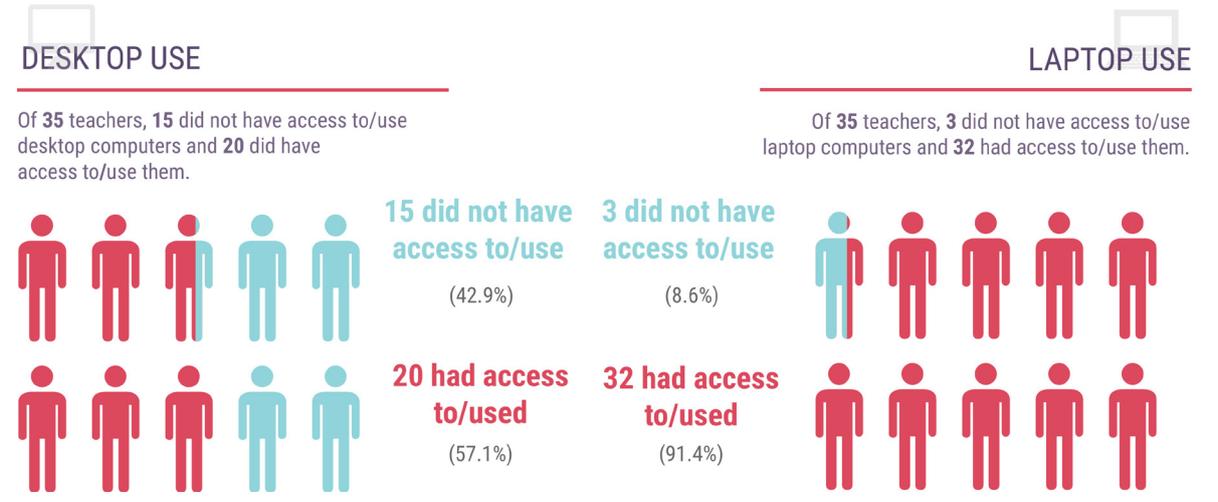


Figure 1: Teacher Reported Desktop Use

Figure 2: Teacher Reported Laptop Use

Comparing the two responses, overall, 100% of teachers indicated that they had access to either a laptop or desktop computer at home. Thirty-seven percent reported having access to and regularly using both laptop and desktop computers at home (see Figure 3). These responses indicate that teachers who participated in the study are computer users.

COMBINED DESKTOP AND LAPTOP USE



Figure 3: Teachers' Combined Desktop and Laptop Use

Other than general use, teachers were asked about their confidence using computers and software. Responses were collected using a Likert Scale—a six-point scale that evaluated responses from 0 to 5, where 0 referred to not at all confident, 1 to very little, 2 to somewhat, 3 to mostly, 4 to very much, and 5 to completely confident. Reported here are the mean scores. Asked about confidence using the computer at home and at school, responses were identical with 90% reporting confidence when using the computer at home and at school. Somewhat high confidence levels were also reported for using the computer to communicate with other people (73%) and learning to use new software on the computer (73%). Lower comfort levels were reported for fixing the computers if they run into problems (58%) and using software never used before (49%). This data suggests that the teachers who participated in the study were computer users but that their confidence declined when they were required to fix the computer or learn new software (see Table 3).

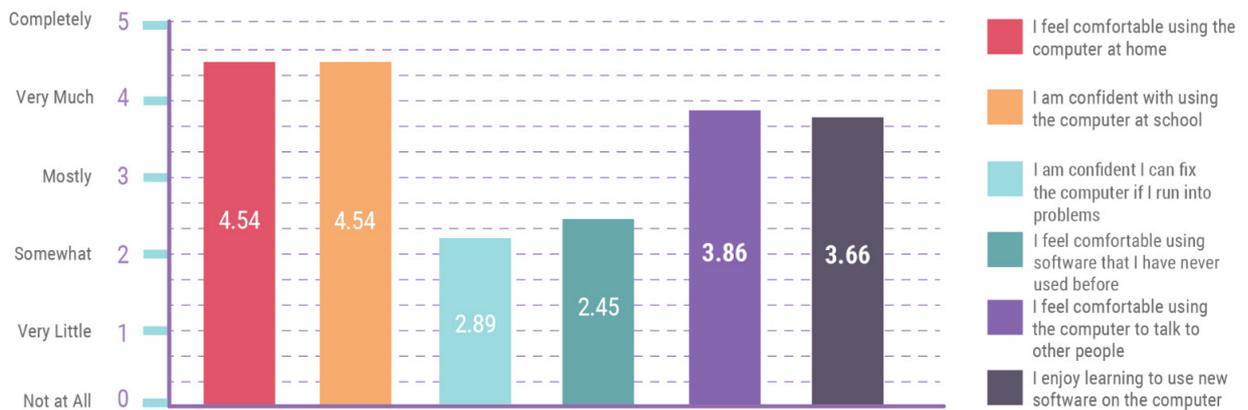
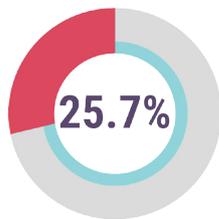


Table 3: Teacher Reported Confidence with Computers

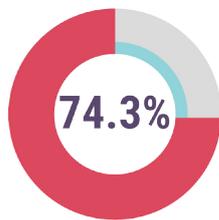
Game Play Data: Teachers

Turning to games in particular, only 26% of teachers reported having access to and regularly using a game console at home (see Figure 4). Speaking to exposure to videogames more broadly, just over half of the teachers (51%) indicated that they have a child in their home who plays videogames (see Figure 5).

TEACHER ACCESS TO GAME CONSOLE

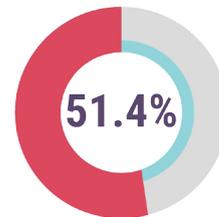


9 teachers reported having access to/playing console games.

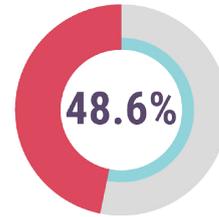


26 teachers reported **not** having access to/playing console games.

TEACHERS WITH CHILDREN AT HOME WHO PLAY VIDEO GAMES



18 teachers reported having a child who plays video games in their household.



17 teachers reported **not having** a child who plays video games in their household.

Figure 4: Teacher Access to Game Consoles

Figure 5: Teachers with Children at Home Who Play Videogames

Commenting on game use more broadly, teachers were asked to report on frequency of use of board or card games, console videogames, computer videogames, massively multiplayer online games (MMOs), handheld device games, and mobile or tablet games. Responses were also collected using a Likert Scale: from 0 to 4, where 0 referred to never, 1 to 1-2 times per month, 2 to 1-3 times per week, 3 to 5-6 times per week, and 4 to 5-9 hours per week. The mean out of 4 is reported here. Of the highest scores, nearly 30% of teachers reported playing mobile or tablet games an average of slightly less than 1-3 times per week. Thirty percent played board or card games an average of slightly more than 1-2 times per month, and 27% played handheld device games an average of 1-2 times per month. Eighteen percent noted that they play videogames on the computer an average of less than 1-2 times per month, 15% played videogames on consoles an average of less than 1-2 times per month, and only 4% reported playing MMOs an average of less than 1-2 times per month. Overall, this data indicates that the teachers who participated in

the study are not game players, with the highest percentage (only 30%) indicating that they play games on mobile and tablet devices rather than consoles or on the computer, and only about 1-3 times per week (see Table 4). This is an important finding as it indicates that teachers are not necessarily familiar with games as media because they do not play them regularly. This lack of familiarity with games was something that they also addressed in their conversations with us while we visited their classrooms and in the interviews, worrying that they were not good enough game players to help their students if they were confused or could not complete a level.



Table 4: Teacher Reported Game Use

Students' Device and Media Use

Data for this section is based on 795 student responses to the pre-survey. Asked to identify the devices they have access to at home and use regularly, desktop use was fairly evenly split with 48% of students indicating access to and regular use of desktops (see Figure 6). For laptops, more students (65%) had access and indicated regular use (see Figure 7).

DESKTOP USE

Of 795 students, 410 did not have access to/use desktop computers and 384 had access to/used them.



Figure 6: Student Reported Desktop Use

LAPTOP USE

Of 795 students, 281 did not have access to/use laptop computers, and 513 had access to/used them.



Figure 7: Student Reported Laptop Use

Overall, 32% of students indicated that they had access to both a laptop and desktop computer at home, 81% of students had access to either a laptop or desktop computer, and 19% of students had access to neither (see Figure 8). This finding is significant as it highlights limitations for game-based learning that extend outside of the classroom. While most students who participated in the study did have access to a computer at home, one fifth of students did not. For this reason, with all technologically-based assignments, teachers must recognize that not all students have access to technology at home.

COMBINED DESKTOP AND LAPTOP USE

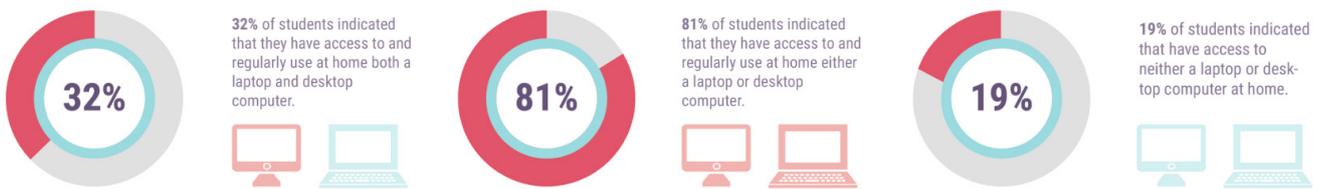


Figure 8: Students' Combined Desktop and Laptop Use

Students were also asked about their comfort and confidence using computers. Much like the teachers, students reported high levels of confidence using computers at home and at school (82%). Enjoyment in learning to use new software on the computer was also fairly high (65%). Confidence was lower for tasks such as using the computer to talk to people (59%), using software that they have never used before (54%) and fixing the computer (51%). Overall, the students who participated in the study were confident computer users and reported greater confidence than their teachers (see Table 5).

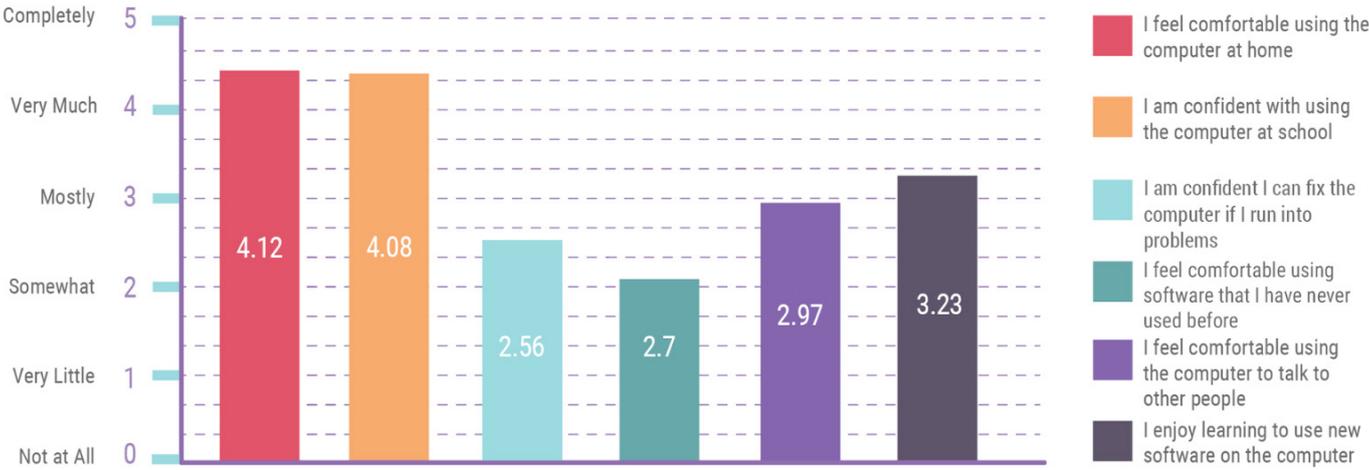


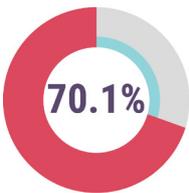
Table 5: Student Reported Confidence and Comfort with Computers

Game Play Data: Students

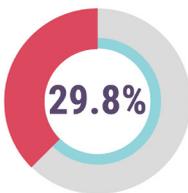
Turning to games in particular, 70% of students reported having access to and using a game console at home (see Figure 9).



GAME CONSOLE USE



557 participants in total reported playing console games.



237 participants in total reported **not** playing console games.

Figure 9: Student Game Console Use

Like the teachers, students were also asked to report on frequency of use of board or card games, console videogames, computer videogames, massively multiplayer online games (MMOs), handheld device games, and mobile or tablet games. The highest numbers were reported for games on tablet or phones at 66% (between 1-3 times per week and 5-6 times per week), games on handheld devices at 54% (also between 1-3 times per week and 5-6 times per week), and videogames on a console at 50% (slightly more than 1-3 times per week). Lower numbers were reported for videogames on the computer and multiplayer online games, with both at 39% (between 1-2 times per month and 1-3 times per week), and the lowest for board or card games at 30% (1-2 times per month). Overall, data suggests that the students who participated in the study are regular users of games on tablets or phones, playing on average twice as frequently as their teachers, and they are also more frequent console game players (see Table 6). Students are not regular players of games on the computer or of multiplayer online games, averaging only slightly more than 1-2 times per month. That students play games more than their teachers is not necessarily surprising, but it does indicate that games are a medium familiar to many in this generation of students, more so than for their teachers. We believe the data speaks to a compelling reason for using games as a learning resource in classrooms: games hold the attention of today's students (see de Castell & Jenson, 2004).

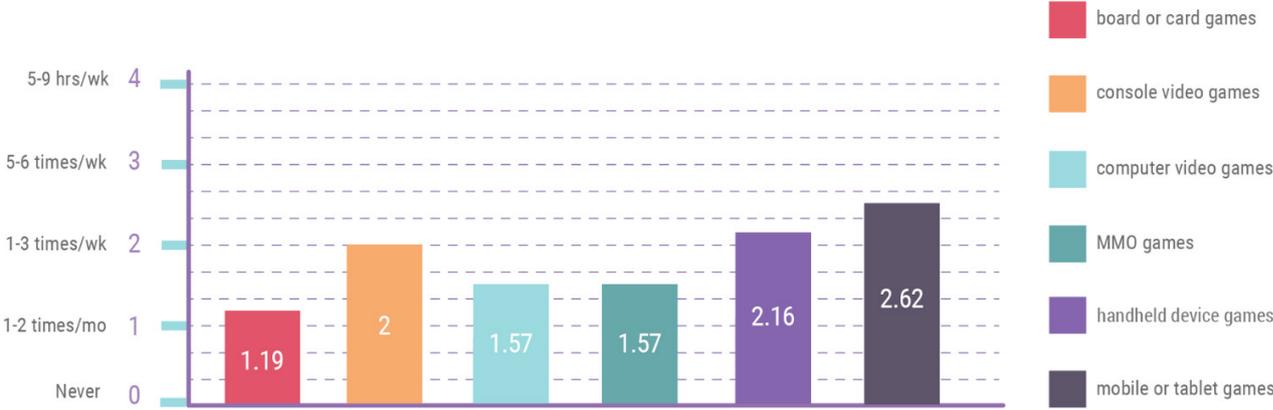


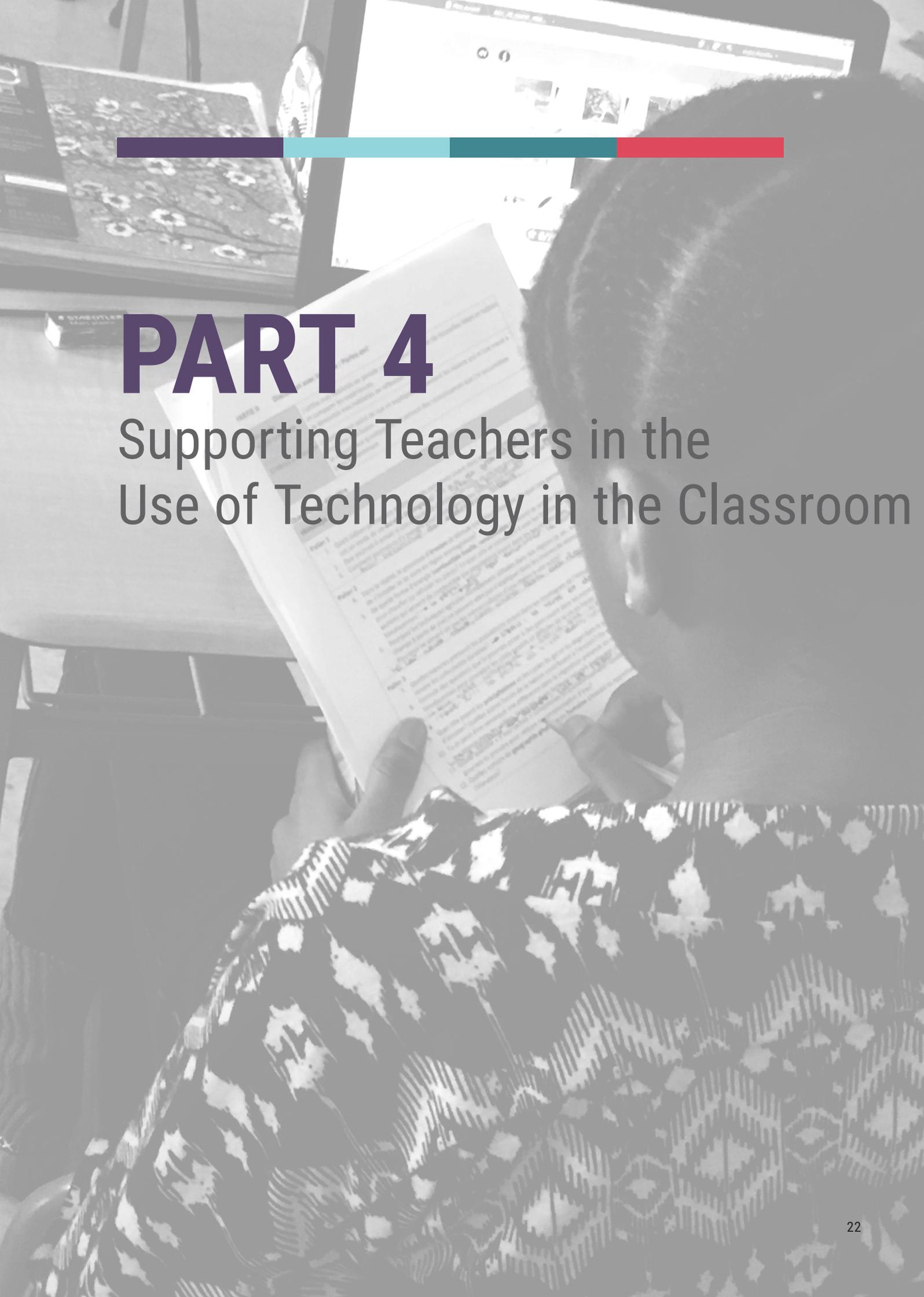
Table 6: Student Reported Game Use

Moreover, we asked students if videogames could be useful in teaching and learning and 89% of students said yes (see Figure 10). This finding suggests that the students who participated in the study were overwhelmingly in favour of the idea of using videogames for learning.

VIDEO GAMES AS TEACHING TOOLS



Figure 10: Videogames as Teaching Tools



PART 4

Supporting Teachers in the Use of Technology in the Classroom

In the pre-survey and interview, teachers were asked to discuss current supports for using videogames in the classroom, barriers to using technology, and further supports needed to use videogames in the classroom. For analysis, answers are grouped by type such as access to technology within schools, student access to technology at home, and barriers. For the survey, the percentage of responses received per category is calculated out of the total number of responses given. Space was provided for teachers to offer more than one answer per question. Of interest, then, is the number of times an answer was provided per category overall rather than the number of teachers who provided an answer in that category. For example, rather than noting that 14/34 (41%) teachers indicated lack of access to technology in school, we calculate 84 total responses to the question and note that 18/84 responses (17%) focused on lack of access to technology in their schools. For each thematic category, responses are listed by percentage in descending order¹.

Using Videogames in the Classroom: Current Supports, Required Supports, and Barriers

Pre-Survey Data

Asked what current supports teachers have for videogames in the classroom, 58% of responses indicated that teachers had access to hardware such as iPads/Chromebooks/laptops to borrow (22%), student devices (14%), computer labs (10%), computers in class (6%), SMART board (4%), and WiFi (2%). In addition, 14% of responses called attention to having support from support staff and principals, and 4% reported having software for access to games. When asked about current supports in the classroom, 22% of responses indicated that teachers have none (see Table 7).

1. Percentages were rounded to the nearest whole number. As rounding was used, the total percentage in "Further Supports Needed to Use Videogames in Classroom: Pre-Survey Data" equals 101% rather than 100%.

SUPPORTS	IPads/Chromebooks/Laptops to Borrow/Book	22%	% OF RESPONSES
	Student Devices	14%	
	Support Staff	12%	
	Computer Lab	10%	
	Computers in Class	6%	
	SMART Board	4%	
	Access to Games	4%	
	WiFi	2%	
	Principal Support	2%	
	No Response	2%	
Total Percentage of Responses Indicating that Teachers Have No Current Supports		22%	

Table 7: Current Supports for Using Technology in the Classroom

It is noteworthy that hardware access varies drastically among teachers, even within the small majority who said they had access. Moreover, in many instances, responses about hardware access were coupled with a qualitative comment about the restricted nature of that access. For example, addressing disparities between teachers’ access to technology, a participant noted having access to “1:1 iPads in our [school] classrooms” (Elizabeth), while another had access to “15 iPads to share among 5 intermediate classrooms” (Sarah). Commenting on restricted access to technology, teachers stated, for example, that “access to 28 desktops – must be scheduled” (Kelly), or “We have a computer lab that I can occasionally sign up to use” (Tad). Or, in another example, “We have regular access to 13 iPads shared amongst 7 Grade Seven classes. We also have access to 2 class sets of iPads and 2 class sets of Laptops, shared amongst the entire school (23 classes)” (Dennis). Importantly, while teachers cited hardware as a current support, they simultaneously acknowledged restrictions and barriers with respect to that support.

Asked to identify requested supports for using videogames in the classrooms, the majority shifted away from technology to pedagogical support. Of the responses provided for requested supports, 53% cited pedagogical concerns. Teachers expressed the need for professional development opportunities connected to game-based learning, training on specific apps and games, and training on how to use games in the classroom in a meaningful way, including implementation strategies, creating assessments, and producing learning goals. Workshops and modelled lessons were also included as the type of training required, as was a desire to better understand how “students

learn from the playing of the game” (Tad). Additionally, access to a wide variety of games that are engaging, cross-curricular, and pertinent to the curriculum was also recommended, as was time to play the game and gain experience, time to read through the accompanying resources provided with a game, and exposure to a variety of games.

Despite the emphasis on pedagogy, 34% of the responses cited technological issues as barriers affecting the use of technology in the classroom. In addition to the need for more technology in the school and increased regular access to technology, technological issues included a need for up-to-date equipment and software, reliable access to the internet, gaming-focused hardware such as Xboxes and controllers, and access to licensed games, installed applications, games with the capacity to log in (so that student progress can be saved), and reliable electricity in the classroom. Additionally, 6% of responses highlighted external constraints such as lack of support from administrators and parents who do not recognize the learning potential of games and fail to “champion games” (Barry). The remainder were unsure or did not respond (see Table 8).

Further Support Needed	% of Responses
More Technology/Access to Technology	21%
Teacher Training in Apps/Games	21%
Knowledge of Games: Cross-Curricular and Educative	16%
Time	8%
Buy-In/Support from Administrators and Parents	6%
Networking/Collaboration with Other Educators	6%
Reliable Technology	6%
Apps Available/Installed	5%
Electricity	2%
Student Understanding of the Purpose of Technology in the Classroom	2%
No Response/Unsure	8%

Table 8: Requested Supports for Using Technology in the Classroom

Responses to questions about barriers to using technology in the classroom focused largely on technology and access, following a similar pattern to discussions of needed support. Seventy percent of the responses focused explicitly on technological barriers such as availability of computer labs, availability of devices when needed, and a sufficient quantity of devices to ensure that students each have their own. Teachers also called attention to the cost associated with obtaining additional technology, one noting a lack of parent council fundraising at the school for these types of items. Another highlighted the extent to which teachers were required to apply for grants, fundraise, and “beg” to acquire additional technology. Out-of-date or non-functioning devices and computers, including those that require software updates or run too slowly, were also cited as barriers. Additional technological barriers ranged from inconsistent WiFi signals, unreliable or inoperable WiFi, and bandwidth issues such as getting all students on the internet at the same time, getting a class on the internet when others in the school are using the network, and limited choice of accessible games due to limited bandwidth. Teachers’ comments on barriers to videogame use in the classroom also called attention to pedagogical concerns such as lack of knowledge leading to low comfort levels, getting access to improved knowledge of games, and broader issues such as student reading levels and classroom time constraints. Overall, 28% of responses cited pedagogical concerns (see Table 9).

B A R R I E R S	Lack of Technology/Access to Technology in the School (28%)	28%	% O F O V E R A L L R E S P O N S E S
	Wifi/Internet/Network Access	22%	
	Student-Specific Issues with Technology	11%	
	Out of Date Technology	8%	
	Lack of Knowledge/Comfort Level	8%	
	Lack of Access to Technology for Students at Home	6%	
	Time	3%	
	Getting Access to/Knowledge of Games	3%	
	Platform Compatibility	3%	
	Concerns about Technology	3%	
	Buy-In/Support	3%	
	Other	3%	

Table 9: Barriers to Using Technology in the Classroom

Further Supports Needed

Interview Data

After participating in the workshop and using *Sprite's Quest* in their classrooms, teachers were asked what types of supports they need to use videogames in the classroom. As noted in the pre-surveys, a number of teachers called attention to the need for access to technology. Jackie described the experience in her school:

Our school doesn't have much. I mean [we have a] computer lab and a really bad netbook cart. I would to do more tablet based things, but we don't have those. That's the one thing I would love to have at my school -- some more tablets. But then another drawback we've got... so this past summer I actually sent out an email to a whole bunch of random organizations saying, "if you have any old cell phones that you don't want and you want to get rid of, donate them to me and I will happily use them." There was a set of thirty-five cell phones donated to me. Then I got in major trouble at school because we don't have enough outlets in the classroom so we were plugging them in with power bars and got into trouble. I can't use them anymore because we don't have enough outlets. I know that's a really, really silly one but in this day and age of high tech, I have two outlets in my classroom, two. More outlets, more outlets, I know that's a really silly one, but would make such a big difference in my world.

Similarly, Jasmin explained the technological situation in her school and the barriers that come from having her classroom in a portable:

We have 2 iPad carts in the school, and [I'm] out in the portable, so we can't bring the technology out to the portable. We have to come and book up the staff room. That gets a little bit tricky, depending on what's going on in the staff room. Since there's so many kids in the school and so many teachers and only 2 iPad carts, it's a little bit difficult to always be able to book them out....

Then, we have Notebooks, but again, we can't take that to the portable. They're not the quickest, and they're very small. The computer lab was closed for three weeks during EQAO. It was closed for the three weeks before EQAO to do all the testing and get all the equipment ready. That was a huge challenge because you couldn't even use the computer lab to go and play.

And Cassie noted how quickly devices are signed out in her school:

At our school, we do have a lot of the different technology. We have 1 netbook cart, which I think has about 25 netbooks on it. We have 2 separate iPad carts and the computer lab. We do have the technology; it's just availability. You really have to be quick. The thing is that teachers can book them weeks in advance, so sometimes you don't think about using the technology until a couple days before and then, when you go to get it, it's gone. You have to rearrange your schedule. That's probably the biggest thing that I've always had difficulty with. I'll have a great idea and then I'll be like, "Oh, let's go book this out," and it's not there.

As in the pre-surveys, teacher training and administrative support were also cited as further supports required for teachers in the use of videogames in the classroom. Speaking first about training, Charles noted, "We need workshops. We need workshops to, one, introduce us to the game [and two] so we know that it's there." Similarly, Elizabeth expressed a desire to have access to and knowledge of games connected explicitly to the curriculum:

I think knowing what games or apps are useful for what part of your curriculum would be really helpful especially this being my first year in intermediate. It was really nice that *Sprite's Quest* was geared towards Grade 7 and I knew that it was hitting certain points of the curriculum, whereas often you get flooded with apps and you have to filter through how you're going to use it, for what part? Even if it is relevant, does it go deep enough into your math curricula, and is it a little more of an intro to something else that you're doing...?

As a first-year teacher in this grade, it's difficult to go through all that work to get an app on the iPad, have it approved, have it loaded on and then not to have it work. If there was a little more of a guideline of what suggested programs to use, that would be helpful.

And commenting on the need for support from administrators, Knox explained:

Obviously it would be good to have the support of the administration for sure. Usually we have big directives and principles that they want us to follow. We've been doing things this year like guided inquiry.... If there's a way where we could do that and use technology, I'm sure my principal would be behind that. I don't want to speak for her, but I would imagine she would be. For me, I would definitely want the support of the administration. If I could do it, then absolutely I would bring [using more games in the classroom] up to her.

Yet, unlike the pre-surveys, after participation in the study, teachers cited the need for in-class technical support in the form of people who could provide assistance and operational support including more detailed teacher's guides. For example, Dante expressed the need to have an expert nearby while using the game in the classroom:

There are some teachers like myself who are not very adept at playing the game, who are not manually adept, I would like to see a specialist who would teach us how to play and to be there when we ran into trouble. It would be nice to have someone with whom we can discuss aspects of the game, what to explore more in depth in the game. Because for me, for instance, I am not very fast and there were students who were much faster than I am and who finished before me because they are more used to playing games than I am, so to invite a specialist into the classroom who could do a general presentation about the game for the students [would be good].

And Kimmy noted her desire to have a teacher's guide as a source of support:

I think teacher's guides are really important, because there is still some skepticism out there with using video games in the classroom and sometimes having to prove why it works. Teacher's guides are helpful to have as backup and to guide your planning because there are so many places that you can take it. It's nice to have someone give you some ideas of where to go.

In addition to in-class technical support and teacher's guides, timely responses from IT staff for the installation of games and platforms was a needed support cited in the interview but not mentioned in the pre-survey. Barry noted lengthy wait times for having *Sprite's Quest* installed:

[To use technology in the classroom], you would always have to have proper support from the IT, but we don't have that. Even related to this [project], we didn't have [access to the game] right up until before you guys came to observe. I think we were one of the first you came to see. Our IT team was taking a while to get it up and running. We didn't even have access. The games weren't loaded on the devices; the e-Learning site wasn't available for us.

Charles echoed:

We need the technical support from our IT department to be on board to get things installed or fix any glitches immediately. If there's delay, the drive or willingness to move forward just dwindles. That definitely would have been an issue. I know if I had to do it through our lab it could have been a complete disaster. Even trying to get our educational *Minecraft* fixed and up and going, it took six months. That's impossible. We only have geography half the year; we have history the other half. If I waited half the year, the term would have been done.

And Madalena outlined difficulties with getting the board to install the game on her devices:

Well, from the very beginning I found it very difficult within our board to even just get *Sprite's Quest* onto our page and have all the students have access to that. That 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.

The post-survey responses offered important commentary on the need for in-class technical support and timely IT assistance. Similar to issues with support noted above, quick IT support was likely a concern that arose during practical experience with attempting to use the game in the classroom, and hence, was not reported in the pre-survey as it may not have yet been a concern for teachers.

Summary and Discussion

Access to Technology

The most commonly cited concern for teachers, both in listing barriers and supports necessary for supporting videogame use in the classroom, was access to technology. From a practical standpoint, access to hardware, such as desktops, laptops, and iPads, is a basic requirement for using videogames in the classroom; students will not be able to play a game without a device. Similarly, internet, WiFi, and bandwidth access are necessary for games that are played online or downloaded from the internet, and adequate power supplies, including outlets in the classroom, are required for ensuring that devices have power. While many schools have shared devices, teachers called attention to practical concerns with timing and planning when devices need to be booked in advance, sometimes leading to large gaps between lessons when technology is not available.

Quick and Ready Access to Games

As noted above, while concerns about access to games and resources were not reported in the pre-survey data, after using *Sprite's Quest* in the classroom, teachers reported problems with being able to get games loaded onto devices and obtaining access to D2L sites. In particular, frustrations were noted with lengthy wait times coupled with a limited window for teaching a particular subject. As with access to hardware and the internet, access to the game and its resources is crucial to the successful utilization of games in the classroom.

Teacher Training

Prior to the workshop, teacher training was considered an important support for the integration of game-based learning in classrooms. However, after the workshop, training was less of a concern than access to pedagogical supports such as a teacher's guide and physical supports such as a tech support person in the classroom to assist the teacher while students play the game. Perhaps training was less a point of concern as teachers had just completed the kind of training they felt was needed: e.g., an overview of a specific game, training on how to use the game, the chance to collaborate with other educators, and various types of assessments (by way of a walkthrough of the teacher's and student guides and the opportunity to create assessments with colleagues).

Knowledge of and Access to Games

Teachers continued to call attention to the need for a more centralized means of gaining knowledge of and access to games with explicit connections drawn to the curriculum. Highlighting the extent to which access impacts a teacher's choice to use a game in the classroom, teachers were asked if they would have used *Sprite's Quest* in the classroom were it not for the workshop. Six teachers indicated yes, citing the game's value with respect to student engagement and student learning, or noting that they would have used the game had they come across it during their geography unit. Only two teachers said no, and they cited a lack of comfort with technology and the need for the workshop to help expand their knowledge base. All of the other 26 responses emphasized awareness of the game as the determining factor: either they would not have used the game because they would not have known about it or they would have used the game had they known about it. For example, Kimmy stated, "I don't know that I would have [used *Sprite's Quest*] only because I don't know how I would have found out about it. If I had known about it or learned about it, I would absolutely [have] be[en] open to using it in the class. I just didn't know about it." Similarly, Matthew responded, "Probably not because I wouldn't have come across it," and Mary stated, "I wouldn't have known about the game, to be honest. I hadn't heard of it until I was approached about [the workshop]. I wouldn't have known where to find it or I would have had no idea where it was located." Yet, when asked if they would use *Sprite's Quest* in their classrooms next year, 29 of the 31 teachers asked said that they would.



PART 5

Student Learning and Engagement with Game Play and Game-Based Learning Unit

Learning Activities in the Classroom

Not surprisingly, the length of time individual teachers spent on the game varied by classroom, as did the content of the unit. For example, some teachers spent three periods on the game, others fifteen or sixteen. Some teachers focused on concepts in the game and the teacher's guide such as liveability, sustainability, or economic issues such as tourism and trade. Others focused on particular areas of the game such as the Himalayas or New York.

Most teachers relied on the teacher's guides or student activity guides for the content of their lessons, either using activities taken directly from the guides or crafting their own modified version of learning activities.¹ In fact, in the interviews, 97% of the teachers who participated in the study reported that they used the teacher resources and student activity guides in their classroom-based learning activities. For example, 50% of teachers used some variation of the "What's There, Why There, Why Care" activity in their classrooms, either as a task for students to complete while playing the game or as a learning task to be completed at the end of a level. During play, some teachers asked students to take notes on paper or sticky notes, or they grounded student play in learning activities by creating their own sheets for students to complete during play. Jackie, for example, created a graphic organizer for students to keep track of items identified in the level, while Kelly generated a "Play Accountability Sheet" containing blank boxes for students to record the level of the game, what they noticed, what structures they saw, points of interest, obstacles encountered, yellow rain drop trivia, and yellow star information (see Appendix B for walkthroughs). Similarly, both Walter and Scott constructed short quizzes for students to fill out based on the facts that appeared throughout the level during play, while Jerry generated a question sheet. Nina, Jessica, and Dennis's students filled out worksheets modified from the "Natural Processes" activity, and Jerry's students completed an overview of China worksheet, explaining its physical features, history, politics, culture, economy, and military (see Appendix I for samples of student work).

Beyond activities to be completed during play, most teachers required students to complete multiple follow-up activities over the course of the unit. For example, students may have been asked to complete a "Natural Processes" activity and a discussion question, or a series of multiple discussion questions per level leading up to a culminating activity. Hector, who spent 16 classes on the game, required students to complete discussion questions, learning activities, and a culminating activity for each level, all taken directly from the student guide. Barry, who used the game for approximately 10 classes, asked students to submit "Natural Processes" and "Geographic Thinking" activities as well as a culminating task that asked students to respond to the question: how does tourism affect the area? Dali's students filled out a "What's There, Why There, Why Care" worksheet and composed a short paragraph identifying a factor in the game that enhances or hinders liveability that could then be connected to an experience outside of the game (see Appendix J for samples of teacher-created instructional material).

1. The one teacher who did not reference either the teacher resources or student activity did not include any learning activities in her lesson.

Assessment

To evaluate the learning activities completed in class, teachers employed a variety of assessment strategies, and assessment varied among teachers. In cases where numerous tasks were completed over the course of the unit, many teachers reported that they provided formative feedback for students in the form of oral or written comments, anecdotal notes on some tasks, and a formal grade for the final or culminating tasks. For example, Charles's students wrote a paragraph about whether or not Hawaii is a sustainable place to live. Similarly, Dali's students were given a final grade for their short paragraph activity—a text discussing how a particular factor in the game enhances or hinders liveability—as were Tom's students for their “Through The Eyes of the Artist” presentation, a presentation based on the “Through the Eyes of the Artist” activity located in the teacher's guide. Final grades were also given by Elizabeth for her students' visual organizer, and by Jackie for her students' culminating task for the Himalayas level of the game—a graphic organizer taken from the teacher's guide asking students to respond to the question of whether or not there should be a limit to the number of climbers allowed on the mountain. Other teachers graded multiple tasks: Barry assigned a mark for all three of his students' tasks, as did Hector for the discussion questions and culminating activities his students submitted, and Nina for the worksheets students completed and her students' infographic. In general, most teachers used assessments from the teacher's guide and the student guide, though some did create their own assessments, linking game-based learning to learning outside of the game. Nina and Madalena, for example, had their students create an infographic based on both game-based learning and student-based research that extended beyond the game. Jeannette connected the game to the history curriculum, evaluating a student-produced graphic organizer that drew from both the game and other material for a comparative picture study.

In keeping with ethics protocol, neither the activities nor the assessments used in class were evaluated by the researchers. Rather, materials from lessons such as PowerPoint slides and SMART Board images, documents used for assessment (including handouts, instruction sheets, and rubrics), and samples of student work were submitted by teachers in order for researchers to get a sense of the types of activities and assessments used in the classroom outside of the researchers' classroom visits. Based on teachers' statements in the interviews and the extent to which materials from the teacher's guides were used in classrooms, it is evident that at least for this group, the teacher's guides were necessary for the integration of game-based learning activities. This is especially the case when teachers are new to a game as they rely on the guides to direct them to meaningful and engaging pedagogical materials.

Teacher Perceptions of Student Learning: Pre-Study

Asked at the outset of the study about the perceived impact of games on students' learning, 45% of responses commented on how the game would positively impact student engagement. For example, teachers noted that the game would “make them excited to participate,” offer “greater enjoyment of

[the] material being learned” (Cassie), “chang[e] attitudes on geography being boring” (Mario), and would “be positively received by students” (Lia). Moreover, 6% spoke of reaching different types of learners such as visual and tactile learners or those who require differentiated instruction. Twenty-five percent of responses cited improved learning and retention as a perceived impact of game play broadly, though they did not specify a manner in which it would be improved. Teachers noted that students might have “more dialogue about their learning [and be] invested in learning” (Madalena), that the game will “educate them while they play” (Knox), and that it will help them “learn what they struggle to learn with the more traditional ways that have been used by myself in the past” (Hector). Twelve percent of the responses revealed that teachers were unsure of the impact at the outset, with some noting that the use of games “[could] go both ways” (Matthew); that after initial engagement, “interest will rapidly fade” (Dennis); and that while for some the game may have “a high impact, for others [it will be] just an excuse to play” (Jessica). The remaining responses focused on the game’s perceived benefits as, for example, a resource for reviewing concepts, a means for bringing content to life, a means for helping students develop other skills such as confidence and self-directedness with respect to their learning, and a tool for encouraging healthy competition among students. Also noted were possible risks such as the game’s potential to frustrate students who do not like gaming and undue emphasis on game play over learning the curriculum.

After using *Sprite’s Quest* in the classroom, a benefit of the game frequently cited by teachers was its accessibility for a class of students who possess a wide range of learning needs. Highlighting the game’s ability to appeal to students across a spectrum of learning styles, Cassie explained that the game “would be good especially for...kids who are visual learners because it gives them that more interactive feel versus a teacher just standing there spewing information or having them do paper/pencil tasks.” Another teacher put it this way:

Gaming...really lends itself to differentiated instruction. Some of the kids were having a tough time, so that’s fine. They were still trying to learn and still game...Then there are some of the high [performing students] who were totally getting it real quick.... They just continued to play the game but in a different way where they’re trying to maybe get more points or more stars or more water, whatever it was, just to challenge themselves in a different way.... It’s kind of cool where they’re all learning geography, but they’re all learning at their own pace. (Charles)

Jackie praised the audio component of *Sprite's Quest*, which made the game accessible to her students who are unable to read:

For some of my kids who can't read, it's much easier to just have them have to write one word that they see on the screen that they can fill in and that they've heard, because that's the one thing I do like about *Sprite's Quest*... that at least the information was also read to them as well [orally]. I thought that was really important that they would have the words in front of them, but they weren't having to do it all themselves.

Inclusive of students with a wide range of learning styles, students on Individualized Education Programs (IEPs) were identified as beneficiaries of game-based learning. Teachers emphasized the fact that the game leveled the educational playing field, providing lower performing students or students on IEPs with the opportunity to access the game and possibly even excel:

You didn't have to be brilliantly intellectual to do well at the game. [So] some of my lower [level] kids who don't always feel confident, they felt like they fit right in and they love it when someone asks them how they did something. They thought for once they had something that was really valuable to share and that was really great for my lower kids. They did pretty well. They weren't behind anybody else. It was quite levelling in that sense. (Mary)

Lia saw benefit for leadership development:

It was nice to see some of our spec[ial] education kids do well and become leaders.... One of the kids was walking around and helping kids out and providing advice. It was nice to see him being able to take that kind of leadership and feel good about himself. Because it was a kind of like an equalizer in terms of creating a more levelled playing field than otherwise.

And Kimmy found similar results:

What I liked about the game is that because we have such a high needs group in our class, the game really made it a levelled playing field. You couldn't tell who the [students on] IEPs were necessarily when they were playing. I guess, in that instance, a lot of them really excelled that way. No one seemed to really struggle playing the game.... We had one student who is really struggling in school academically, and we put this game in front of him, and all of a sudden he was a leader in the classroom.

Speaking of one student's experience with the game and the game-based learning unit, Jeannette explained: "An IEP student [in my class] ...was taking notes and writing things down on paper.... I've never seen him do that all year, really."

Beyond the game's perceived enhancement of differentiated instruction, teachers also called attention to game content and learning activities that they saw as beneficial for student learning. Introducing students to a wide diversity of locations was cited as a benefit of the game, specifically, its ability to "open [students'] eyes to another part of the world that they didn't necessarily know much about" (Jackie). Echoed Dali, "I think that [the game] was a great way for students to get some exposure to different countries and what [they] look like." Yet, a struggle was identified in trying to get students to recognize the relationship between game play and game-based learning. In particular, game content was often bypassed by students in favour of just playing the game and moving quickly from level to level. Speaking of the Japan level of the game, Nina noted:

[In the Japan level,] they have these containers [as part of the game that they use to] import and export stuff. I thought that those things...would be more.... for kids to be able to get information from as opposed to learning from just what Sprite was actually doing.... I think that the majority of what [the students] were trying to do was trying not to die. That was it. And they wanted to get through the level. I don't think [the students] looked carefully at what learning could be taken from that.

Similarly, a number of teachers saw a disconnect between students' understanding of game content and their connections between that content and the real world. For example, when asked if her students were making connections between the game and the real world, Nina replied:

No. Not at all. That again could be me not telling them [to make those connections]. Even though we told them these are realistic examples [of geographical objects] ...a game version [of] things [that] are happening in real life in some of these countries...a lot of them couldn't transfer the information over.

Some teachers attributed the disconnect between the game and learning to the structure of the game itself. For example, Chance asserted:

My only major...bone of contention with the game was that...it took a lot for me to get the kids to realize that the actual content that we want them to turn [to] is more in the background and not in the details. If it wasn't directly happening to the character, Sprite, I guess kids weren't picking up on things. You had to do a really good job every lesson at making sure the kids really focused on what was going on in the background.

And Scott described his experience:

I had to encourage some [game to real world connections] too.... I think there was still that concentrating [of students on] playing the game rather than that spatial awareness of what [they] were doing as [they] were playing it.... [I was] just trying to get them thinking about "Where are you?" They don't even...some of them didn't conceptualize, there's water here and there's a boat here, and why are those boats like.... That kind of connection to try and get them thinking. There was some encouragement with that. What I tried to do as they played...I try and move myself around the room and, "Oh yeah, what are you seeing there, what you're talking?" ...Again, I would think that was more teacher directed for a lot of them. Again, was that because it wasn't well designed, not necessarily.

At the same time, the idea that the game would serve as a stand-alone segment of curriculum for student learning that is, that it could and would do all the work conveying the physical geography concepts that students need to learn may align with past experiences of both students and teachers. Barry called attention to his own experiences with games, connecting his experience with *Sprite's Quest* to his initial interest in participating in the project:

When I first started [with the project], before we even met [as a group] and I was reading the study [description], the understanding that I had, to sum it up, was that it would be e-based learning, but it would go beyond the one-dimensionalness of all the games [the students] have been exposed to prior [to this game]. Any other game that we have is... you don't go beyond the experience of the game. You're just there, you open your device, you have that experience and then you leave. It seems like there are starting to be more and more types of these games that are starting [to be created] Once I got to understand what was going on, I thought the mov[e] from the game experience into the real world was probably what interested me the most and became the most attractive.

From these comments and based also on our observations, it is clear that more work needs to be done to draw explicit attention to both the manner in which games are conceptualized by teachers as learning tools that require pedagogical support to foster game-based learning and the types of pedagogical practices required to create this type of learning environment. And, while some teachers faulted the game for failing to elicit learning, others recognized that strong pedagogy was the impetus for moving students beyond the game content to the collection of additional information and examination of further sources. Knox described his students' game play: "[It] got to the point where they were [so] hooked on the game that they weren't even wanting to do anything else. It was almost good sometimes to take them away from the game and look at it from another angle." Jeannette noted her attempts to re-orient student focus to a particular learning goal during game play:

If you let [the students] play for the sake of playing, they'll play and they won't get what you want [them to get] out of it. If they play with a specific focus in mind...I think the focus[ed] questions really helped them, and they said they appreciated the focus[ed] questions because they're in school and there's got to be some kind of purpose.

Charles perceived that the game was one learning tool among many, and he recognized the requirement that students move beyond the context of the game as one of its benefits:

They're learning research skills because they're not only researching through their findings playing *Sprite's Quest*, but they're also going to be researching additional information on the internet, and then of course, old school: they're going to go to a library and take out at least one book and hopefully synthesize all of their information, and use it in their supporting details on their essay.

John noted the relationship between the game as a learning tool and the role of the teacher:

[When the students were working] in small groups, it was my job to help them and to encourage them but also to teach them when I saw that they could not understand [something], explaining "that is why this is happening, these are the consequences of whatever..."

Highlighting a similar emphasis on pedagogy, Walter talked about connecting the game to other aspects of the curriculum, thereby reinforcing for students the notion that the game is a learning resource. He noted: "We tend to mention [the game] quite often. I always try to talk about global warming, and sustainability, climate change. We're studying glaciers this week and drinking water. Remember [the] Hawaii [level of the game]? I try to tie it in if I can." Speaking more generally about a broad interest in learning more about game-based learning and its connection to her pedagogy, Jackie said:

If I were to go back and use [the game again] in my curriculum, I would really have to rethink how I was doing it. You probably know better than I would what the research shows to get the learning from the game, to make that connection. I would have to look into that and how I would make that work, because it didn't happen. What teaching do I have to do to get there?

It is clear that the teachers saw and indeed tried to demonstrate for their students a connection between the game and the concepts it was attempting to model, while also acknowledging a general enthusiasm on the part of their students to just keep playing. Their concerns about "just playing" versus understanding the concepts being demonstrated in the game show that the teachers by and large did not expect the game to be a stand-alone curriculum resource, but instead viewed it as one resource among many. That they also spent considerable time and effort scaffolding students to use concepts from the game outside it and in the service of filling out worksheets, answering questions, or participating in creative activities like "Through the Eyes of the Artist" is evidence that teachers found ways to demonstrate student learning from the game.

Student Learning: Survey Results

In addition to the assessments that the teachers carried out in their individual classrooms, which we did not have direct access to, we also attempted to measure student learning through a pre-and post-assessment tool that we designed specifically to address concepts and facts that were supported through playing the game. These instruments were reviewed by the teachers who participated in the workshop and edits were made to them based on teacher feedback. While we knew that this form of assessment was somewhat flawed, specifically because we were using a paper and pencil evaluation measure instead of attempting to understand what students might have learned as they were playing the game, we wanted to see if there was something meaningful we could learn from this kind of assessment even though it has been widely criticized in the literature (see Barab, et al., 2005; Jenson, de Castell, Thumlert, & Muehrer, 2016; Young et al., 2012).

In all rounds of analysis that focused on student learning, the French survey was analyzed separately from the English survey due to the fact that the short answer questions differed from English to French survey. While we initially translated the English version of the survey into French, the images diagrams, maps, and graphs posed a challenge as they contained English labels that could not be modified within the images. When the first draft of the French teacher's guide was released, not all of the images had been translated into French. To ensure that student learning was being assessed in the language of instruction, we altered the French survey questions to reflect the images we had available. Questions were content focused and similar in kind to those included in the English survey.

First Round of Analysis

In this round of analysis, student learning was assessed by examining pre-survey and post-survey scores for all surveys that were completed. A total of 748 English and 30 French pre-surveys were collected, along with 623 English and 27 French post-surveys. While the game-based learning questions in the surveys were divided into sections by game-played, we initially analyzed all survey responses. In the data entry process, we noticed that some students had attempted to answer all of the questions, and we wanted to capture all learning based on the game through our analysis. According to this method of analysis, on the pre-survey, the total mean score for English-speaking students was 9.6 of 44 possible points (22%). Breaking down the score further by type of question, English-speaking students had a mean score of 7.38 of 40 points on the short answer questions (18%) and a mean score of 2.22 out of a possible 4 points (56%) on multiple choice questions (see Table 10).

Measure	Total Students	Mean Score	Total Score	Highest Score	Grade (%)
All Questions	748	9.6	44	26	22%
Short Answer	748	7.38	40	24	18%
Multiple Choice	748	2.22	4	4	56%

Table 10: Total Pre-Survey Data Scores for English Surveys

For French-speaking students, the survey was half the length of the English version because *Seedling Saga* was unavailable in French and so related questions were not included. Both groups involved in the study played *The Lost Feathers*. Nevertheless, French-speaking student scores were almost identical when comparing the mean score in percentage form. French-speaking students had a mean score of 5.73 of 24 overall possible points (25%), a mean score of 3.47 of 20 for short answer questions (18%), and 2.23 of 4 (56%) for multiple choice questions (see Table 11).

Measure	Total Students	Mean Score	Total Score	Highest Score	Grade (%)
All Questions	30	5.73	24	11	24%
Short Answer	30	3.5	20	8	18%
Multiple Choice	30	2.23	4	4	56%

Table 11: Total Pre-Survey Data Scores for French Surveys

On the post-survey, which was longer and attempted to ask more in-depth questions about concepts students learned through the game, overall mean scores for English-speaking students increased by 5% for the multiple choice questions but dropped by 6% for short answer and 8% for overall questions (see Table 12).

Measure	Total Students	Mean Score	Total Score	Highest Score	Grade (%)
All Questions	623	12.74	88	44	14%
Short Answer	623	10.31	84	40	12%
Multiple Choice	623	2.43	4	4	61%

Table 12: Total Post-Survey Data Scores for English-Speaking Students

In contrast, French-speaking student scores increased between pre- and post-surveys by 10% overall, by 13% for short answer questions, and by 16% for multiple choice questions (see Table 13).

Measure	Total Students	Mean Score	Total Score	Highest Score	Grade (%)
All Questions	27	20.22	60	35	34%
Short Answer	27	17.33	56	33	31%
Multiple Choice	27	2.89	4	4	72%

Table 13: Total Post-Survey Data Scores for French-Speaking Students

The decrease in scores from pre- to post-surveys and the differences between English and French scores were initially a surprise; however, there are a few possible explanations. The first is simply fatigue with the instrument. Many students had limited time between the surveys (some only 6 or 7 days), and given that the post-assessment was longer, students may have simply tired when answering questions. Second, sections of the short answer questions for the English survey focused on different games, an important consideration when evaluating the assessment. It could be the case that students answered only segments of the survey that focused on the game they played and in this round of analysis unanswered segments were given scores of 0. In contrast, the French survey focused only on *The Lost Feathers*, which was the only game French-speaking students were asked to play. That the French survey focused exclusively on questions pertaining to the game French-speaking students played may explain why their scores were higher than those of the English students. Third, since we were not present for the administration of the post-survey, we are unsure precisely how it was framed as an assessment tool. It could be the case that some teachers rushed the administration of the survey, given it was the last part of the study, or instructed their classes to just answer what they wanted. Essentially, we do not know what occurred in the classroom with respect to how the survey was administered, and as a result, we tried to find the most appropriate way to interpret the data. For this reason, we decided to return to the data for a second round of analysis that would pay particular attention to the game students were asked to play in class. We wanted to ensure that students were being evaluated on the particular game that was played and was the focus of their classroom learning.

Second Round of Analysis

On the English pre-survey, students responding to questions about *The Lost Feathers* and *Seedling Saga* were asked to “answer two or three questions in th[e] section as best [they] can.” On the English post-survey, students were asked to answer three or four questions for both *Lost Feathers*

and *Seedling Saga*. To ensure that students were only evaluated on the questions they were asked to complete, this round of data analysis focused on students' best two answers from the pre-survey and best three answers from the post-survey based on the specific game played in class. Additionally, survey analysis was narrowed to include only surveys of the students who had completed both pre- and post-surveys and to match individual students' pre- and post-surveys. Technology use and its impact on scores, for example, could only be assessed by comparing students' surveys as these questions appeared only on the pre-survey. While students were asked to answer a range of questions, analysis was restricted to the lower number in the range to ensure that scores accurately reflected the minimum number of questions to be answered.

Overall, 549 English surveys and 23 French surveys were analyzed. On this analysis of the data, English post-survey scores improved by 4.7% for total scores and 6.5% for short answer. This is more in line with our initial expectations and with the fact that teachers reported evidence for student learning based on their assessments and observations. For French post-survey scores, changes were less significant, with overall scores decreasing by 1.19% and short answer scores increasing by 3.5% (see Table 14).

Measure	English	French
Number of Surveys	549	23
Score Change from Pre- to Post-Survey: Short Answer	6.5%	3.5%
Score Change from Pre- to Post-Survey: Total	4.7%	-1.19%

Table 14: English and French Survey Change Scores Based on Top 2 (Pre) and Top 3 (Post) Responses

For English-speaking students, computer use approached significance as a predictor for short answer change scores. Students who reported using computers at home tended to show more improvement between the pre- and post-survey short answers; however, computer confidence was not a predictor of change scores. Media device usage was a significant predictor of short answer change scores but not total change scores. Specifically, students who reported using a media device tended to show better performance between the pre- and post-survey short answer questions. There was also a trend that approached significance where the higher the students rated *Seedling Saga*, the greater the improvement in performance between the pre- and post-survey. Finally, gender was not a statistically significant predictor of change scores. For French-speaking students, computer use, media device use, game rating, game play at home, and gender did not impact scores, though the sample size was likely too small to demonstrate significance of any of these factors.

Another factor we were interested in was how professional development impacted student learning. According to this data set, teacher professional development was a significant predictor of student performance between pre- and post-survey scores. Specifically, students who were in classes where the teacher had received professional development performed an average of 13 points higher than students in classes where the teacher had not received professional development. Short answer scores of students whose teachers received professional development were higher by 18 points. French teachers were not included in this part of the analysis as the data set was too small. Also, all French teachers received professional development (albeit in English) and there was no non-professional development group to which they could be compared.

Our examination of the pre- and post-survey data revealed difficulties in trying to measure student learning through game play, as well as the limitations of standardized assessments. First, the survey questions were designed to be broad in order to capture a wide range of student learning; however, we noticed in our classroom observations and in our review of the teachers' curriculum that many questions and their related topics were not covered by the teachers during class. For example, a number of our survey questions required students to read graphs, diagrams, and maps. While these items were taken directly from the teacher's guides, many teachers decided not to focus explicitly on these components of the guides in their classes. Second, for the sake of breadth, we included questions for students to answer from a number of specific levels in the game. However, it is possible that students' inability to answer certain questions was not an indication of deficient pedagogy or learning, but simply because the content was not a point of focus in the classroom. Third, it may be that the post-survey was too long and that low scores on the post-survey may have resulted from survey fatigue more than from what students learned. Nevertheless, we did find evidence of student improvement from pre- to post-survey when we controlled for student answers. While not a perfect measure, and certainly impossible to normalize across 34 classrooms, it is evident that the surveys were able to lend some support to the claim made by teachers that students were indeed learning through game play.

Student Conceptions of their Learning

Acknowledging that prescribed multiple choice and short answer assessments might not necessarily reflect what students actually learned, we also asked them to identify three facts or concepts learned through playing the game. Student responses were then hand-coded qualitatively on a scale from one to ten. The intent was to see whether students mobilized concepts from the game in their answers and how they applied them and wrote about them (see Table 15).

Score	Explanation and Example Response
0	No Answer Provided
1	The student does not demonstrate understanding of physical geography. Answer is likely vague or about student's perception of the game and/or game play. E.g., "Learning shouldn't be in videogame– it's not fun."
2	The student does not demonstrate understanding of physical geography, as answer is vague, incomplete, and not explicitly connected to the game and/or geography. E.g., "what the world looks like," "different facts," "Himalayas"
3	The student attempts to offer a geographic fact, but the fact does not demonstrate geographic learning. E.g., "The Netherlands are nice." or "There's lots of garbage in some places."
4	The student includes an answer explicitly connected to the game, but geographic learning is not demonstrated due to the absence of explanation. E.g., "Yak patties" or "what dams are"
5	The student attempts to offer a geographic fact connecting the game to geographic learning but the fact is incorrect. E.g., "Hawaii imports coffee beans."
6	The student demonstrates good understanding of physical geography by providing a response specific to the game, though the student may not connect facts to geographical concepts. The answer may not be clear. E.g., "Yak patties are used for heat."
7	The student demonstrates understanding of physical geography by providing factually accurate information from the game and geographical references. E.g., "Hawaii is the only American state that grows coffee beans."
8	The student demonstrates strong understanding of physical geography by explicitly naming a physical geography term. The term is likely not explained. E.g., "Erosion"
9	The student demonstrates advanced understanding of physical geography by offering a geographic fact, though connection to a physical geography term not necessarily included. E.g., "The higher you go, the colder it gets."
10	The student demonstrates exceptional understanding by using physical geography concepts and explanations of concepts. Facts may be provided to illustrate terms and concepts. E.g., "Rain can wear down and break up rock (weathering)."

Table 15: Evaluation of Student Responses to Post-Survey Question "Identify Three Things You Learned Through Playing Sprite's Quest"

For the English surveys, 1869 answers were coded while 81 answers were coded for the French surveys. For the English-speaking students, 21% of answers were coded as 0 for not providing a response. In other words, approximately one fifth of the total possible answers were left blank. For the French-speaking students, only 12% were coded as 0 (see Table 16).

Nine percent of the English surveys and 17% of the French surveys received a score of 1, demonstrating a lack of physical geography understanding with students providing, for example, generic responses about learning rather than geographical concepts. These were responses such as “I learned that without challenges, success wouldn’t feel so great”; “animals hurt” (e.g., flying squirrels and frogs); and “yaks are dangerous.” It is important to note that some of the student responses that were awarded a 1 for failing to demonstrate student learning in relation to the game did offer a critique of the game or express frustration with the project more broadly. For example, commenting on learning, students wrote: “I learned everything online. I learned nothing from the game”; “[Name of teacher] taught me more than the game”; and “I learned that I’m not interested in learning through videogames and would much rather have a teacher teach me.” Those more critical of the game made comments such as “[I learned] how not to make a game”; “It’s only a game—no point to it”; and “how boring this game was.” Given the inclusion of these types of responses on the survey, it may be the case that some of the scores of 1 and 0 represent student disavowal of the game rather than a lack of student learning when comments are evaluated qualitatively and considered in relation to one other. For instance, the student who wrote, “I learned everything online. I learned nothing from the game,” left the next possible answers blank, receiving a total possible score of 1/30 for the answers provided. As another example of disavowal, one student wrote for their three responses: “There can be a bad game,” “I learned how not to design a game,” and “I learned not to go to [University]” (see Table 16).

Responses that represent a failing score—generic, vague, and unexplained responses as well as incorrect responses—earned scores of 2, 3, 4, and 5 respectively and represented a total of 32% of the English responses, with 12% receiving a score of 2, 10% a score of 3, 7% a score of 4, and 3% a score of 5. For the French responses, 38% received a failing score, with 19% receiving a score of 2, 15% a score of 3, 4% a score of 4, and 0% a score of 5. Examples of these types of responses included: “there are many ways to help our environment,” “China has a lot of pollution,” “Netherlands has a waste management system,” and “I learned that 1/3 of our lava supply comes from Iceland.” Combining these types, 62% of responses did not demonstrate geographic thinking or make connections between the game and geography. While taking survey fatigue into consideration alongside student disavowal of the game, these results are in line with the other post-survey results that suggest more work needs to be done to support teachers in the use of enriching learning activities in the classroom and in drawing meaningful connections between the game and learning (see Table 16).

Finally, answers that drew connections between the game and geography—that is, answers that identified geographical terms and facts and then connected them to the terms and facts of the game—constituted 38% of total responses for the English-speaking students and 33% of the

responses for French-speaking students. Specifically, for the English-speaking students, 3% of responses received a score of 6, 25% a score of 7, 8% a score of 8, and 1% each for both 9 and 10. For the French-speaking students, 0% received a score of 6, 5% a score of 7, 26% a score of 8, and 1% each for 9 and 10. Examples of these types of responses included: “Yak dung (dried) is used as a source of fuel,” “Netherlands has the tallest people in the world,” “population density,” “temperature has to be 0°C or less for water to turn to ice,” and “erosion takes a long time to happen” (see Table 16).

In this data set, the French students scored slightly higher than the English students (by 5%) on questions receiving a score of 6-10 out of 10, on questions that received a score of 2-5 out of 10 (by 5%), and on questions that received a score of 1 out of 10 (by 8%). That said, a slightly higher number of English-speaking students received a score of 0 on the survey (8%) than the French students. Overall, English-speaking and French-speaking students’ scores were fairly consistent. Averaging student scores, English-speaking students received 3.97/10 and French-speaking students, 3.79/10 (see Table 16).

Score	% of Responses E (individual)	% of Responses F (individual)	Per Category E	Per Category F
0	21%	13%	21%	12%
1	9%	17%	9%	17%
2	12%	29%	32%	38%
3	10%	15%		
4	7%	4%		
5	3%	0%		
6	3%	0%	33%	33%
7	25%	5%		
8	8%	26%		
9	1%	1%		
10	1%	1%		

Table 16: Score Analysis of Student Responses to Post-Survey Question “Identify Three Things You Learned Through Playing Sprite’s Quest”

More than a third of responses were scored as 6 or above, supporting the teachers' claim that for some students the game was also a learning activity. In particular, that one quarter of all total responses received a score of 7 is substantial and indicates that these students performed slightly higher than average. Results from this analysis indicate a greater overall need to increase support for teachers in making connections between a game and game-based learning. But the fact that 25% performed higher than average and 38% used some game-based concepts in their responses does indicate that learning is taking place. How better to measure that, while not the intent of this study, is certainly something that needs to be investigated.

Student Engagement

Asked at the outset of the study about the perceived impact of games on students' engagement, 35% of teachers responded that engagement, as well as enjoyment and entertainment, would likely be impacted by using games in the classroom, noting that "gaming can only increase student engagement" (Mary), offer a "positive engagement factor" (Chance), and lead to "greater enjoyment of class materials" (Cassie). Seventeen percent of teachers surveyed indicated that they thought games would engage students by offering a platform that is relevant and meaningful to them and, as a result, bridge a potential gap between what students do in school and at home for fun. For example, Kylie noted that "videogames are a huge part of (students') lives" and hence a game "reaches the students where they are." Similarly, Hector noted that "kids love games that they learn from," and Tad described the game as "closely connected to the ones that [students] play for fun." A number of responses commented on the extent to which a game could reach a wide variety of different learners. Referring to *Sprite's Quest* specifically, some noted that the game could help engage reluctant learners, including those who are easily distracted or reluctant to participate; others stressed that the game could provide an opportunity for quieter students to be involved; while others cited strong gamers as a group who would be engaged by the game. Some of the teachers offered a set of caveats about the game's impact on engagement, cautioning that engagement would depend on the game's design, the type of accompanying assignments, and the individual. Speaking of differences based on the individual, Keira stated: "for those that like videogames...they will be highly engaged. For those that don't like or are afraid to manipulate computers, this may be a daunting task." Similarly, Scott offered the impression that the game would "motivate the gamers in [his] class" but that it may "turn off some of the non-gamers in the group."

Other teachers drew a correlation between engagement and the types of skills believed to be developed by game play and game-based learning such as an interest in game development, competition or collaboration, general retention and absorption of content, general skills such as resilience, growth-mindset, and prolonged attention, and additional technological and mentorship skills for those already good with technology. Finally, some teachers called attention to the practical impact that the game would have on the classroom: improved attendance.

After using *Sprite's Quest* in the classroom, the vast majority of teachers interviewed emphasized the extent to which the game engaged students as evidenced by their enthusiasm to play. Some teachers called attention to their class' enthusiastic response upon hearing that they were going to play a game in geography. For Sarah's class, the "engagement level, the enthusiasm was palpable. They were so engaged and they were so excited. They were excited because I had gone away [to attend the workshop and] I was bringing back games." Jeannette had a similar response:

I had talked to [the class] and I [had] said, "We're going to play a game in geography." They got pretty excited.... I felt like the [playing of the] Nile [level] day went really well. I was getting really good feedback and there was a lot of voluntary participation.

And Jackie offered an anecdote about a student's enthusiastic response to learning that the class was going to engage in a game-based learning unit:

[My students] were engaged in the game. They loved the game.... When I first told the grade sixes that they were getting to do it, because originally the plan had been just the sevens, and then I got the go ahead to let the sixes be part of it, one of the grade sixes said to me, "I have been preparing my whole life for this."

For some, enthusiasm translated into requests to play the game. Dali noted that "students were really engaged the entire time and kept asking, like the next couple of classes, 'Can we play next class?' And they'd be excited to play it." Claire also found her students eager to keep working with the game: "[The students] loved playing the game. They were right into it... [The students] actually asked me, 'Miss, I know that [the researchers] are gone [after the classroom observations], but are we going to finish The Nile [level of the game]?' And for others, excitement resulted in students foregoing breaks. Keira explained:

We went into the lab for five mornings consecutively. Normally we would break for a snack time, and the first three mornings they didn't even want to break for snack. They wanted to keep going and try to keep progressing through.

A number of teachers acknowledged that game play and game-based learning serve as a divergence from traditional modes of teaching and learning and, therefore, may have engaged students as a result of novelty. Charles stated, “It was nice to just switch it up from the traditional classroom to the gaming classroom.” Similarly, Jeannette noted, “[The students] were all happy to play it because they knew they were at school and [the videogame] was a better alternative than reading the textbook.” Lia concurred: “There’s a lot of content in that game and it does provide them with a way to really understand what some of these topics mean in a way that a textbook doesn’t put out there, right?” And Mario had a similar experience: “When the question was raised [to the class], ‘would you rather use this or use a textbook,’ they said they would [rather] use the game.” More than a divergence, some interpreted game-based learning as a means for differentiating instruction and engaging reluctant learners. Jessica explained:

The enthusiasm that the kids displayed I think really brought on board the reluctant learners, the one[s] who don’t like to learn out of a textbook, and even though we have a lot of tools available to us now to make education a little bit more engaging for kids who aren’t engaged, it’s still hard to reach them all. I think that this game in my classroom with these kids that I have this year, every one of my twenty-three kids was highly engaged in learning this curriculum via this game.

Similarly, Elizabeth interpreted the game as a form of active learning that could engage students in a manner quite distinct from a textbook:

I think [the game-based learning] was just a different aspect or a different delivery of material. I think it was refreshing for the kids to have that. It wasn’t just teacher driven and teacher talk. It was them experiencing. The kids say ... We had that discussion after and they said, “It feels like we lived it.” That was good.

Elizabeth’s sense that the game offers direct experience to students was confirmed by Nina, who stated: “[The game] gets kids definitely involved in their own learning. I become the facilitator.” Moreover, enthusiasm and engagement were reported to have transcended the classroom space and entered discussions at home. Jessica reported that:

They seem[ed] really anxious to want to play the game. When I [told] them we [were going to] play *Sprite's Quest*, [they said] "Yeah! Yeah! We're going to play a game!" ... The kids talk about this game [outside of the classroom]. They think it's amazing. They get to play a video game.

Mario noted that excitement led to the completion of homework for students who do not regularly complete tasks outside of class time:

It's great that students were playing the levels at home. It shows great engagement and it shows learning opportunities at home where most of them don't always complete homework tasks. So I like that engagement.

As a testament to engagement extending beyond the classroom, some students did acknowledge that they played *Sprite's Quest* outside of the classroom (25%). This is quite a large number, all things considered, and given that access to devices can be a barrier to game play outside of the classroom. As reported above, of the students surveyed, 19% did not have access to either a laptop or desktop computer at home.

Finally, with respect to engagement and enthusiasm, competition and collaboration were cited as evidence for both. Turning first to competition, Tad spoke more broadly about competition as a motivating factor for student engagement, connecting competitive game play with *Sprite's Quest*:

Kids like competition. They like challenging themselves. There's that almost like a finish line or a, "I'm going to get to that point." I think that's important because if they don't see where they're actually going, then very often they lose interest unless it's some of the good kids; it's just like they're going to do it. That aspect I think was good for *Sprite's Quest*.

Other teachers called attention to groups of students, interpreting the behaviour of boys in their class as competitive. Nina expressed it this way:

Some of [the] boys [in my class] that I know that are gamers tended to like the game and they seemed pretty happy navigating through it. They were...they kind of established their own sort of competitive streak at how many levels [they were] able to get through, how many regions did [they] master, which was good.

Similarly, Cassie explained perceived patterns in her class' behaviour:

The boys really competed with each other. They were constantly trying to one-up one another, like compare scores for different levels, it seems. The girls ... They were just excited if they got past something, it seems. It was like the little accomplishments made them feel good, whereas the boys ... They [had a] 'have to beat everything' type of mentality.

These statements suggest that playing games invoked for teachers a commonly held gender-based stereotype that boys are more inclined to compete and girls more inclined to collaborate. While some studies do reproduce that stereotype (Hong, Wheng, & Pheng, 2012), other studies have found that when gender-based norms around behaviour were removed, girls were just as likely as boys to compete (Jenson, de Castell, & Fisher, 2014). Gender-specific stereotypes will be discussed in further detail at the end of this section. Moving away from describing stereotypical behaviours, some teachers noticed competition between sexes. Jasmin explained:

These three girls were super excited about it, were actually jumping up and screaming at one point, jumped out of their chair and were super excited, because they [had] beat where the boys were. They were very excited.

And Mary offered a counterpoint to the connection between competition and game play, highlighting the extent to which people playing games are eager to help each other:

It's interesting because when I look at all these videos on YouTube about how to get past levels on any game, people [creating these videos] just want other people to know how to do it. They weren't competitive at all in that way. They were really happy to help each other out. I really appreciated the collaborative nature of that.

Picking up the theme of collaboration with respect to game play in her classroom, Kelly reported: "[Working with the game] really reminded me [of collaboration], seeing them work together on those games and how wonderful they were together." Elaborating on classroom interaction, Chance found that contact among his students was "actually all pretty positive while [the students were] playing the game, [and consisted of questions such as] 'How do I do this?' [The students] were helping each other out." Cynthia stated that "96% of the communication that went on between the students was actually extremely positive." Barry said of his students: "I found a lot of collaborating and asking questions when they were working in the groups. Particularly when they were trying the game out for the first time as well." And Kylie shared this experience of her students:

Their interactions with each other were quite enthusiastic, actually, when it came to game play. When it came to answering the activity guides, they were still talking and I really encouraged kids to work together in class and to talk. I think that their best learning happens when they're talking to one another.

While student engagement was a commonly cited benefit of game play and the game play unit more broadly, teachers were also quick to point out that not all students were engaged with the game. Some students had difficulty mastering the game, struggling to manipulate controls or move Sprite from point A to point B. For example, Elizabeth claimed that one of her students "didn't know how to be good at [the game] so she wasn't going to like it." Other students took issue with the quality of the game, labeling the aesthetics or content deficient. For instance, Kylie suggested that one of her students "found [*Sprite's Quest*] repetitive," and Jasmin found that one of her students "was not interested in it at all. He said the graphics weren't good." And finally, some students struggled to connect the game and the course content. For example, Chance shared the experience of two of his students:

A couple of the grade eight boys that I thought would be really into it because they're big gamers just couldn't make that connection between this is a game and I can use what I'm learning in this game to then do well in the actual academic side of it.

In addition to acknowledging that not every student was engaged, some teachers called attention to the fact that collaboration and engagement did not necessarily translate into learning. As Dali stated: “I don’t think that I actually heard too much conversation between students in terms of the learning part of it. It was more of the game play part of it. Things like, ‘I got a star!’ ‘Oh, I got to the next level.’ ‘What level are you on?’ Things more like that, like ‘How do you swim?’ When they got stuck on something they would ask someone stuff like that.” Jasmin’s experience was similar: “[My students] were talking about the game and trying to see how they could progress in the game quicker. It wasn’t really as much fact-based as it was game-based.... More game play than geography.” Speaking more broadly about a student’s excitement for the game and its disconnectedness from learning, Jessica noted of one student:

[Bill], for example, was very good at the gaming experience and was very intent on finding out [about the game]. There are portions of the game where the kids seem to be able to walk into a wall and they disappear. They call them glitches. And he was hell-bent on being able to find every glitch in every level.... That was [his] experience with [the game]. And I told him, “That’s great! I’m glad you want to do that. But remember the reason for playing the game.

In our own observations of classroom environments, we witnessed high student engagement with the game. This engagement was made evident mainly through student interactions with the game and one another. Students regularly orated their movement through the game, announcing both successes and frustrations with the game. For example, a student might excitedly shout, “I got a star” or “The squirrel killed me!” They also announced the temperature, local facts given in the game, and whether or not Sprite had “died.” Conversations with one another often centered on progress through the game or tips and strategies for completing certain aspects of a level. For instance, a student might inform a classmate of her particular location in the game or walk him through how to successfully navigate the mountain to complete the level. Engagement seemed to wane when students were asked to play the game for an extended period of time, especially in instances where learning tasks were not linked to game play. In these instances, engaged play declined into what we called *zombie play*. In zombie play, the player lacked vitality and appeared to be simply going through the motions of play rather than being committed and connected to the game. This is different than purposeful play—which we also witnessed—whereby players would play so that they could complete all the levels of the game. That play of course had a purpose, to complete, but zombie play seemed to us to be play that was both disinterested and disengaged.

Finally, as evidenced in the comments above, some teachers made gender-based assumptions about how engaged students were in the game—specifically, that boys would be gamers more than girls and that due to girls’ perceived lack of interest in games, they would not be as engaged. Keira felt that “the boys in general were a lot more interested in the game than the girls,” and

Kylie asserted that “boys do enjoy videogames very much and so they would have played [*Sprite’s Quest*] all day [while] the girls really kind of struggled to stay focused on it.” For some teachers, it is likely that their preconceived ideas about gender and gaming impacted what they saw occurring in the classroom. This is not uncommon given that videogame play has been and indeed still is characterized as a masculine activity (see Jenson & de Castell, 2010). For example, Mario said: “I thought in the beginning that the people most engaged would be the traditionally engaged boys. [That] was true.” For others, what occurred in the classroom acted against their preconceived ideas of gender and game play. For example, one teacher explained:

I was really surprised with a group of three girls. I didn’t think they were going to like it. I found the boys more engaged than the girls, but I didn’t think the girls were going to like it whatsoever. (Jasmin)

Another teacher said about his experience with a student:

When I first chatted with her about the game, she was not too pleased with it. She kind of said it was really hard, which for me, [is] stereotypically [how] girls [respond to] video games [which is] not surprising. It was a complete stereotype. I kind of felt for her. Then I checked in with her again a few days later, a few periods later, and asked her how it was. She said, “I love it!” (Charles)

What is interesting about Charles’s response is the fact that he equated the reversal of the gender stereotype to teenage fickleness: “This is classic teenage response, up and down with everything.” He did not consider investigating the ways that his stereotypical gender assumptions influenced how he understood his female student’s response to the game. In our observations in the classroom, we did not notice many differences in engagement levels between boys and girls. In fact, in many of the classrooms we were in, the girls appeared just as engaged with the game—passing levels, collecting information, speaking to others about their progress in the game—as the boys, and much mixed-gender interaction was taking place between groups. These findings suggest that the stereotypes teachers hold about gender and game play—much like stereotypes generally—shape understanding of the behaviours observed in the classroom and expectations of who will be engaged with the game. For this reason, more work needs to be done to make teachers aware of the extent to which girls enjoy games and play them outside of the classroom and the types of stereotypes and expectations teachers might bring to the classroom around game-play and engagement.



PART 6

Technology and Gameplay

Technology Use for Game Play: Devices, Multiple Screens, and Learning Platform

For the vast majority of teachers who participated in the study, classes used only one device for engaging with the *Sprite's Quest* unit as a whole. In total, 71% of teachers had students using only one device (a laptop, desktop, or iPad), while 27% of teachers had their class using two (usually a laptop and an iPad). Only 2% of classes used three devices (laptops, desktops, and iPads), though we did not observe students using all three devices simultaneously. In cases where three devices were used, students either had access to all three to use or had access to different devices at different times during game play and game-based learning activities such as a period in the computer lab one day and a work period in the classroom another day (see Appendix K for examples of single and multiple device use).¹

Single Device Use

In instances of single device use, 54% of classrooms used iPads or tablets, 29% laptops, and 17% desktops (in a computer lab). For some teachers, using one type of device over another was a matter of accessibility—the school only having access to a computer lab or single set of laptops. For others, iPads or tablets were a preference given that the game could be pre-loaded onto the device, meaning connectivity related to WiFi and loading the class onto a D2L site was not an issue. Of the classes that used single devices, only 13% also used the online version of the student activity guide compared to 88% who used pencil and paper activities. For many teachers, only a single set of devices was accessible at a time.² Dali explained her reasons for using only iPads during the game play unit:

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. The way that our system works in terms of our computer lab time, it's booked on an as-needed basis.

1. Cellphones have been excluded from this analysis of device use in the classroom. In the classrooms we observed, cellphones may have been used as a component of a board-based BYOD policy, but given that the game is available to play on cellphones, students were restricted to cellphone use that pertained to assignment completion. Additionally, of interest for the purposes of this study were the types of technologies teachers had access to and used with students during the game play unit. While cellphones were used in some classes, use was infrequent and often unreported by teachers.

2. Percentages were rounded to the nearest whole number and hence add up to 101% total.

Multiple Device Use

For teachers using multiple devices, 80% used laptops and iPads or tablets, 10% used desktops and iPads or tablets, and 10% used desktops, iPads, and laptops. In cases where teachers used desktops, these devices were located in a shared computer lab located outside of the classroom. For some teachers, two devices were used to enhance student learning, ensuring that students could access both the game and the student activity guide online at the same time. Of teachers who used multiple devices, 70% used the online component of the game for some segment of their unit—30% requiring students to work with the online version of the student activity guide and 40% using both the online guide and pencil and paper tasks. Only 30% used pencil and paper tasks.³ For others, multiple devices were needed because classes lacked access to enough of one type of device or because they had access to different devices over the course of the unit. Within the group of teachers using multiple devices, a multiple screen phenomenon was present in 40% of the classrooms, i.e., answering questions on a laptop and playing the game on a desktop or iPad. For the remaining 60%, tasks were either completed using pencil and paper (10 of 20), or multiple types of devices were used in the classroom due to insufficient quantities of one type of device. In the latter case, only one type of device was used per student or group of students (10 of 20). Finally, in some cases, student preference played a role in making multiple devices available. Jessica explained the influence of student preference:

[We] initially played the game on just the iPads. And [the students] were not overly impressed with the controls. They were difficult to maneuver with their thumbs. The second level that we played, I booked the hub/library where we have desktops, and I brought in iPads, and they had the desktops available, or Chromebooks if students wanted to use them.

Finally, given limitations around access to devices, students were required to share devices in 41% of classrooms at some point during the *Sprite's Quest* unit.

Technology Use for Game Play: Learning Platform Use Overall

Overall, only 24% of the teachers who participated in the study utilized the online version of the student activity guide for game-based learning activities, while 74% of teachers grounded learning activities in pencil and paper tasks.⁴

3. The remaining 30% of teachers who used multiple devices used exclusively pencil and paper tasks with their students.

4. The remaining 2% of teachers did not engage students in any learning tasks, and hence, no platform could be identified for learning tasks.

For the teachers who used the online version of the guide, it was cited as a preference because students had been using the board-based site for the duration of the school year and were familiar with the platform.

Keira explained her rationale for using the platform:

One [reason for using the online tools] was to kind of cut down on some of the photocopying, and they're very used to using Google classroom and posting. Usually when they submit their materials to me I have access to it right away. I can make notes on it and send it back. It's a platform that our class has been used to all year.

For many others, however, the D2L *Sprite's Quest* platform served as a barrier in that teachers were unable to sync it with a board-based submission platform such as Google Classroom. Chance noted:

We had major issues trying to get our D2L going and working, and I just found, based on our timeline...the easiest way was just to get on and sort through it myself and make up my own sheets or whatever I needed to do. From there, the kids would just answer it and turn it into me. I've got a collection of their stuff in hard copy. We didn't use [the online platform] at all.

Similarly, Sarah expressed frustrations with trying to save student work to access later online:

We started off with the iPads and [the students] playing the game [on the iPads]. We struggled with trying to figure out how they would save the cards in the PDF format on the iPads, because the iPads are shared amongst the entire school community. It wasn't something that was going to be easy for us to do. We tried to set up the binder, it's very buggy for e-Learning and it really wasn't working for us that way.

Jessica recalled similar struggles:

I had difficulties connecting the e-Learning site to Google classroom, which is where we do most of our work. Had they used the...culminating activities at the end, they could [access] that, but when they saved it, they didn't know where it was being saved. I played with it for a while. I think having some clear instructions or directions on what to do with that would have saved using the pencil-paper a lot. We ended up having to do almost everything on pencil-paper.

In addition to technical issues with the D2L platform, others noted concerns about students having to collect information from the game while playing. For example, Knox observed that “us[ing] the iPad to type, they wouldn't be able to look at the game while they're typing.” Some teachers noted that the lack of a pause button in the game hindered flipping between the game and the online sources; others wanted to minimize flipping back and forth between screens or devices. Elizabeth stated, “I chose to do iPad and paper versus iPad and iPad just because I figured it would be too much switching between the game and another form on the iPad.” Matthew determined that “[using pencil and paper], they were able to stop, put the game down, jot down a quick note, as opposed to closing down the game and opening up pages and jotting the notes down.”

Beyond the stated problems with the online platform, consistent access to reliable technology in the classroom was another deterrent to its use, mitigated through a return to pencil and paper tasks. Nina expressed a shared concern: “I wasn't always going to have... [access to] the Chromebooks.” Hector elaborated on his particular situation:

I did want to have the hard copy because ... Again, it's always that technology...when it's working, it's great. When it's not, it's a nightmare.... We do the old school stuff where it's pencil and paper, and at least there they can get something done and accomplished.

Aside from concerns about access to technology and technological platforms, teachers cited both personal and student comfort as reasons for using pencil and paper over the online platform. Mario explained that he decided to use pencil and paper because he thought it would best support his students and because “it was just along the lines with what we've been doing already.” Similar concerns were behind Madalena's decision:

I also thought [using pencil and paper] helps some of my students that still were kind of struggling with this idea of navigating through the game. If I were going to add another thing of “now you have to navigate through the student guide,” I think that would’ve caused a little bit more anxiety on their part and frustration.

Speaking of his own comfort level, Lenny noted:

I think the idea of having them write things down, they had to [use a] Duo-Tang and it was just a way of keeping better track, for me.... I’m doing my best with getting into the world of technology but I’m still a little bit back there, where I like to have pen and pencil too so it was comfort level I guess. The kids seemed okay with that too and I think it kept them accountable more so.

Walter also expressed a preference for paper:

I just need the piece of paper in my hand. I like to take my own gun into battle, something I’ve created. I kind of know my way around that sheet. If I used someone else’s, I don’t know what their asking. I don’t know who created it. We’re not quite sure if we would trust to get it from the cloud or not.

Finally, some teachers cited student accountability as a reason for using pencil and paper over online tasks. Cassie explained:

[I used pencil and paper] just to kind of make it more accountable. [The sheets were] something for them to hand in, because I find that if it’s something more interactive, then they will kind of skip through it more quickly and not care. With paper and pencil tasks, they had a partner that they could work with so they could kind of bounce ideas off of each other and hand something solid in.

And Scott noted that the sheets served as a way to “focus [students] on what they were doing.” He expanded:

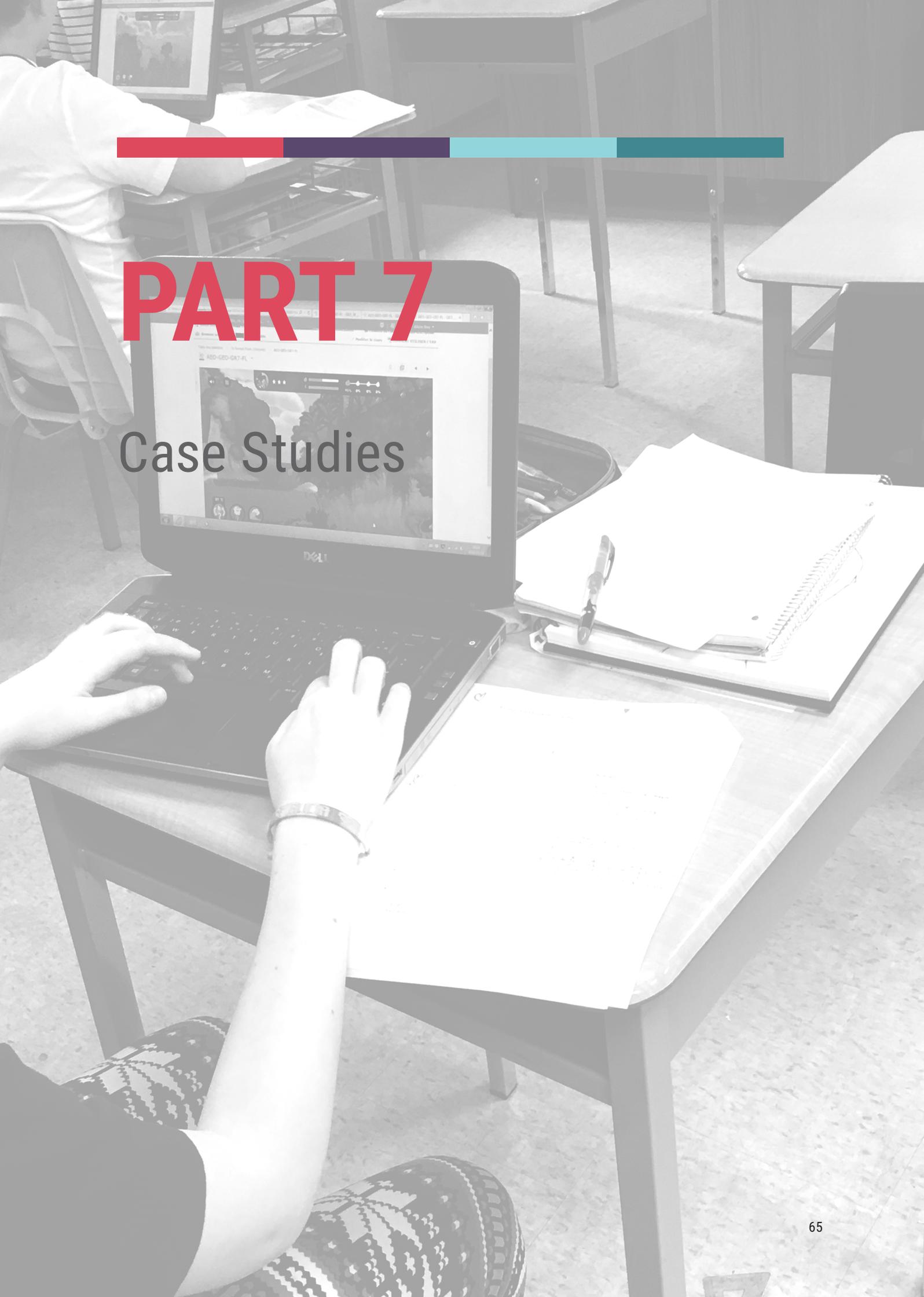
What I certainly found both the first time and then the second time [we used *Sprite's Quest*] is they just played the game. I don't necessarily know if they were reading the stuff they needed to. It was just a matter of getting from point A to point B to finish the game, if that makes sense. That was my thought with those fill-in-the-blank sheets.... It was just a check-in too, to see how much completion they had done.

Overall, the interviews with teachers and our classroom observations revealed that single technological devices were used more frequently than multiple devices and that teachers chose pencil and paper tasks to support student learning over having them switch between online platforms (the game and D2L). Considering these trends in conjunction with teacher-provided rationales for using pencil and paper tasks, game developers interested in obtaining more buy-in from teachers with respect to online platforms need to be aware that it is most likely a single device that will be used for game play exclusively, much like game play outside of the classroom. That this is the case in classrooms should be considered during design and curriculum planning with the game, bearing in mind that students will likely need to switch between the game and game-based learning activities and that, in a very real sense, game play must be interrupted in order to get on with those other learning tasks, at least in the case of *Sprite's Quest*. Concerns about student accountability during game play could also be alleviated by way of a data collection tool integrated into the game, whereby teachers could see how far their students had progressed during game play. One teacher asked if it is possible to have an alert on her phone notify her when students had completed the level so she could check in with them immediately. Moreover, electronic platforms (e.g., Google Classroom) need to be compatible with board-based D2L sites so that teachers can integrate the two, mitigating the need for teachers to become familiar with an additional platform and lessening or rectifying worries over losing student work.



PART 7

Case Studies



Pedagogical Practices that Support the Use of Videogames in the Classroom

Through classroom observations and the teachers' interviews, blog posts, and surveys, we constructed themes that reflect the pedagogical practices of participating teachers. In particular, we identified practices that supported the integration of the game and game-based learning in the classroom, thematically labeled as meaningful, structured, and supported game-based pedagogy. Of the classrooms observed during the study, 26% integrated game play and game-based learning effectively, producing classroom ecologies that supported meaningful, structured, and supported game play, while 29% were somewhat successful, and 44% struggled.

Meaningful Game Play and Game-Based Learning: Content, Connections, and Technology

Classroom environments in which the game and game-based learning were well integrated into the curriculum contained meaningful learning activities that connected the game to prior learning, the geography curriculum more broadly, and the real world (including the local community). In this classroom ecology, game play was focused, the teacher usually set up the game play activity, and the game play period was then followed by a specific learning activity that required an application of knowledge, e.g., in the completion of a culminating task. These learning activities were rich, taking the form of a task that required higher order or critical thinking such as class discussion or debate, or the production of a travel video for a particular region. In environments less supportive of this type of learning, lessons lacked a cohesive focus with respect to the game play unit. In some instances, an introductory lesson was not offered, and so game play was not grounded in learning or oriented to a specific focus. In situations where a learning goal was not established prior to game play, students were often found to be playing the game for the sake of playing rather than playing with an assignment or culminating activity in mind. And, in this less structured environment, when activities were introduced, they were often somewhat simplistic or superficial, with students asked to record facts (e.g., those that appear in the game) that were not subsequently used toward another end or the completion of worksheets (e.g., "What's There, Why There, Why Care") with even a minimal level of analysis. As a result, a meaningful approach and meaningful tasks were lacking with respect to game play and game-based learning.

In classroom environments that meaningfully integrated the game and game-based learning, tasks centered on game content rather than technology. While most teachers in this group used electronic platforms such as Google Classroom and board D2L sites as a component of their *Sprite's Quest* lessons specifically and physical geography units generally, the platforms were positioned as tangential to the content. For example, teachers might remind students that an activity should be completed and submitted for evaluation through Google Classroom or they might

demonstrate submission techniques through a brief modeling activity, but the game and learning activities remained the point of focus. In situations where technology failed to function properly, troubleshooting took place quickly and effectively while the learning task was positioned as the focal point for students. For instance, a student whose game or Google Classroom site was taking too long to load was told to share a classmate's computer or to complete the activity using pencil and paper. In another example, a slow network that delayed login was rectified by students logging in according to an assigned number, and while waiting, they were asked to complete learning tasks using pencil and paper. Consequently, the pacing of the lessons was fairly consistent and maintained a sense of speed and flow. In contrast, in situations where game play and game-based learning were less integrated, electronic platforms often served as the focal point, detracting from learning. In some instances, logging into a particular platform remained a point of focus for the class as a whole, the lesson paused until all students had been granted access. For example, a teacher whose network was relatively slow struggled to get students logged on to the system and spent a large portion of the period focused exclusively on this task. As a result, the pacing of the lesson was frequently slow or delayed or just non-existent.

Structured Game Play and Game-Based Learning: Focus, Pacing, and Multiple Tasks

Classrooms that integrated game play into a curriculum that was also structured and focused typically asked students to collect facts while they played and/or to pay attention to particular items or objects while working through the game. This focused play also translated into accountability for learning during play, with students often asked to submit artifacts such as jot notes as evidence of learning at the end of game play. Additionally, within these more structured classrooms, specific and limited time frames were offered for the completion of tasks. Both the lesson and the period moved at a fairly quick pace, and students were frequently required to demonstrate productivity by submitting learning tasks at the end of the period. More often than not, students were required to complete more than one task per period or were given multiple tasks to work on if a single task had been completed. More broadly, the *Sprite's Quest* unit involved multiple activities, including a series of "What's There, Why There, Why Care" worksheets per level, a "Through the Eyes of an Artist" activity, a graphing activity, and a culminating activity such as a paragraph or persuasive essay. These activities were reinforced by a series of lessons (e.g., class discussions) on topics such as liveability and sustainability, plate tectonics, climate graphs, and so on. Conversely, in classrooms where game play and game-based learning were less integrated, game play was relatively unstructured and unfocused. Accountability was also lacking with respect to students and their own learning. In many instances, students were not required to complete notes or assignments during play or to pay attention to specific aspects of the game such as the background, Sprite's movements, or the temperature of the location.

Supportive Game Play and Game-Based Learning: Knowledge of the Game and Check-Ins

In classroom contexts where game play was well supported and integrated, teachers were engaged in game play, demonstrating knowledge of the game and speaking with students about their own experiences and their students' experiences while playing the game. Engagement also extended to game-based learning, with teachers regularly checking in with their students by circulating during game play to ask questions, including those connected to learning and the follow-up activities. Consequently, students in these environments were often on task. In classrooms less integrated, teachers were more likely than not to claim lack of expertise with the game, to admit to students that they had not played the game before, and to exhibit a lack of interest in the game. In these classroom ecologies, teachers checked in with their students infrequently, asking few if any questions of students, and circulating rarely or not at all. As a result, students in these classes were often off-task, sometimes frenetically playing but with little purpose. Game play periods were not closely regulated, with students often granted entire 40-minute periods to play exclusively or play and complete one short task such as recording facts or completing a worksheet. In other instances, the majority of the periods were unstructured, with students asked to work at their leisure on the completion of a series of worksheets per level.

Implications for Further Study

These findings indicate that for integrating games and game-based learning in the classroom, additional teacher training is needed. In addition to introducing teachers to a game and its accompanying resources, professional development could center on creating classroom ecologies that encourage meaningful, structured, and supportive practices. Through modeling by workshop moderators, emphasis could be placed on creating meaningful learning activities that extend teacher resources beyond those offered with the game. Connecting the game to prior learning, the curriculum more broadly (including across subject areas), and the real world is an important component, along with creating meaningful introductory activities and highlighting how the game can be used as one learning tool among a broader network of resources to support student learning. In a similar vein, training can call attention to the extent to which particular game-based learning activities can be connected to others, creating a cohesive learning experience for students in which learning can be extended over a period of time and across a range of activities. Moreover, the role of electronic platforms as supportive of but not central to game play and game-based learning should also be emphasized during training sessions and complemented by troubleshooting techniques that ensure that game-based learning environments are dedicated to learning.

To ensure that play and game-based learning is adequately structured and supported, additional focused training should strive toward utilizing the game as both a text and a learning resource that offers support for additional learning tasks. In this respect, the game is positioned as a tool that can

be used for learning with the support of a teacher, rather than a tool where learning occurs in and of itself. As emphasized in the professional development session we ran, teachers' knowledge of the game is an important component; teachers need to play and experience the game, and through that experience, engage in a meaningful way with their students. Teachers who are familiar with the game, we observed, are better able to assist students than those who are not. Additionally, knowledgeable teachers present the game as a text or object worthy of the teacher's interest, and consequently the student's time, in the same sense that English teachers recommend that a student spend time with a novel they have enjoyed, or social studies teachers suggest that a student read a map they found particularly relevant. Furthermore, this study highlights a number of pedagogical practices that need to be emphasized in training so that teachers and students get the most out of game-based learning. These practices include pacing and structuring of lessons and units, checking-in with students during game play and the completion of activities, and submitting materials as part of accountability in learning.

Snapshot of Teacher Successes: *Seedling Saga*, Keira

Day One

Keira's class was asked to play the China level of the game. As students played, they paused to jot down facts on lined paper and to complete questions listed on handouts. Handouts were compiled in a booklet the teacher had created including the "What's There, Why There, Why Care" activity and the star chart. The teacher circulated around the class reminding students to pay attention to what appeared in both the foreground and background of the game. She also coaxed students to jot down information as they were playing the game, paying attention to both the physical and human elements of the environment.

At one point during the period, Keira interrupted game play and called attention to some of the comments students had made during play. Some students, for example, mentioned that China would be a great place to live, while others expressed disbelief that anyone would want to live in China. On the basis of these student-generated insights, Keira initiated a brief small-group activity wherein students were asked to gather with peers to provide a response with reasons to the statement that China would be an interesting place to live. Students then shared their responses with the group and, building on their geography vocabulary, classified their reasons as either physical or human. Keira furthered student geographic learning by calling attention to the fact that concerns students cited existed within their local communities and by asking students to think about the government's responsibility to the community with respect to these concerns.

Keira transitioned to a third activity for the double-period session, asking the class about the government's responsibility to a changing population. Students were then required to work with the population chart provided in the *Sprite's Quest* teacher activity guide and to think about the following questions:

- What does the graph show?
- How can you compare the population from one period to the next?
- What is the government's responsibility?

In addition to completing the population chart, students were told to complete a series of questions in the activity guide looking at reading population pyramids. As the students worked, Keira continued to circulate and engage the class, asking questions of students both individually and as a whole.

As an example of the latter, she interrupted the class working to remind students to "think about how a population increases and decreases. What causes a population to increase? What causes a population to decrease?"

Day Two

Keira introduced the “Through the Eyes of the Artist” activity, querying how the designers of the game would have selected the artwork and why they might have included images generally. She also highlighted the connection between the game and the real world, noting that images in the game had to have come from somewhere in the real world. She then walked students through their task for the period, telling them to choose a level to focus on that they had already played. Pacing her lesson and ensuring that everyone was on task, she stopped the work period after 15 minutes to check in to see who still had to locate an image and who needed assistance.

Day Three

The class was divided into groups by geographic region and asked to look for certain objects to analyze while playing the game. They were given a specific amount of time to play the level and then asked to return to the group to complete a set of discussion questions.

Snapshot of Teacher Successes: *The Lost Feathers*, Nina

Day One

Nina began the class by checking in with the students regarding their impressions of the game. She posted five points to consider on the SMART Board to stimulate a brief class discussion:

1. Cheers/Challenges as a player
2. Cheers/Challenges of the game (what's missing)
3. What important pieces of information did you learn?
4. What stood out to you?
5. What connections have you made to parts of the curriculum we've studied so far?

During the discussion, Nina prompted the class to think about how they were accessing information during the game and for what end this information was useful. They were encouraged to open their Duo-Tangs and identify information about landforms learned in the game that they did not know beforehand. After a student recited a fact, Nina asked the class as a whole to expand further on the significance of the fact by connecting it to general themes in the geography curriculum, e.g., "why do [the homes] need to receive heat? What's not happening there? What do we know about the Himalayas?" She also asked for additional facts about a particular item or object, e.g., "what else do yaks do?" Nina reinforced game to real-world connection by asking students about the regions they visited in the game the day before and what they learned about the regions. Focusing their game-based learning and connecting content to lived experiences, she reminded the class that they would be required to create a graphic organizer encouraging their teacher to visit these places as a tourist. She also encouraged the class to think more generally about what the region has that is good for the people living there; how what is located in that region is sustainable; what their climate is like; what their government is like; what people do to survive on a daily basis; and what a tourist would go to see or stay away from. She further solidified game to real-world connections by asking her group: "You do understand, grade 7s, that the information we are learning in the videogame is true to life, right? They are not made up facts. You are actually learning about different parts of the world." She asked how many students had completed the thinking and learning chart, a document with two columns asking students about learning (notes from the game including facts, definitions, references to landform regions, and levels) and thinking (reference to the text that explains ideas in their own words and makes connections to other knowledge, makes inferences about cause and effect including short and long term, explores impact, and explores how ideas are connected or not). Keeping their learning on track, she reminded the class that they

should have at least three points for each.

For the next activity, the class was told to think about how the Himalayas level they would be playing connected to each of the four different types of landforms they had been studying. She asked: Where are the Himalayas? How was the mountain range formed? How do people live day to day? Students were given a new worksheet to complete in addition to their learning chart. She reminded them that they could combine information from the game, the textbook, and their own research to come up with content that would help them answer the questions. She also stressed that this information might be helpful for another project they would be completing in geography. As students played, she interrupted frequently to ask questions. For example, she asked students to think about what the “just right” temperature would be for living in the Himalayas, explaining, “You have a mountain that is about 7000 meters high [in the Himalayas]. What specific temperature is needed at different levels of the mountain for people to survive?” She asked the students to think of Sprite as a person while they played, noting, “Forget that Sprite is a water droplet. Pretend he’s a person living [Sprite]. Pretend he’s a person living in that area. What does he need to survive?” Making connections to prior learning, she encouraged students to think about climate, vegetation, landforms, lakes and rivers, and how they work together to keep people in this area of the world alive.

Day Two

Nina began by talking to the students about how to conceptualize the game as a form of literacy [learning]. She explained how in her own playing of the game, she began to re-think the water droplets as a resource and energy as a means of survival. She explained how in conceptualizing the game as a tool for learning, we begin to notice things in the game differently. Nina led the class in a brief discussion of the challenges people in rural communities face, with students offering examples of how the challenges are overcome using examples from the game and other geography learning. The class also talked about how homes are situated in the natural environment and what tourism looks like in the Himalayas.

Turning to the thinking and learning chart, Nina asked the class as a whole for a response to the question of where the region is located. Highlighting the game as one source of information among many while calling attention to students’ awareness of their own learning, she queried the class about what sources they could use to access information and respond to the questions on their sheet. She reviewed points of focus with the class: climate, vegetation, landforms, and lakes and rivers. Offering an example from climate—wind—she asked how many students were dying while playing the level because of the wind. Connecting the game with prior learning, she queried “what have you studied that could help you explain why a wind mass might be harmful in that part of the world?”

Students were given 10 minutes to play with their peers and compare their responses from their thinking and learning chart (completed for homework) to their partner's. Nina reminded students to use their time wisely; while the game was loading, for example, students could begin comparing answers with their partner. They were told regularly how much time they had left as a group.

The class ended with a 15-minute discussion of specific responses to the questions in the thinking and learning chart, where they located information to complete the questions in their thinking and learning chart, and which answers reminded them of prior learning. Nina wrote responses on the SMART Board and told students to copy down answers in their notes. Students were also reminded that explaining "why" is imperative in providing responses and doing research. Students were also asked what specifically they noticed in the videogame to support their answers such as what they noticed about the vegetation and climate. They were assigned homework: adding information to the thinking and learning log for a new geographic region.

English and French-Speaking Teachers

Two of the 34 participants in the study were French-speaking teachers employed by a French board. While multiple French school boards were contacted during the initial recruitment period in October to December 2015 and also in April and May 2016, only one board and two teachers agreed to participate. We attempted to recruit a number of other teachers and were supported in trying to recruit at the board level through CODE.

Aside from recruitment, numerous challenges arose for the teachers from the French board involved in the study that were not present for the English-speaking teachers. First, given the small number of French participants, the workshop was held in English; however, the resources we produced for the workshop—such as the overview of the game and its English-based student and teacher activity guides, material on action research, and a walkthrough of the English-version of the game—were translated into French for the French-speaking teachers. And, while the workshop was conducted in English, we had a French-speaking faculty member at the workshop for support. Nevertheless, opportunities for cross-board collaboration during the workshop were more limited for the French-speaking teachers. French-speaking teachers and one of the francophone teachers stressed the need for videogame and technology training in French for francophone teachers exclusively. He explained following the workshop:

[The workshop] was in English and my English is not good which blocked me a bit [from understanding].... But if the workshop had been in French it would have been even more interesting for us. [I would like] to have a whole workshop in French for the Francophones. There are many francophone teachers who would like to know about this game and I know that there is one colleague in the same school who would find it very interesting. Therefore, if we could have one session in French for the French teachers only that would teach us in French how to apply this game, that would be interesting. (Dante)

In addition to limitations with respect to language-specific training, lack of access to the game and the absence of a teacher's guide and an activity guide in French constituted the primary barriers experienced by the French-speaking teachers. For example, the workshop began with the resource person from the board being unable to locate *Sprite's Quest* and make it accessible on the board D2L website without assistance from the Ministry of Education. Given that the game had not been released in the App store (to be accessed on iPads, tablets, and other devices), the teachers did not have access to *The Lost Feathers* until four weeks after the workshop and never gained access to *Seedling Saga* in French.

As the English versions of the teacher's and student activity guides were discussed at length in the workshop, the French-speaking teachers were introduced to the types of learning materials that had been produced for the game, but we did not yet have access to those in French. Moving forward, the French-speaking teachers either experienced delays accessing the teacher's and student activity guides or were unable to access them altogether through the D2L website. For *The Lost Feathers*, a rough draft of the teacher resources was made available to the teachers at the end of March and only in draft form, meaning a number of diagrams in the guide had yet to be translated to French. The student activity guide had also yet to be produced; therefore, French-speaking teachers were limited with respect to how material that was created for the game could be delivered to students. For *Seedling Saga*, neither the teacher's guide nor the student activity guide had been created and as noted, the game was not translated during the duration of this study. Hence, the French-speaking teachers were restricted to using *The Lost Feathers*. Lack of access to the resources proved to be both challenging and frustrating for French-speaking teachers with respect to lesson planning and the types of activities they could complete with their students. John explained:

I asked our board about the activities book and they said it was not available in French, so I had to rely on my own translations of various questions and activities.... I would have liked to see the final version of the game with all the activities in French available to the students because, when I explored a little the game in English, it was much better since the students could actually work on the worksheets on the computer itself and answer the questions.

As challenging as it was for the French teachers regarding lack of access to French-language specific training and teacher and student resources in French, teachers still participated in the workshop and used the translated version of *The Lost Feathers* and its accompanying resources with their students.

Teachers Who Received Professional Development and Those Who Did Not: A Comparison

Of interest for the purpose of this study were the differences between the way in which game play and game-based learning were taken up by teachers who received professional development (PD) and those who did not. As noted above, constructed themes related to observations and analysis of the extent to which meaningful, structured, and supported game-based pedagogy (MSSGBP) was present in particular classrooms.

Some teachers were successful at producing MSSGBP, yet when divided by teachers who received PD and those who did not, a higher percentage of teachers who received PD were more likely to have integrated MSSGBP. Of the teachers who received PD, 29% of their classroom ecologies were more likely to have created MSSGBP, and 32% of the teachers who received PD were somewhat successful at creating MSSGBP. Conversely, a higher percentage of teachers who did not receive PD—67%—were less likely to produce MSSGBP compared with 39% of the teachers who did receive PD (see Figure 11).

STATISTICS REGARDING PARTICIPANTS PRODUCING ENVIRONMENTS FOR MEANINGFUL, STRUCTURED AND SUPPORTED GAME-BASED LEARNING ACCORDING TO PARTICIPATION IN PROFESSIONAL DEVELOPMENT

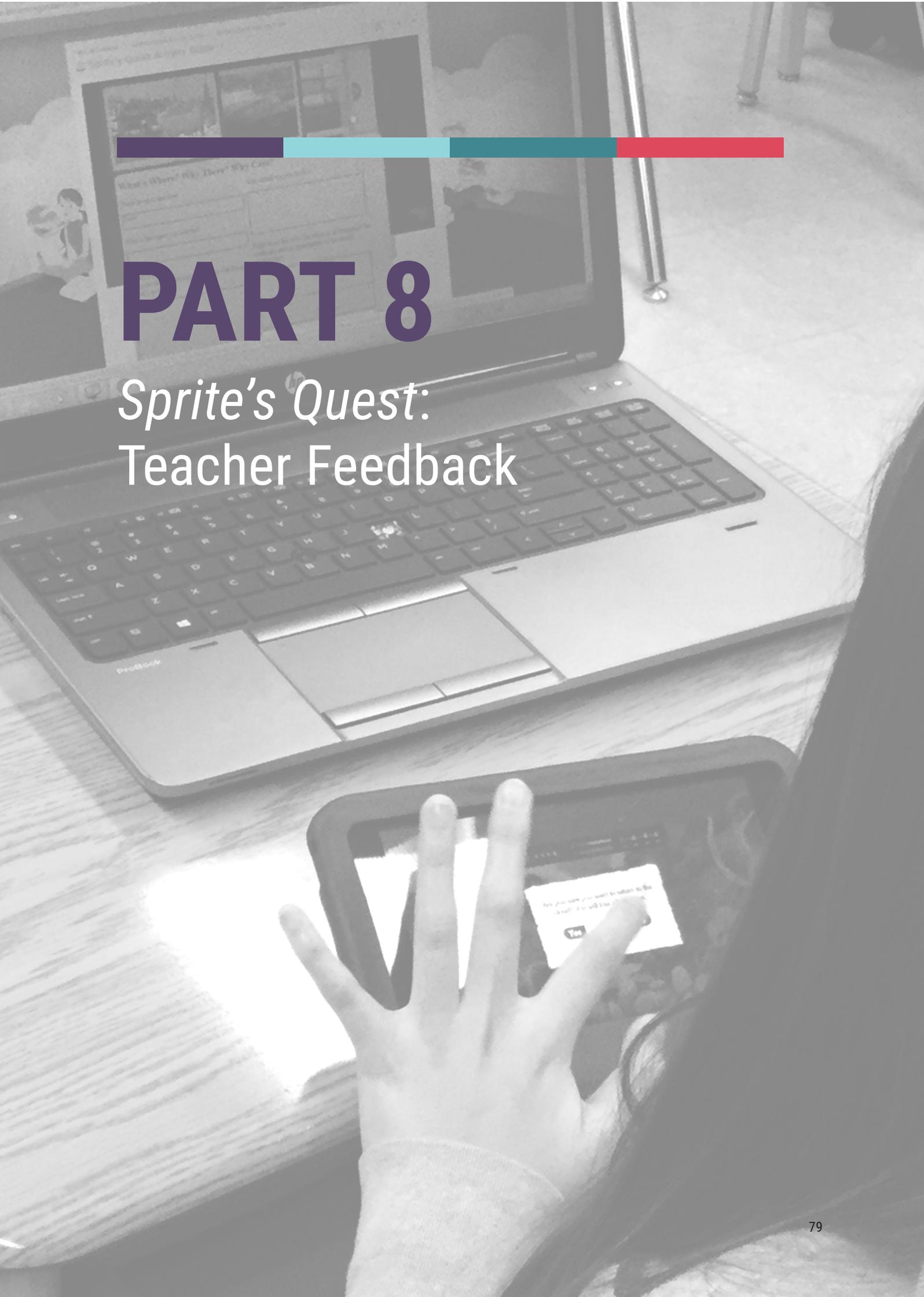


Figure 11: Statistics Regarding Participants Producing Environments for Meaningful, Structured, and Supported Game-Based Learning According to Participation in Professional Development

In addition to being more likely to create classrooms that seemed to have fostered ecologies suited to supporting game-based learning, the teachers who received PD were also more likely to have used the teacher resources and student activity guide than those who did not receive PD. Teachers who received PD were also more likely to have more detailed units—including a number of activities—and lengthier units centered on the game than those who did not attend the PD.

These findings suggest that professional development workshops are a vital component of creating meaningful, supportive, and structured game-based pedagogy. Part of this is due to the fact that teachers do not ubiquitously use or have mastery of digital games. Moreover, teachers require the opportunity provided in professional development sessions to become familiar with the available

learning activities that accompany games. Being led through resources in the context of the workshop, the professional development session served as a practical means for overcoming one major barrier to using technology in the classroom: time. In these sessions, teachers are provided the time required to learn how to use the resources and to at least play with the game in a directed way. In the case of our professional development session, as noted, teachers were afforded 2 hours and 15 minutes of lesson planning and 1 hour and 30 minutes of assessment planning time. This time was not granted to the teachers who participated in the study without the benefit of professional development.



PART 8

Sprite's Quest: Teacher Feedback

Feedback: *Sprite's Quest*

Teachers offered feedback on *Sprite's Quest* with respect to both the content of the game and logistical elements such as the controls and glitches that appeared in some levels. Speaking first to the content, a number of teachers praised the game for bringing the curriculum to life in interesting ways and for serving as “springboard” for discussions of geographical concepts. For example, Scott noted that the New York City level enabled him to have “good discussions about...the high-rise buildings, and the green walk [High Line],” and Sarah mentioned that the game sparked conversations about “place and environmental impact.” At the same time, teachers were also critical of game content, calling attention to a lack of cohesion in some of the elements of the game and a lack of purpose with *Sprite's Quest* overall. One area of concern for teachers was the water vault’s disconnectedness from the main section of the game where Sprite is moving through the geographical regions. Keira explained her concern:

I wish that there had been more to do with the water vault.... There wasn't a lot of development there. [The game] touch[es] on [the vault] a bit in one of the extending pieces and how you can maybe look at that or consider that within your community. I don't think that piece was developed, which is kind of funny because [Sprite] is a water droplet, and you're trying to pick up water all the way through. That wasn't developed.

For Marvin, the water vault also left him wanting more given its inability to capture students’ attention, once again owing to its lack of connection to other areas of the game. He compared *Sprite's Quest* to other games:

What [the students] like as they play [other games are] hidden things and the things they can save up for.... Let's say you have water and stuff – how much water is involved in some of the items you guys have listed there of the products [in the water vault]– it didn't grip and hold their attention because there was no real connection to them. There was nothing they could buy or customize their Sprite or anything like that. That's stuff they really wanted to do. When they saw that the water [card] element really wasn't... I guess they could flip a card over or unlock something, but there was no personal benefit for them to do it. They lost interest in that totally.

Other teachers stressed conceptual inadequacy with water conservation and droplet collection in the game. Chance commented on the fact that students “could beat levels without collecting all the water.... It sent the message that you don’t have to conserve water and you can still get ahead.” Beyond the water vault, another concern cited was a lack of differentiation between the content of levels and a lack of connection between facts and the rest of the game. Calling attention to the fact that students might be comparing *Sprite’s Quest* to another game that they play in class, the math game Prodigy, Dennis explained:

[The students] thought that information bubbles should pop out here and there and that they should ask you quick questions in order to gain access to the tunnel. Or that you should...battle someone else to get the right answer, or something like that.... They thought after a couple of days, you’re still this little blob running around.... I think a lot of them are comparing [*Sprite’s Quest*] to Prodigy, because you have to be asked questions periodically [in that game].

Perhaps owing to the similarity of the levels with respect to what Sprite was required to do, teachers noted that student engagement tended to decrease over time. Marvin observed, “The initial engagement was extremely high, but...there wasn’t enough difficulty and enough hidden stuff for them to really stay engaged over the course of the [unit].”

Turning to the structure of the game, how levels were accessed was a point of contention for teachers who reported a desire to have more control over the levels that students could play, unlocking certain segments as the class worked through them together. Marvin noted problems with engagement that arise when teachers are not able to prevent students from accessing sections of the game:

The kids...were playing [the game] when they were not in class, so by the third period of teaching, most of the kids had completed the game. That becomes a problem because once they complete it, it’s almost like you’re back to a normal style curriculum again where you are saying turn to page 5 and we are going to read this paragraph. You say, ‘go to this level here’ and they say ‘well I’ve already done that.’ [The teacher says] ‘Well I want you to pay attention to this’ [and the student replies] ‘I’m not really interested. I’ve already done it.’

Similarly, access to all levels (e.g., 1, 2, 3, and 4) within the same location was recommended so that students could return to a particular level to obtain additional information or check facts for the completion of an assignment.

With respect to how the game is played, teachers commented that students expressed a desire for check points to appear throughout a level so that they were not required to start at the beginning of the level each time Sprite died. Additionally, glitches in the game served as a point of frustration. These glitches commonly took the form of Sprite becoming stuck in a gray area outside of the frame of the game play action and often, this could only be rectified by restarting the level.

Feedback: Resources and Activity Guides

In general, teachers praised the teacher's manual and the student guide for helping them to better understand what was available in the game and how the game was related to the curriculum. They offered, too, specific suggestions as to how the resources could be improved. First, technological compatibility was a barrier to access. While some teachers, such as Keira, maintained that, "it was...really easy to...cut and paste [the material from the guides] into a Google document so that I would be able to just drop things I needed into Google Classroom," others, such as Jessica, struggled to transfer information from the guides to board-specific platforms. Jessica explained: "I had difficulties connecting the e-Learning site to Google Classroom, which is where we do most of our work.... The culminating activities at the end, [the students] could use that, but when they saved [the work], they didn't know where it was being saved." Mary noted similar issues with asking students to complete activities electronically in the student guide:

We wanted to [complete the unit being] paperless as much as possible, so I had them fill out [answers] within the activity [guide] and answer the questions in the activity as a group on their laptop. I gave them a laptop for that and then download and send it to me by email. A number of groups did that successfully. But when you go to print it, the text all globs together and it is not legible. It was a great idea to be able to fill it out and download it but as you will see from the examples that I am going to send you, it doesn't print properly. That was a downer. I couldn't read it properly on the screen, I thought maybe it was just the screen so I tried to print and it was exactly the same.... The text overlaps. If their answers aren't clear either on screen or on a paper it defeats some of the purpose if you can't type it within the guide.

Dali expressed the desire for the resources to be downloadable, eliminating the work she was required to do to create the documents herself by transferring material from the guides into Word documents and PDF files:

I thought that [the guides] could have been a little more user friendly.... Perhaps having a PDF with those charts available if someone wanted to download them might have been a little bit easier. I had to look at what was on the version and then create my actual chart for the students to fill out. We're always pressed for time and stuff like that.... It would have been helpful if everything was put together on the teacher's guidelines part of the work. Anyway, if it was just like in PDF form, you could download and print it, or use a digital [version of] a Word document so you can check it and they can type it themselves.... Perhaps having it in a Word document, it would be an amazing thing for everyone.

Commenting on the structure of the student guide in particular, Kylie suggested an electronic cache or notebook for students to record facts and observations while playing the game. She offered:

If there was a way somehow to archive the information into a location that they're encountering through the game, it would be much easier for them to access it in order to complete the activities.... I do [envision] something like an independent notebook, whether they can take screenshots or whether those little water droplets they collect can then be collected in a student notebook.

Aside from technological compatibility, teachers requested additional content in the teacher's guide, including more detailed lesson and unit plans along with sample answers. Commenting on detailed lesson plans, Claire explained that an absence of such plans in a teacher's guide can sometimes serve to deter teachers from using particular curricular items in their classroom:

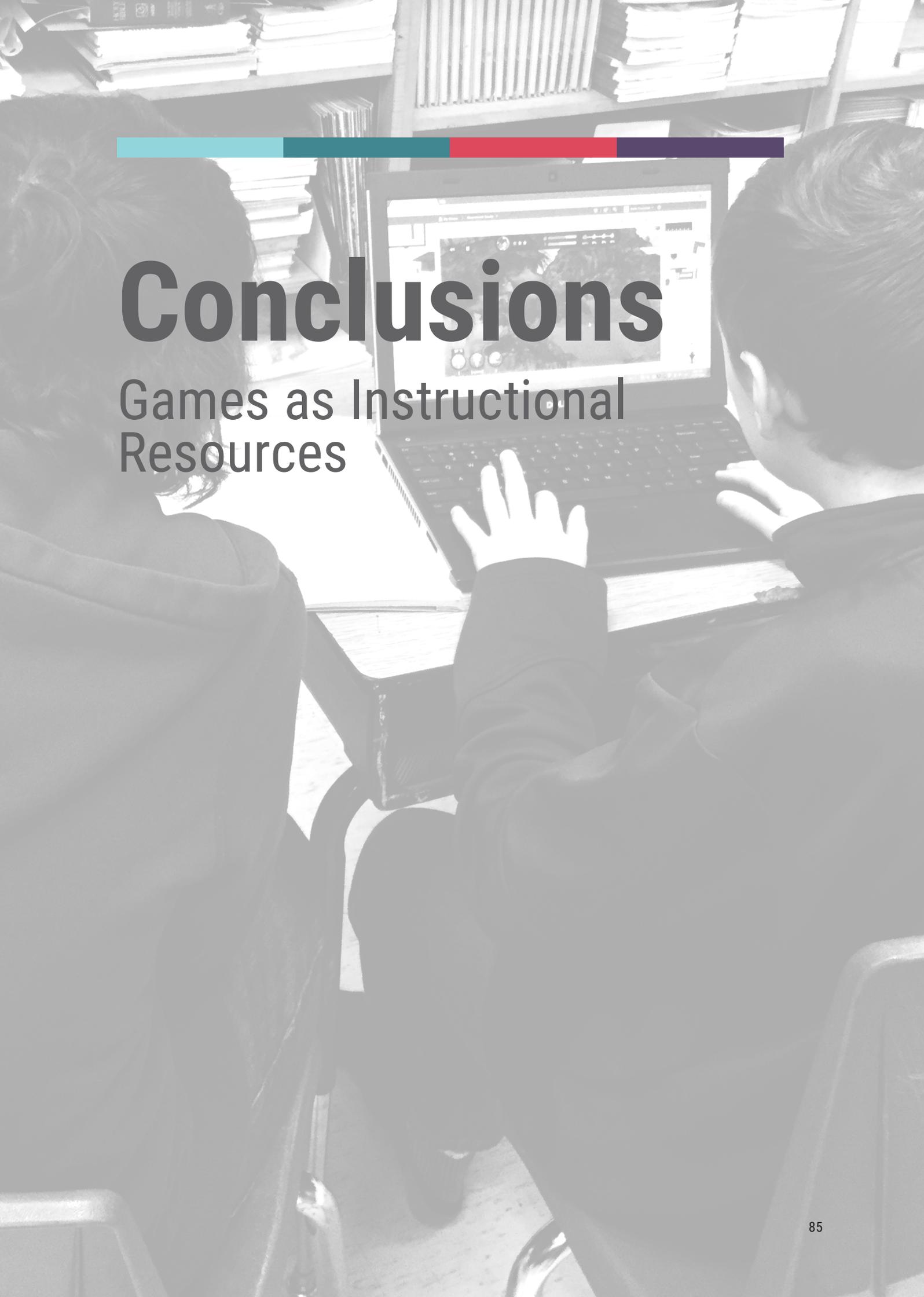
What would be very helpful...as time savers—teachers love to see things already done for them—[is] a laid-out lesson plan: day one, day two, day three; worksheets to go with it or cue cards, already done; answer sheets – all of that kind of stuff. Because I tell you, sometimes when we see that we've got to do additional work and it's time consuming, we move onto something that...[is] pre-made.

Regarding the addition of lesson plans with sample answers, teachers described these kinds of resources as useful forms of support for teachers who have not completed the game or are not comfortable or confident with the game and its content. Hector agreed that answer keys would be a welcome addition:

I know that there's a range of possible answers, but it would have been good to have some sort of teacher guide [containing]...the expected responses. Just an indication.... I know we've taught these concepts, but again, it's connecting the dots.... I wasn't confident in terms of the [material in the] game itself, in terms of making the connections between the questions and what I should have been seeing. Having an answer key would have assisted with that greatly.... It's nice to know what the expectation is location-wise or for a task.

For the student guide, the major point of concern was that it was not completely accessible to students. Teachers suggested that additional instructions in the guide for students would have been helpful, as would further details that connected the activities in the student guide to sections of the game. A number of teachers also called attention to the complex language utilized in the student guide, noting that it was "a little bit beyond their understanding" (Jessica). Offering a specific example, Mary described her students' experience with the natural processes activity:

Some of the kids in the second activity that we did where they had to choose geographical processes, some of them found that it was so hard that partway through the lesson, they switched to a different one. They couldn't find what they wanted or find enough information about it. That's what some of them did. For example, the glaciation. One used a lot of very complicated vocabulary. For example, a terminal moraine, that was ... I mean, just a moraine would have been fine. There [were] a few [terms] in that vocab diagram that totally threw them.



Conclusions

Games as Instructional
Resources

This study sought to examine how teachers used a digital game as part of an integrated unit on physical geography and how they could be best supported in doing so. Because of the scope of the project, we were able to observe game-based learning taken up in very different contexts: from highly-resourced schools to ones where technological devices were certainly scarce shared between many classrooms and many grades. The scope also resulted in a population of teachers from very diverse backgrounds with respect to experience in the classroom and with technology; while some teachers were quite technologically savvy, others were concerned about their abilities to adequately teach a game-based learning unit. Beyond the teachers, diversity was also represented in the classroom, with students from a wide range of racial and ethnic backgrounds, levels of English-language learning, physical and cognitive abilities, and previous and ongoing game play experience. What was common to all of the classrooms, however, was a general and marked enthusiasm for and interest in playing the game - that enthusiasm what we have referred to here as engagement - is a significant outcome of this research. We can say with some certainty that *Sprite's Quest* is an engaging instructional resource for teaching physical geography.

Other notable findings from this study are:

- Students understand games as media and overwhelmingly see them as learning environments.
- While some teachers reported experience playing games, games generally are not media that teachers are necessarily emerged in. As a result, they require scaffolding in the form of professional development to successfully integrate them in the classroom.
- Assessment models need to change to better reflect learning through game play.
- Despite the cited limitations of a standardized assessment model, results still indicated with statistical significance that student learning of concepts that were related to the game occurred from the pre-survey to the post-survey.
- Gender effects did not exist in the study as related to game play. In other words, boys did not perform any better or worse than girls on either the pre- or post-surveys, even though boys reported playing more than their female counterparts.
- Resources like *Sprite's Quest* also need to be promoted in order for them to be taken up and used, as without promotion, some teachers remain unaware of these games. How to promote games to teachers is outside the scope of this work, but it may be that professional development targeted at this and other games could be one means of promotion.
- Finally, even though we did not set out to evaluate *Sprite's Quest*, student and teacher testimony made it clear that the game works as a resource for supporting game-based learning.

Given its scope, this study offers a unique and valuable contribution to the existing research on games and learning, one that was possible only because of the many teachers and students who participated.

References

- Barab, S. A., Thomas, M., Dodge, T., Carteaux, R., & Tuzun, H. (2005). Making learning fun: Quest Atlantis, a game without guns. *Educational Technology Research and Development*, 53(1), 86–107.
- C21 Canada. (2012). *Shifting minds: A 21st century vision of public education for Canada*. Retrieved from <http://www.c21canada.org/wp-content/uploads/2012/05/C21-Canada-Shifting-Version-2.0.pdf>
- Cohoon, J., & Aspray, W. (2006). *Women and information technology: Research on underrepresentation*. Cambridge, MA: MIT Press.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- de Castell, S., & Jenson, J. (2004). Paying attention to attention: New economies for learning. *Educational Theory*, 54(4), 381–97.
- Denzin, N. K. (1989) *Interpretive biography*. Newbury Park, CA: Sage.
- DeMarco, M., Lesser, E., & O'Driscoll, T. (2007) Leadership in a distributed world: Lessons from online gaming. *Human Capital Management*. IBM Global Business Services. Retrieved from <https://www935.ibm.com/services/us/gbs/bus/pdf/g510-6611-00-leadership.pdf>
- Dorman, S. M. (1998). Technology and the gender gap. *Journal of School Health* 68(4), 165–166. doi: 10.1111/j.1746-1561.1998.tb06338.x
- Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2011). *Writing ethnographic fieldnotes* (2nd ed.). IL: University of Chicago Press.
- Facer, K., & Furlong, R. (2001). Beyond the myth of the “cyberkid”: Young people and the margins of the information revolution. *Journal of Youth Studies*, 4(4), 451-469.
- Francis, D. (2012, April 27). It's time to fix our broken education system. *The Financial Post*. Retrieved from <http://business.financialpost.com/diane-francis/its-time-to-fix-our-broken->

education-system

Gee, J. P. (2003). *What videogames have to teach us about learning and literacy*. New York, NY: Palgrave Macmillan.

Gee, J. P. (2005). Good video games and good learning. *Phi Kappa Phi Forum*, 85(2), 33-37.

Gee, J. P. (2007). *What video games have to teach us about learning and literacy* (2nd ed.). New York: Palgrave Macmillan.

Gubrium, J. F., & Holstein, J. A. (2002). *Handbook of interview research: Context and method*. Thousand Oaks, CA: Sage.

Hargittai, E. (2010). Digital na(t)ives? Variation in internet skills and uses among members of the "Net Generation." *Sociological Inquiry*, 80(1), 92-113. doi: 10.1111/j.1475682X.2009.00317.x

Holmes, W. (2011). Using game-based learning to support struggling readers at home. *Learning, Media and Technology*, 36(1), 5-19.

Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. NY: New York University Press.

Jenkins, H. (2006). *Fans, bloggers, and gamers: Exploring participatory culture*. NY: New York University Press.

Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robison, A. J. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. Cambridge, MA: MIT Press.

Jenson, J. & de Castell, S. (2010). Gender, simulation and gaming: Research review and redirections. *Simulation and Gaming*, 41(1), 51-71. doi: 10.1177/1046878109353473

Jenson, J., de Castell, S., & Fisher, S. (2014). Dynamic (con)texts: Close readings of girls' video game play. In C. Bradford and M. Reimer (Eds.), *Girls, texts, cultures* (pp. 261-286). Waterloo, ON: Wilfred Laurier Press.

Jenson, J., de Castell, S., Thumlert, K., & Muehrer, R. (2016). Deep assessment: an exploratory study of game-based, multimodal learning in *Epidemic*. *Digital Culture & Education*

8(1), 20-40.

- Jenson, J., Taylor, N., Fisher, S. (2010, June). *21st Century skills, technology and learning research report*. Ontario Ministry of Education. Available from http://www.edu.gov.on.ca/eng/research/Jenson_ReportEng.pdf
- Kawulich, B. B. (2005). Participant observation as a data collection method. *Forum: Qualitative Social Research*, 6(2), Art. 43. Retrieved from <http://qualitative-research.net/index.php/fqs/article/view/466/996>
- Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage.
- Kvale, S. (2007). *Doing interviews*. Thousand Oaks, CA: Sage.
- Lisk, T. C., Kaplancali, U. T., & Riggio, R. E. (2012). Leadership in multiplayer online gaming environments. *Simulation and Gaming*, 43(1), 133-149. Advance publication (2011) doi: 10.1177/1046878110391975
- Lynch, K. (2013, March 11). Toward Canadian public education 2.0. *The Globe and Mail*. Retrieved from <http://www.theglobeandmail.com/commentary/toward-canadian-public-education-20/article9532122/>
- Media Awareness Network. (2010). *Digital literacy in Canada: From inclusion to transformation*. Retrieved from <http://mediasmarts.ca/sites/mediasmarts/files/pdfs/publication-report/full/digitalliteracypaper.pdf>
- O'Neill, H. F. & Fisher, Y. C. (2004). A technology to support leader development: Computer games. In D. V. Day, S. J. Zaccaro, & S. M. Halpin (Eds.), *Leader development for transforming organizations* (pp. 99-121). Mahwah, NJ: Lawrence Erlbaum Associates.
- Palfrey, J. & Gasser, U. (2008). *Born digital: Understanding the first generation of digital natives*. New York, NY: Basic Books.
- Prensky, M. (2001a). *Digital game-based learning*. New York, NY: McGraw-Hill.
- Prensky, M. (2001b). Digital natives, digital immigrants, part 1. *On the Horizon*, 9(5), 1-6. <http://dx.doi.org/10.1108/10748120110424816>

- Prensky, M. (2001c). Digital natives, digital immigrants, part 2: Do they really think differently? *On the Horizon*, 9(6), 1-6. <http://dx.doi.org/10.1108/10748120110424843>
- Salen, K. (2007). Gaming literacies: A game design study in action. *Journal of Educational Multimedia and Hypermedia*, 16(3), 301-322.
- Silva, K. (2008, June) *Second Life* (review). TESL-EJ 12(1). Retrieved from <http://www.tesl-ej.org/ej45/m1.pdf>
- Squire, K. (2011). *Video games and learning: Teaching and participatory culture in the digital age*. New York, NY: Teachers College Press.
- Steinkuehler, C., Squire, K., & Barab, S. (Eds.). (2012). *Games, learning, and society: Learning and meaning in the digital age*. New York, NY: Cambridge University Press.
- Steinkuehler, C. & King, B. (2009). Digital literacies for the disengaged: Creating after school contexts to support boys' game-based literacy skills. *On the Horizon*, 17(1), 47-59.
- Tapscott, D. (1998). *Growing up digital: The rise of the net generation*. New York, NY: McGraw-Hill.
- Wajcman, J. (2007). From women and technology to gendered technoscience. *Information, Communication & Society*, 10(3), 287-289. Retrieved from <http://dx.doi.org/10.1080/13691180701409770>
- Warren, C. A. B. (2002). Qualitative interviewing. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research: Context and method*. Thousand Oaks, CA: Sage.
- Young, M., Slota, S., Cutter, A., Jalette, G., Mullin, G., Lai, B., Simeoni, Z., Tran, M., & Yukhymenko, M. (2012). Our princess is in another castle: A review of trends in serious gaming for education. *Review of Educational Research*, 82(1), 61-89.

Appendix A

CURRICULUM FOR PLAYING TO LEARN

WEDNESDAY, FEBRUARY 10, 2016 – THURSDAY, FEBRUARY 11, 2016

Institute for Research on Digital Learning, York University



Wednesday, February 10, 2016 | 9:00am – 5:30pm

9:00 am – 11:00 am

Introduction and Welcome to the Project

- Welcome to the Project
- Introductions
- Logistics and Schedule
- Consent Forms
- iPad Set Up
- Website Access (WordPress) Survey

11:00 am - 11:15 am

Break

11:15 am – 12:30pm

Introduction to *Sprite's Quest: The Lost Feathers and Seedling Saga*

- Walk-Through of Game Activity Guide and Teacher Resources

12:30pm – 1:30pm

Lunch

1:30pm – 2:30pm

Playing *Sprite's Quest* and Quick Debrief

2:30pm – 3:00pm

WordPress Training

3:00pm – 3:15pm

Break

3:15pm – 4:30pm

Action Research Activity: Observations, Photos, Videos and Annotations

4:30pm – 5:30pm

Lesson Planning: Round One: Physical Geography and *Sprite's Quest*

Thursday, February 11, 2016 | 9:00am – 4:30pm

9:00 am – 10:30 am	Observations in the Field Activity and Writing Field Notes
10:30 am - 10:45 am	Break
10:45 am – 11:15pm	Uploading documents, videos and photos to WordPress
11:15pm – 12:30pm	Lesson Planning: Round Two: Group (School District) Planning: Individual Lessons
12:30pm – 1:30pm	Lunch
1:30pm – 3:00pm	Lesson Planning: Round Two Continued: Group (School District) Planning: Individual Lessons
3:00pm – 3:15pm	Break
3:15pm – 4:00pm	Whole Group: Sharing Lessons with Other Groups (Districts)
4:00pm – 4:30pm	Debrief: Questions, Posting Questions on the Blog, Support Moving Forward

Appendix B

Sprite's Quest: Seedling Saga Walkthrough



Character is loaded into game.

Use arrows to move, spacebar for movement. Use 2 to shoot water.

*Jumping can sometimes cause a glitch that makes the player sprite jump constantly. Restart level or go back to main menu and re-select the level to fix this.

▶ Please help the coffee seedling get home. It lived in an American state, which is warm and wet and has many plants with big and broad leaves.

VEGETATION

- Tundra and Alpine Tundra
- Coniferous Forest
- Midlatitude Deciduous Forest
- Subtropical Broadleaf Evergreen Forest
- Mixed Forest
- Midlatitude Scrubland
- Midlatitude Grassland
- Desert
- Tropical Rainforest

1 California 2 Louisiana 3 Florida 4 Hawaii

World 1 Quiz: Answer is Hawaii

HAWAII

LEVEL 1



Collect water droplets. Move the character to the right of the screen and up the ladder. Avoid the rats by jumping over them as they cause damage to your health. Continue right by jumping on the crates and platforms while collecting water droplets.

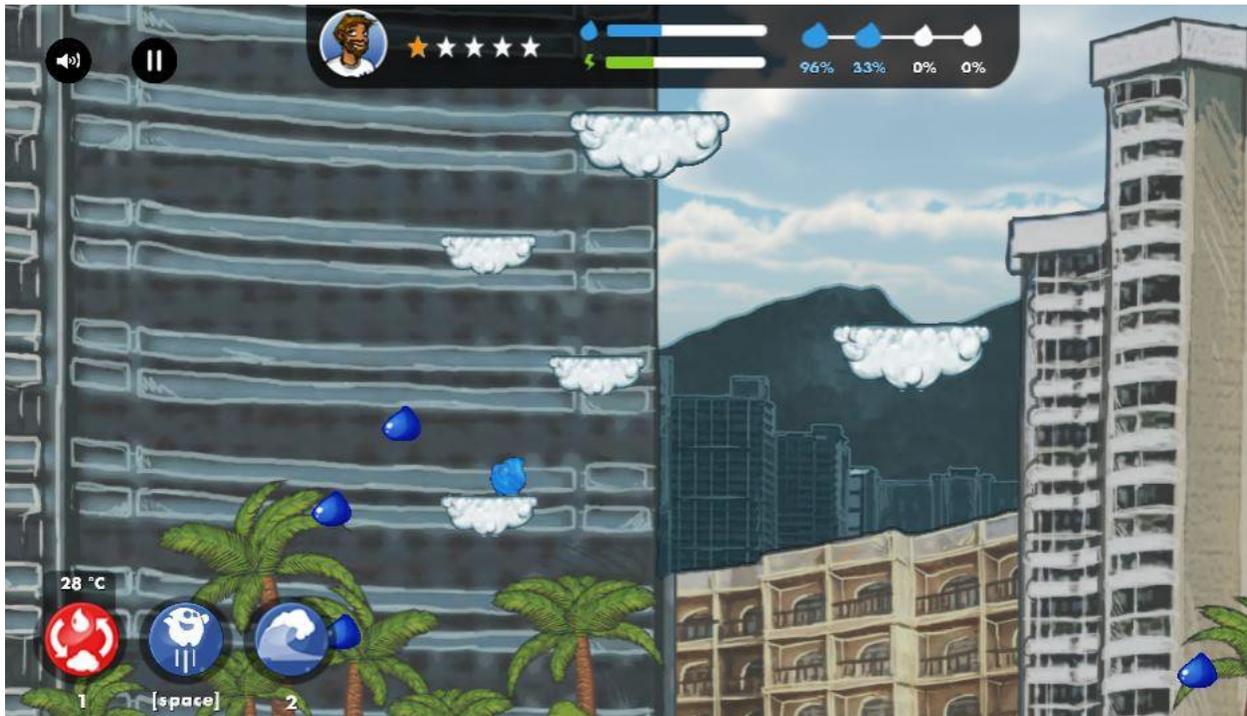
Keep going right until you see a moving crate. Time your jump and land on top of it to reach the other side. Jump onto the crate moving up. Land on the still crate. Go right onto the crate moving upwards to jump on another moving crate and collect the drops. Jump down to collect the drops. Go right into the water to collect the drops.



Jump onto the cloud platform and collect the star. Go right by jumping onto the cloud platforms. Avoid the seagulls by jumping over them or keeping below their line of movement. Keep going right until you see the red arrow pointing right that will take you to the next level.

HAWAII

LEVEL



Continue moving the player right, using the palm trees and beach umbrellas as platforms to collect rain droplets. Avoid the crabs by jumping over them as they cause damage. Keep going until you see the cloud platforms. Use the landmark in the centre with beach chairs and a path to get high enough to reach the cloud platforms. From there, jump down onto the houses and use the ledges as platforms to jump higher. Keep going until you reach the end of the beach. Use the cliffside to gain height and jump into the cloud platforms to collect the star. Continue right to reach the red arrow and go to the next level.



HAWAII

LEVEL



Go right, using houses as platforms to collect the drops. Keep going until you come across a boulder blocking the path. Stand next to it until it prompts a thought bubble above the character. The boulder requires water so that it can erode away. Press 2 to create a raincloud above it, which will erode it away and unblock the path.

You will eventually reach a pond that turns into a waterfall. When swimming in the water, be careful as the waterfall has a current that will pull you in if you get too close. Keep going right and using branches and rocks as platforms. You will come across a tree sprouting from the ground. Stand next to it and with number 2, create a raincloud to make it grow. Once fully grown, you can climb this tree and jump off it into a higher area.



Continue right, using more houses and trees, as well as clouds, as platforms to collect drops and a star sitting atop one of the houses. Reach the red arrow at the end of the screen to end the level.

HAWAII

LEVEL 4

Continue right in this level until you pass a checkpoint that will activate a garbage truck's movement. Jump onto the back of the truck to gain height and jump onto the cloud platforms above to collect drops. Keep going right until reaching the garbage dump. Avoid the rat roaming at the bottom. Use the discarded crates as platforms to collect the star and drops and reach the ledge where a tree is sprouting. Make it grow with 2 then climb it upwards to a higher level.



Continue right, jumping on platforms to collect drops until you reach the red arrow, ending the last level of this section.



World 2 Quiz: Answer is Brasilia

BRASILIA

LEVEL 1

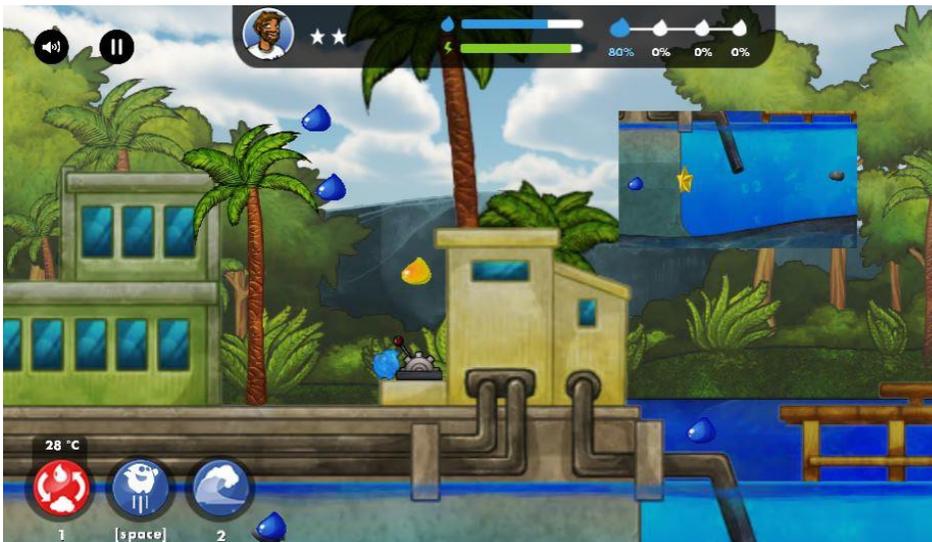


Going right, make sure to avoid the algae blooms in the water that damage your health. There will be a boat passing by on the water. Use it to gain height and jump onto the cloud platforms to collect drops. Be careful of the people gliding across the screen as they can knock you off and cause damage. Jump to avoid them. If you keep going right, using roofs and parasols as platforms, you will come to a tree

sprout. Use 2 to make it grow into a tree that you can climb for height. If you swim below the main platform, you will see a gap between the pipes where you can access the rest of the drops in the water. Going right there will be another gap between the pipes where there are more drops to collect.



You will come across a lever next to a building. Stand beside it to activate it, which will stop the flow of water through a pipe, giving you access to the star that's underwater. Afterward, keep going right to reach a red arrow and go to the next level.



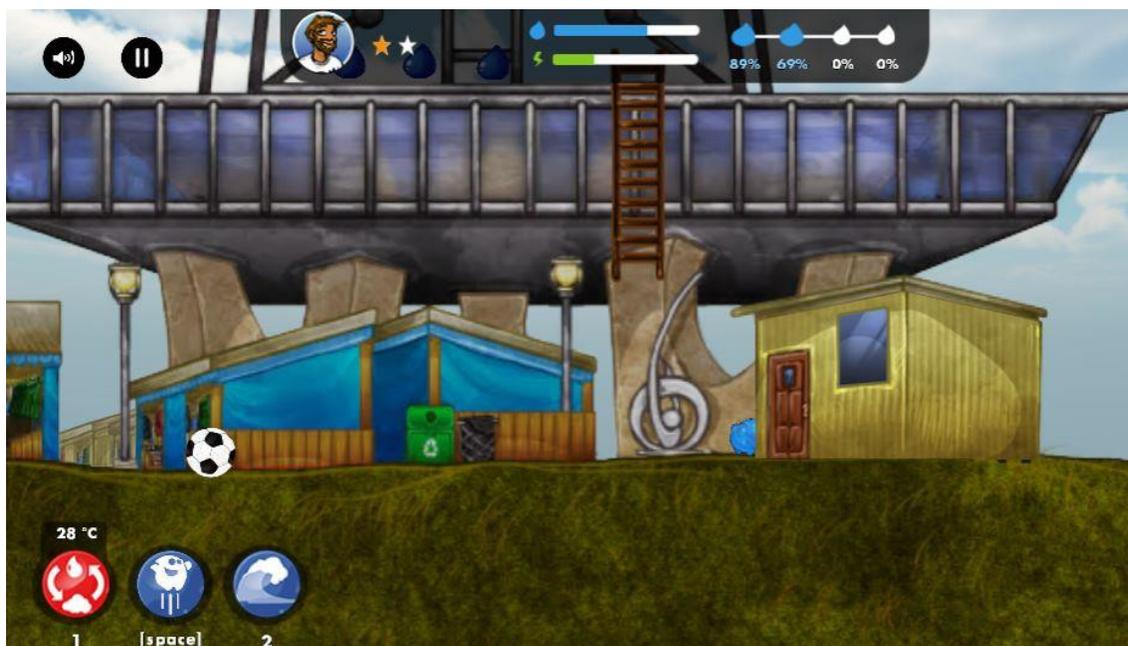
BRASILIA

LEVEL 2



At the very start, approach the lever inside the hut to open the gate that gives you access to the rest of the level. Use palm trees and plants to gain height and gather drops. You will come across a pit with empty water. Stand close to the edge for the character to prompt a thought bubble and press 2 for a raincloud to appear and fill the pit with water. Now you can cross and reach the other end.

Keep going right, using rooftops as platforms and jumping onto the clouds to gather droplets. Head down to the ground level and head right, coming across a base for a metal pillar structure. Avoid the rolling soccer balls as they cause damage. Stand next to a lever inside the yellow house to trigger the ladder to drop down. Now you can climb upwards to collect the rest of the drops. Use the structure's bolts and pillars to go up, eventually reaching the red arrow to go to the next level.



BRASILIA

LEVEL 3



This level is filled with many cars and obstacles. Avoid any smoke or moving cars. To gain more height and reach droplets, jump into the back of a passing cyclist. The cyclist will stop when you jump atop them so time your jump correctly so you are just below the drops at the time of boarding. Jump onto a purple car and head left onto the truck collecting drops. You will reach a bus and note that the truck is now too high to jump back too. You can press 1 to turn the character into a cloud, floating upwards and eventually landing onto the truck. Use this same technique to reach the cloud platforms that are seemingly out of reach.

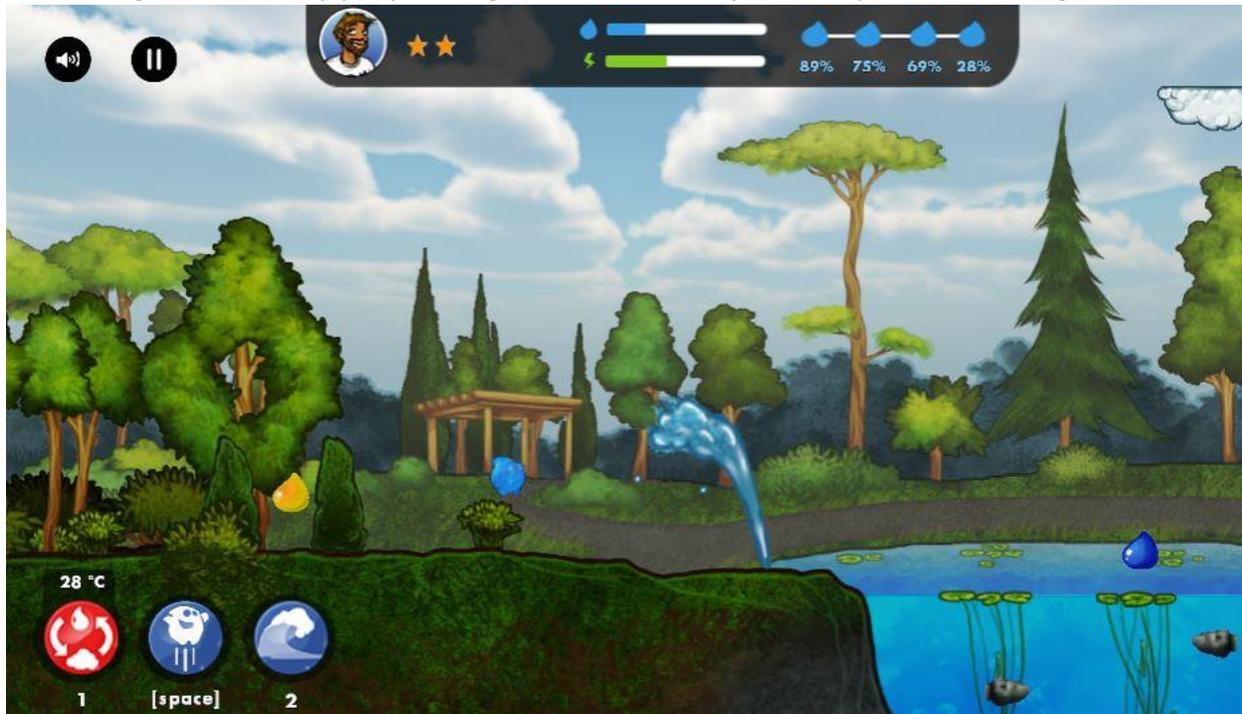
Keep going right, avoiding hazards and using cars as platforms, until you reach the red arrow that ends the level.

BRASILIA

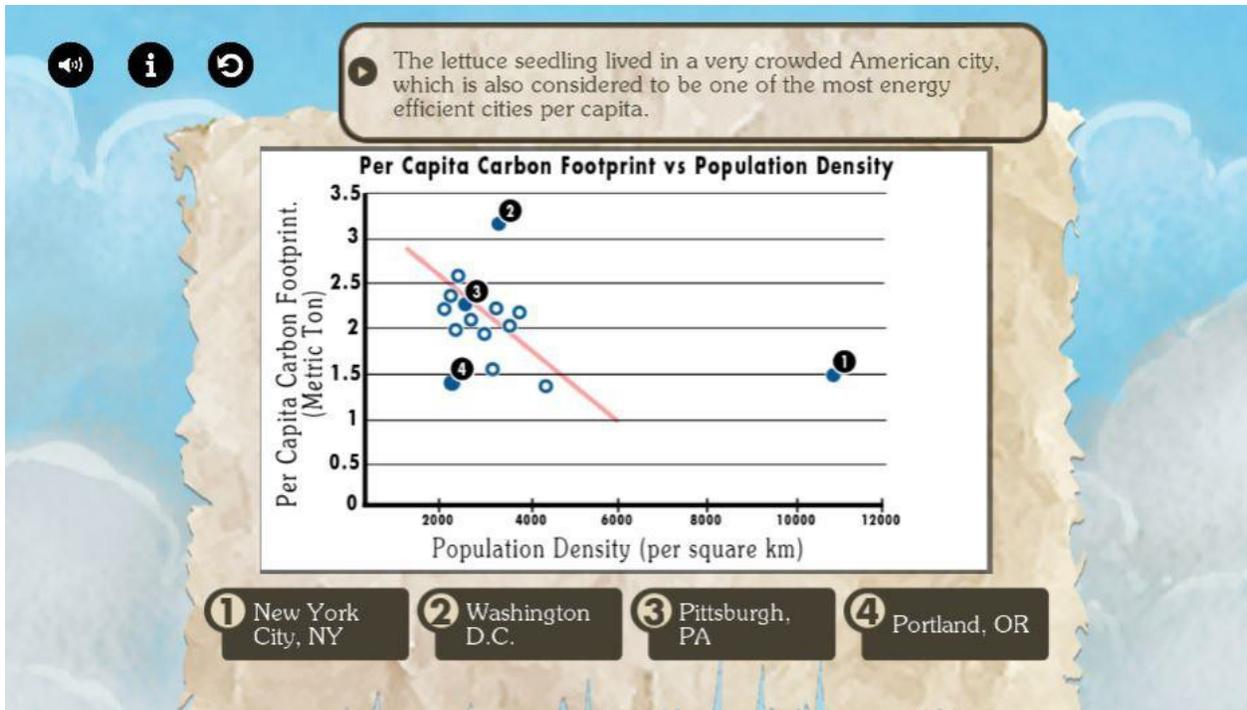
LEVEL 4

Go right and stand inside the hut you see and approach the lever. This will turn off a water fountain ahead that blocks your way. Keep going right and you will see a tree sprout. Water it using 2 and climb the fully grown tree to access the droplets that are higher up. Keep going until you see a lake. Swim

inside and go down to see pipes you can go into to collect drops. Swim up and continue right on land.



You will come across tree sprout. Water it with 2 and use it to gain height and collect more water drops. Reach the cloud platforms and jump around while avoiding the toucans. They are the same as the seagull enemies from before, so jump to avoid damage or being knocked off. Keep going right using the cloud platforms until you come to a tree grove. Avoid the hazards falling from the trees. Reach the green arrow to end the level.



World 3 Answer: New York City, NY

NEW YORK

LEVEL 1



This level consists mainly of boats and vehicles that serve as platforms. Jump to your right, collecting drops along the yellow boat, then make your way around an up to reach the star above.

Continue right, collecting the drops by using the cloud and vehicle platforms. You will eventually come to moving crates.

Time your jumps accordingly and use the crates to reach the drops that are higher up. Be careful to not stand underneath them as they cause damage when they come down and touch you. Keep going until you see the red arrow which will end the level.



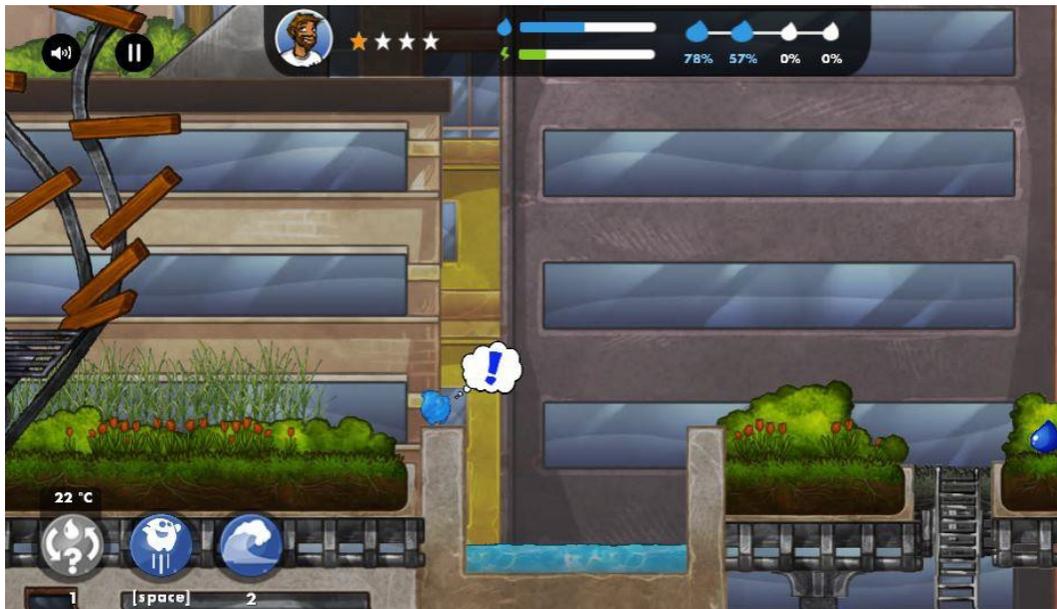
NEW YORK

LEVEL 2



You will start below ground level on this level. Going right, be careful of the approaching taxis. Jump above them to avoid damage. You will eventually see a set of stairs. Go up and emerge on the surface. Take a left and you will see another tree sprout. Stand next to it and press 2 to water it and make it

grow. Now you can climb the fully grown tree to gather the out of reach droplets. Before continuing right, interact with the cogwheel by standing next to it and pressing 2. This will cause a bridge to come down on the further along the right side of the level, granting you access across a gap.



Continue right, using bushes and trees, as well as train tracks to gain height and collect more droplets. You will eventually come to an empty pit with little water left. Stand on the edge so it prompts a thought bubble above the character's head, then press 2 to create rain which will fill the pit with water. Now you can cross the gap using the water. Continue right, making sure to go down the ladder to collect all the droplets in the level.



When you come back up from collecting the droplets, continue right along the platforms. There will be another tree sprout. Water it using 2 as you've done before and make it grow. Now the tree can be climbed so you may collect more droplets and jump over higher obstacles. Continue right using the trees and bushes as platforms, until reaching the red arrow which ends the level.

NEW YORK

LEVEL 3



This level starts you off above ground and will lead you underground, where there will be rats roaming around so make sure to avoid them. You can use the trash cans and recycling bins as platforms to avoid the rats and collect droplets. The wrapping around the pillars can also be used as platforms. Go down towards the ladder and climb it downward. If you go either left or right into the tunnels with water, you can collect some more droplets.



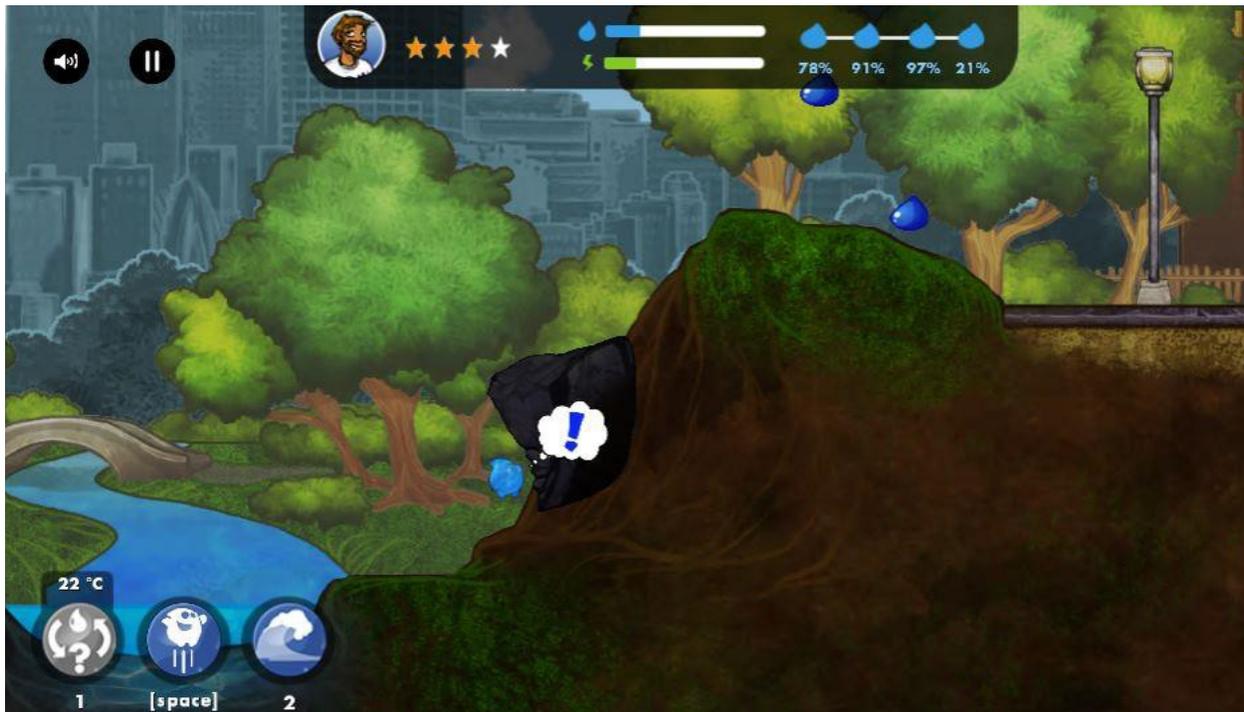
Avoiding the rats, make your way to the right of the screen to climb up a set of stairs and activate a lever by standing next to it. Do the same with the other lever on the left side of the room. Once both are activated, this will cause the water in the tunnels to drain and will make a subway train come through. Climb your way back up and head right over the platforms. Time your jump so you land on the roof of the subway train which will take you to the right. Be careful as there will be flying hazards here. Jump to avoid them.



When the train brings you to a glass staircase, jump off onto the rail to get off and continue to the rest of the level. You will see another tree sprout, so water it using 2 then climb the tree to get higher up. Keep using the trees and roof tops as well as bicycles as platforms to collect droplets. You'll soon come across the red arrow that ends the level.

NEW YORK

LEVEL 4



This level will start you off in a park, which consists primarily of trees, bushes, and lampposts as platforms. Keep going right until your path is blocked by a boulder. Stand close to it and press 2 in order to erode it away like previous boulders and other levels. Once cleared, you can continue climbing the hill

and keep going right.



Going right, collect the droplets and you will eventually come across more buildings. Use the roofs and bricks sticking out as platforms, while making sure to avoid the seagulls that will cause damage and knock you off. Atop one of the buildings will be a tree sprout. Press 2 to make it grow then climb it upward to gain more height. Keep going right.



Once you see the helicopters, you will notice they have platforms attached to them. Time your jumps to move onto these platforms that will take you higher up. There will be another helicopter so do the same with that one as well. There will be flying hazards so be aware of them and jump to avoid them. There will be another tree sprout once you jump off the helicopters. Make it grow with 2 then climb it to gain higher ground. You will soon come across the green arrow that ends the level.

The image shows a quiz interface with a world map and a list of countries. The map is color-coded by population density, with a legend titled "POPULATION DENSITY PERSONS PER sq km". The legend has five categories: Over 100 (dark red), 50 - 100 (red), 10 - 49 (orange), 1 - 9 (light orange), and Under 1 (yellow). Four numbered markers are placed on the map: 1 in Turkey, 2 in Italy, 3 in Egypt, and 4 in Romania. To the right of the map is a list of countries with their corresponding numbers: 1 Turkey, 2 Italy, 3 Egypt, and 4 Romania. Below the list is a cartoon cloud character with a sad expression. At the top of the interface, there are icons for a speaker, information, and a refresh button. A text box at the top contains the question: "The cotton seedling lived in a country where most of the population lives by a river."

The cotton seedling lived in a country where most of the population lives by a river.

1 Turkey

2 Italy

3 Egypt

4 Romania

POPULATION DENSITY
PERSONS PER
sq km

Over 100

50 - 100

10 - 49

1 - 9

Under 1

World 4 Quiz: Answer is Egypt

EGYPT

LEVEL 1



In this level, the sandy dunes and pyramid ledges serve as platforms to collect droplets, as well as cloud platforms. Go up the pyramid until you reach its top platform and notice a gray outline on the top. Stand next to this outline and it will reveal a treasure chest with more droplets to collect. Continue right using the ledges as platforms.



You will notice a bus stop and a lever with droplets hovering above. Use the bus and bus shack as platforms to reach it. Once you stand next to the lever, that will trigger the bus and the bus will start moving. Hop onto the bus and use it as a moving platform. Time your jumps to avoid flying cloud hazards and to reach droplets in the air that were out of reach.

Continue to the right and you will come across another lever and another bus. Solve it just like the first bus above and hope off once you come to a ledge with a star atop it.



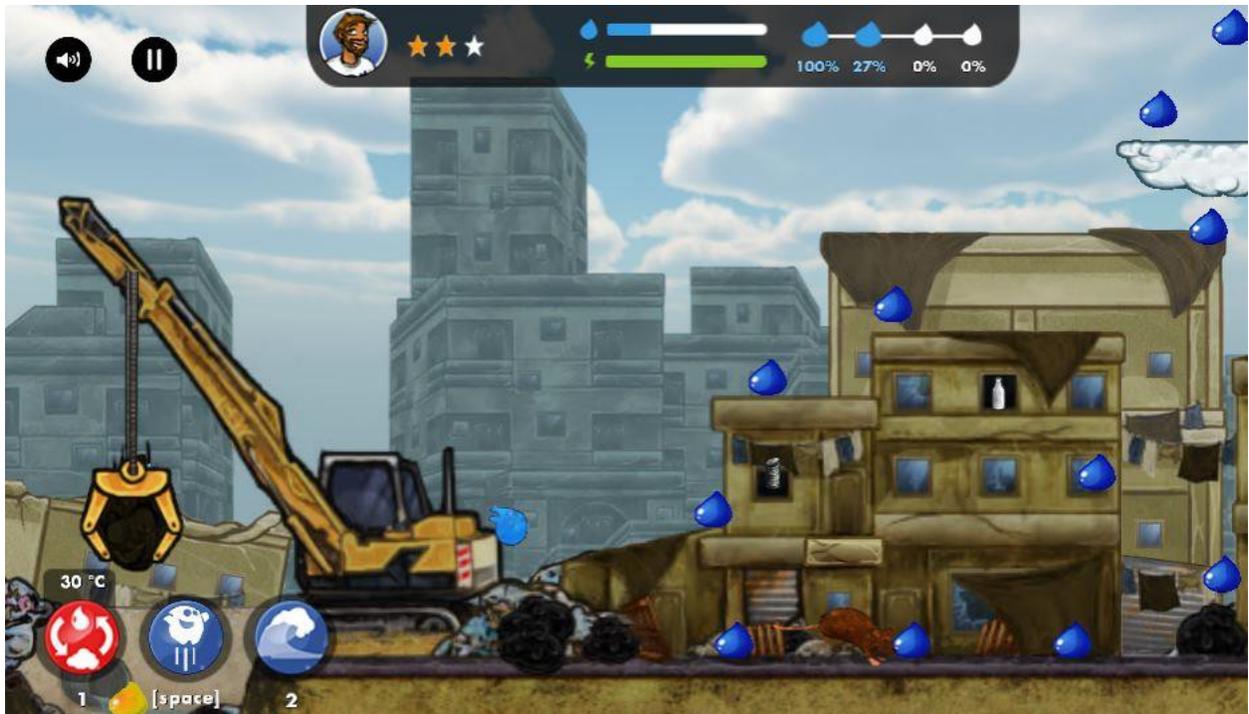
Pass the red arrow to end the level.

EGYPT

LEVEL 2



This level is made of a lot of houses with ledges that serve as platforms. Note that there are platforms that have a crack running through them. Stepping on these will cause them to fall away so don't stand on them too long. Jump on the ledges to collect droplets as well as the star beside the stairs. Keep going right using ledges as platforms.



You will eventually see a truck picking up garbage. Be careful to not stand directly below the claw when it falls down as it causes damage. Use parts of the truck as platforms to get around obstacles. Continue right using the building ledges and clouds as platforms. You will come across more trucks as the one above, use the same approach to get past it.

Keep going until you pass the red arrow and end the level.

EGYPT

LEVEL 3



The very first thing you will come across in this level is a tree sprout. Water it by standing next to it and pressing 2. Climb the newly grown tree to reach the droplets that are out of reach. Jump down and use the palm trees and clouds as platforms, as well as the ledges from the buildings.

Going right, you will eventually come across another boulder that needs clearing. Press 2 for rain to appear and erode the boulder to clear the path.



Once on the road, there will be a blue car coming up and down. Jump over it to avoid it. You will need to time your jump to land on top of this car so it can give you the height you need to reach the cloud platforms. The car will stop when you jump atop it so wait until it's right below the cloud.

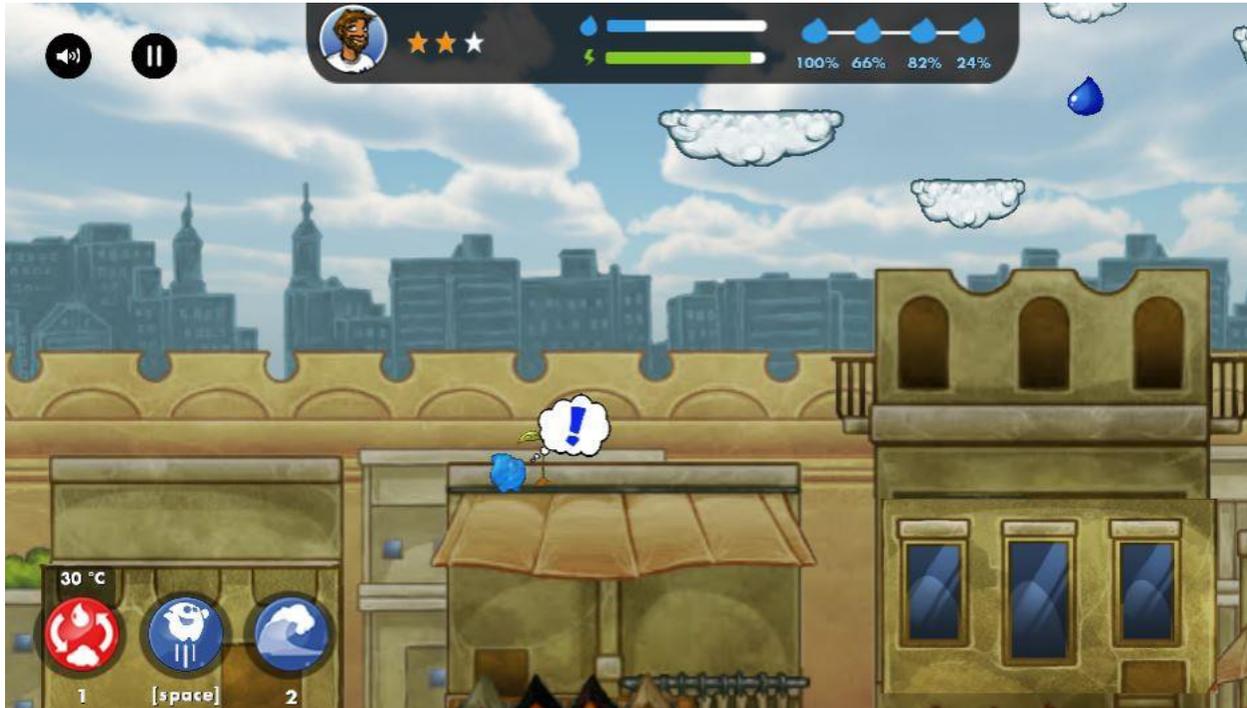


Watch out for barrels rolling out of a truck. Jump over them to avoid them until you reach the area with the cloud platforms. While evading the barrels, jump into the truck and jump into the cloud platforms. There is another tree sprout at the end of the road, so water it by standing next to it and pressing 2. Use

the tree to climb and reach the higher platforms. Keep going right until reaching the red arrow to end the level.

EGYPT

LEVEL 4



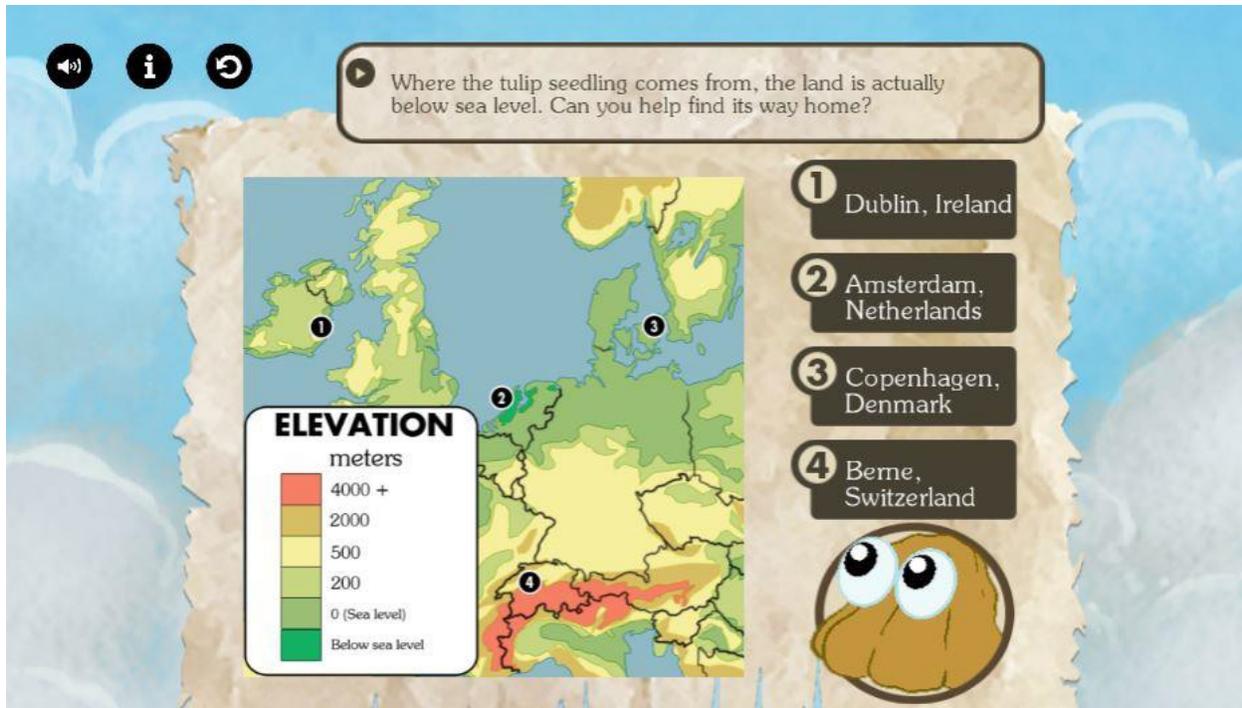
This level is mainly buildings with ledges that serve as platforms. Some buildings will reveal interiors if you stand close to them, revealing more water droplets to collect. Jump all the way to the top of the buildings and you will see the tree sprout. Water it with 2 and climb the tree after it grows to reach the cloud platforms above.



Keep going right and you will eventually come across a gear-shaped object. Stand next to it and press 2 to activate it, causing a bridge to come down below and creating a path. Jump down. There will be a tree sprout. It's not necessary you water it, but if you'd like to backtrack to collect any droplets you missed, you can water it with 2 and climb it to go back.



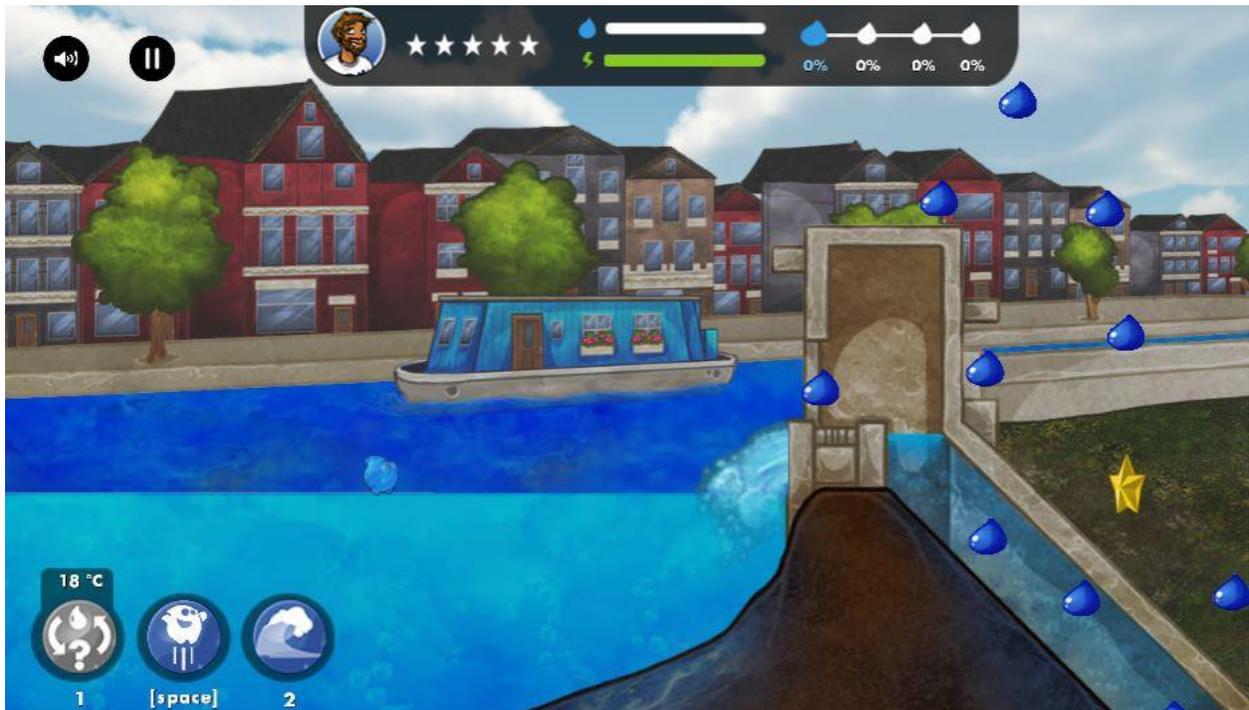
Going to the right, you will come across a tall building. Be aware of the passing cyclists and jump over them to avoid them. Use the platforms around the building to access the inside of this tall building, where you can use the desks and printer as platforms to get higher up. There will be a lever on the top floor on the right wall. Stand close to it to activate it, making a ladder drop down. Climb up the ladder to collect more droplets. Once that's done, you can head left and jump over the gap to reach a tree sprout. Water it to make it grow and use the newly grown tree to reach higher droplets and rooftops. Keep going right and eventually pass the arrow to end the level.



World 5 Quiz: Answer is Amsterdam, Netherlands

AMSTERDAM

LEVEL 1



Once in level, go right until you arrive to the water canal. Jump into the pipes, collecting all the drops along the way. Once on the other side, you can climb up the slope of the canal and use ledges to get higher and collect more drops, as well as a star.

Keep going right and the platforms will eventually become fields and bushes as well as trees.



You will eventually reach another tree sprout. Stand next to it and press 2 in order to make it grow, then climb up and over the bushes and tree.

Keep going right, entering then exiting another canal, using steel beams as platforms. This area will eventually end and turn into buildings with ledges you can use to jump around. Collect the star using the ledges.



When you see a ladder, follow it down to go to a gear-shaped object. Stand next to it and press 2 in order to activate the bridge above. Now you can cross the gap safely. Keep going right and there will be a star you can collect right before the red arrow that ends the level.

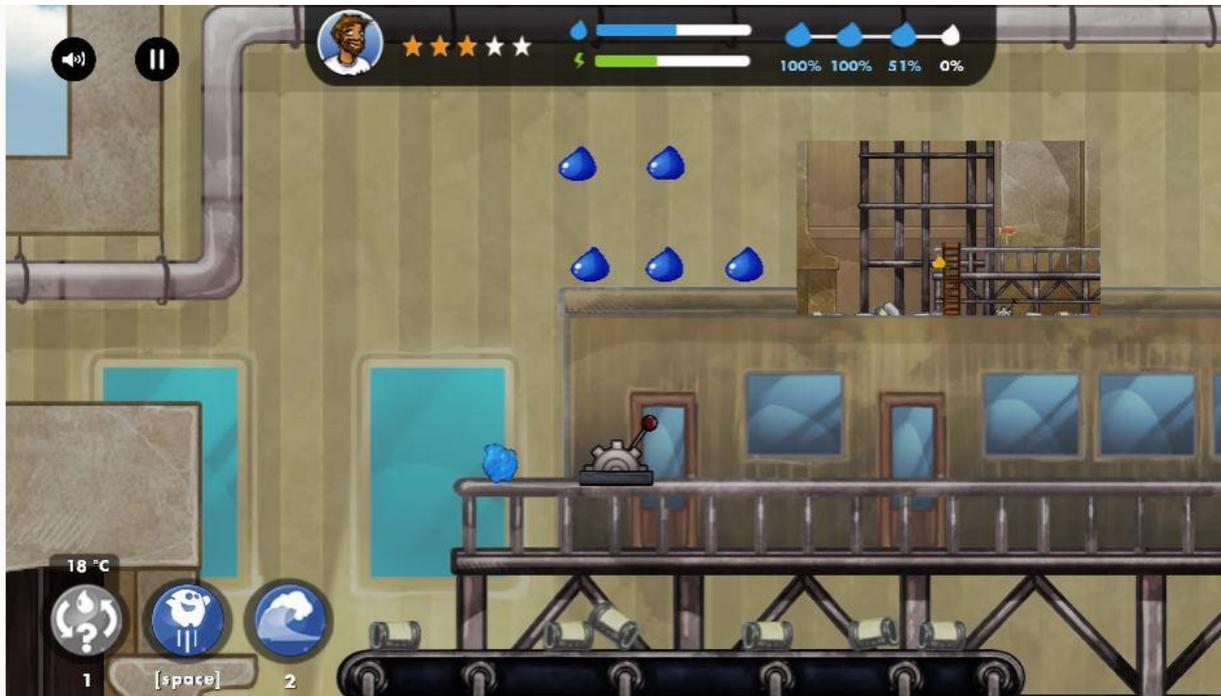
AMSTERDAM

LEVEL 2



Since this level takes place inside a waste management facilities, most platforms will consist of platforms and garbage. There will be rats here so make sure to jump to avoid them. There will be a ladder you can climb to access the bottom and top platforms. There will be waste falling down that you have to avoid as they cause damage.

For now, continue along the bottom part of the level rather than the top. You will pass a tunnel that goes upwards but you can't access it just yet. Eventually you will come to a lever. Stand next to it to activate it, which will cause the platforms in the previous tunnel to start moving. Now you can backtrack to that tunnel and hop onto the moving platforms to access the top level.



Once on the top level, you will see another level. Activate it like the one below and now a ladder will drop in the lower level, allowing you to climb up to a previously inaccessible platform where the red arrow is, ending the level.

AMSTERDAM

LEVEL 3



This level consists of a lot of outdoor platforms, trees, bushes, clouds and some buildings and windmills. There will be small bricks sticking out from the windmills that can also be used as platforms. Keep right going through these platforms until you arrive to an empty pit. Like the ones in previous levels, stand close to the edge to prompt the thought bubble above the character. Press 2 and a rain cloud will appear and fill up the pit with water. Now the pit can be crossed.



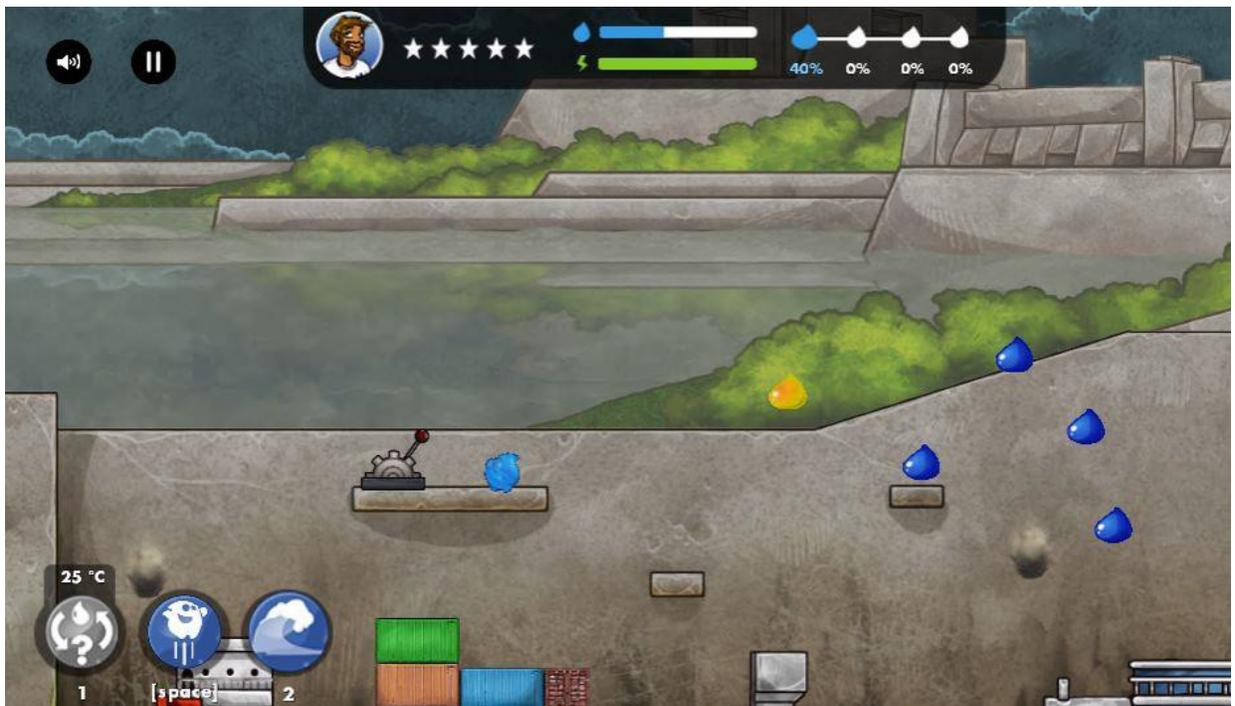
After some platforms, you will come to a hill with a boulder blocking the way. Stand close to it and press 2 in order to erode it and unblock the path. Now you can continue through the rest of the level, collecting droplets, until reaching the red arrow in the forest, which ends the level.



World 6 Quiz Answer: Wuhan

WUHAN

LEVEL 1



This level has quite a lot of hazards you have to avoid. Do not go into the water as it's contaminated and will take away health, as well as any clouds of smoke coming from ships and through the air.

Use the cement structure as platforms to eventually reach a ledge where there is a lever. Standing next to it will activate the ship below and make it rise higher. Now you can use it as a platform to reach the higher ledges that were out of reach.

Keep going right, using ledges and clouds as platforms while avoiding the smoke hazards.



When you see a ship filled with sand, jump down and walk toward the edge. This will prompt a thought bubble above the character's head. Press 2 and a wave of water will move the sand over to one side. Now you can use this small mountain of sand as a platform to reach the cloud platform that was too far away. Continue to the next boat and jump your way through the platforms until arriving to the red arrow that ends the level.

WUHAN

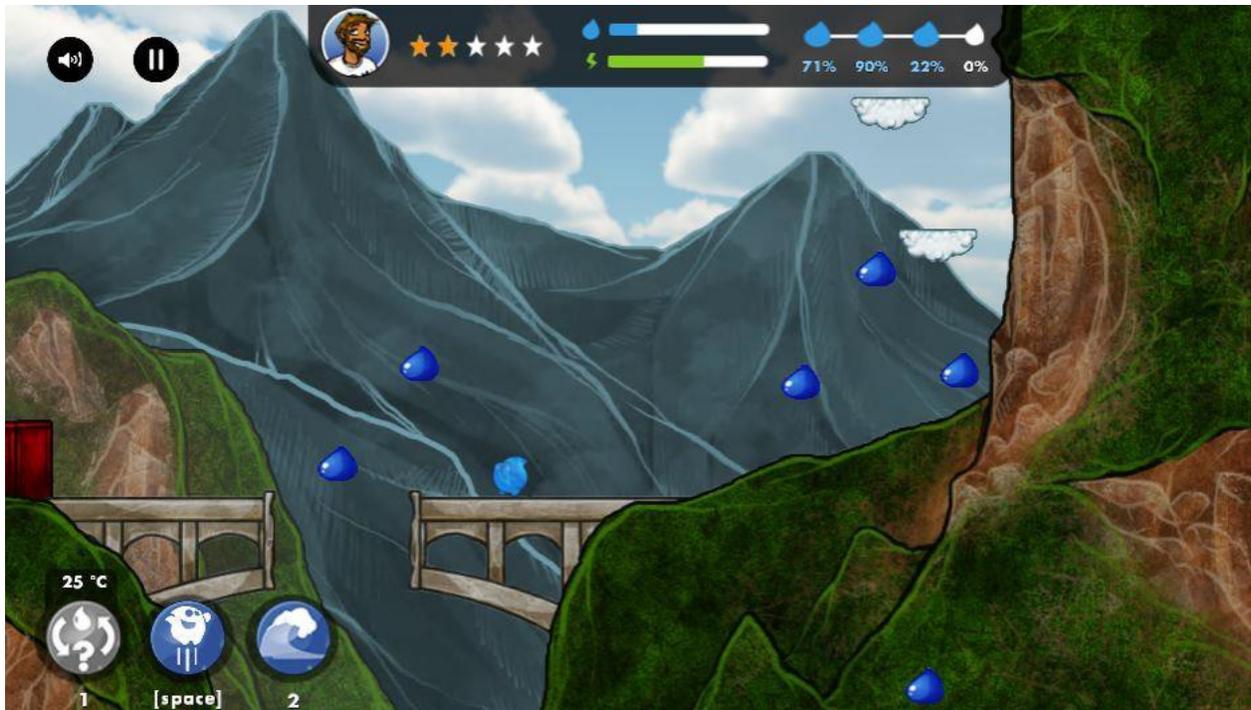
LEVEL 2



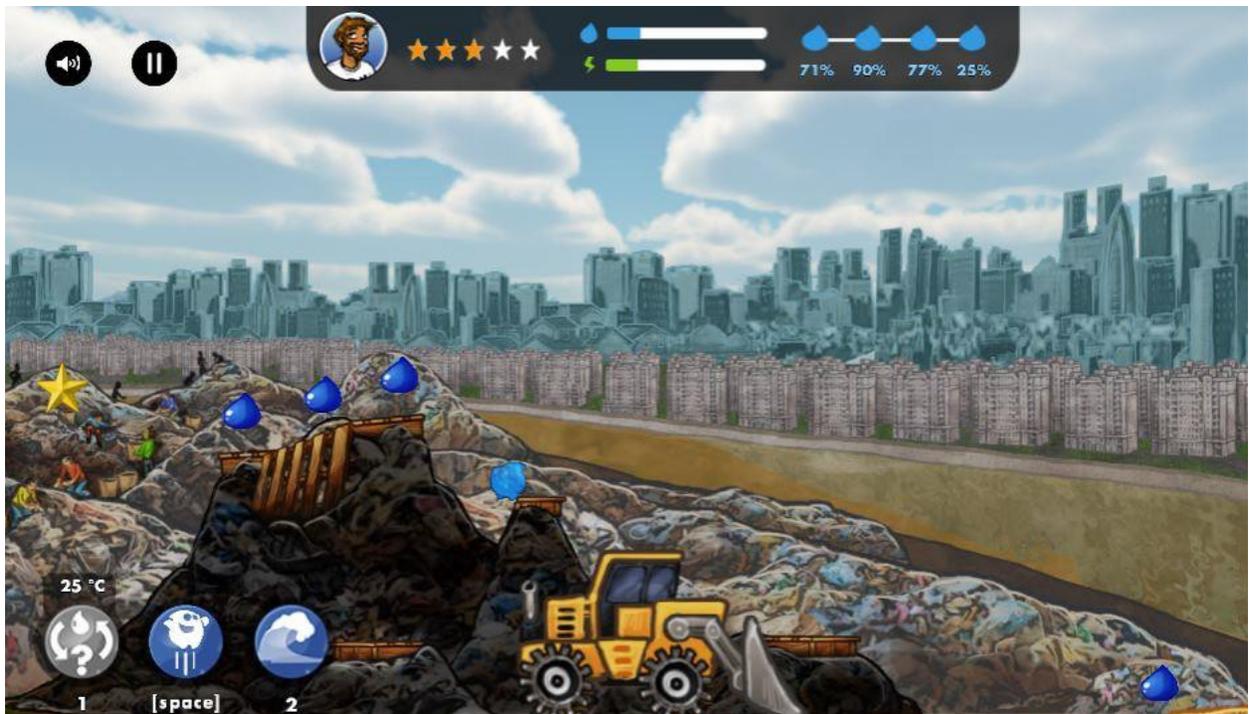
In this level, there will be many hazards floating inside the water that can cause a lot of harm. Tread carefully when swimming to avoid them. Once you've reached the other side of the hill you first see in the level, go up the hill and water the tree sprout. Once fully grown, you can use the tree to gain height and jump to the other side of the hill and collect droplets.

Go back to your right and use the passing ships as platforms while being careful of the smoke hazards.

Continue on land and use the building platforms to get around. You will eventually come to a bridge. Be careful as when you step into its middle section, it will fall through.



Now there will be more garbage-related obstacles once you come over the cliff. There will be crate parts you can use as platforms. Be careful of the truck pushing garbage. You can jump atop it to use it as a platform.



Keep right and you will come across another sand pit. Get close to the edge to prompt a thought bubble above the character's head and press 2. A wave of water will wash over the sand and create a hill you can use as a platform to get on top of the higher ground.



Going right you will soon come across the red arrow and end the level.

WUHAN

LEVEL 3



This level has a lot of high cliffs and hills that will serve as the main platforms. When starting the level, jump down. Go all the way to the bottom until you hit the water and make your way up the cliff to collect all the droplets. You can go back on top of the highest cliff by jumping onto the cloud platform.



The level is fairly straight-forward and there's not too many obstacles or hazards to be wary of. You will eventually come across another empty water pit you must fill by standing close to the edge and pressing 2. Cross the gap. Keep using the cliffs' green patches as platforms, along with the clouds.

The level will turn more industrial, with roads and road-related hazards to avoid. You will eventually come to the end of the level, crossing the green arrow.

Sprite's Quest: The Lost Feathers

Walkthrough

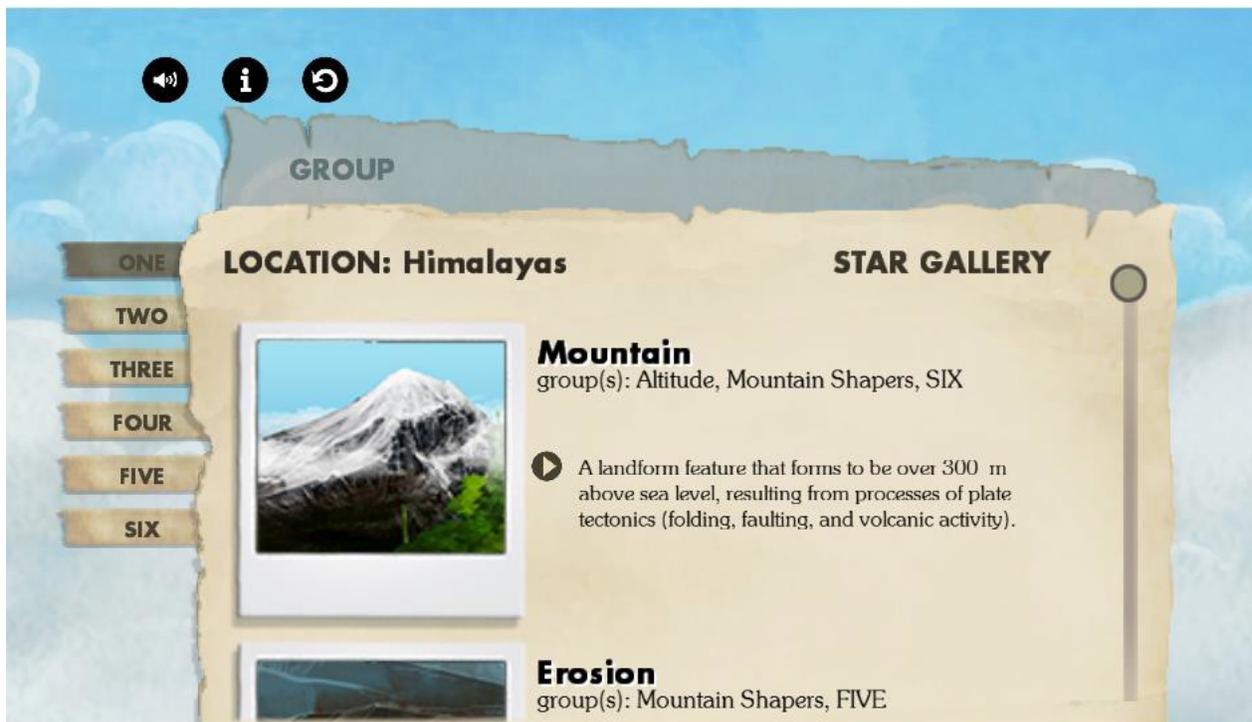


Summary

In Sprite's Quest, students are asked to locate a bird's lost feather as they navigate six levels. The levels represent six different geographic areas: Himalayas, The Nile, Japan, Iceland, Indonesia, and Costa Rica. Each level begins with a question, the answer to which is related to the particular geographic location of the level. Students are then required to lead Sprite - a droplet of water who can shift forms depending on the temperature - through a particular terrain unique to that geographic location. Sprite has to overcome obstacles (flying frogs, volcanoes, fish, yaks, etc.) as he collects water droplets, locates the level's star, and proceeds to the exit sign. As they proceed through the level, students are also offered a set of facts about that geographic location.

Star Gallery

The star gallery is where you can find all the stars you collected from each level. Each star adds a picture from that location where you got the star, along with what it is called, what group it's in and a definition.



Water Vault

The water vault is where you see how much water droplets that you have collected. It also states how much water bottles as well as how much servings the water amount that you have collected is equal to.





Factoids


1 650 L
 =
3 300 bottles

 There is hidden water in everything that is produced, used, and discarded. The amount of water that goes into producing everyday items is often surprising. As you collect water droplets, you will unlock objects in the Water Vault that need more and more water to produce.

30 L 1 cup of tea	40 L 1 slice of bread	50 L 1 orange	70 L 1 apple	140 L 1 cup of coffee	200 L 1 egg
230 L 1 cup of milk	250 L 1 cup of apple juice	520 L 1 serving of yogurt	650 L 1 serving of chicken	1 200 L 1 chocolate bar	1 650 L 1 serving of pork
					

WATER VAULT

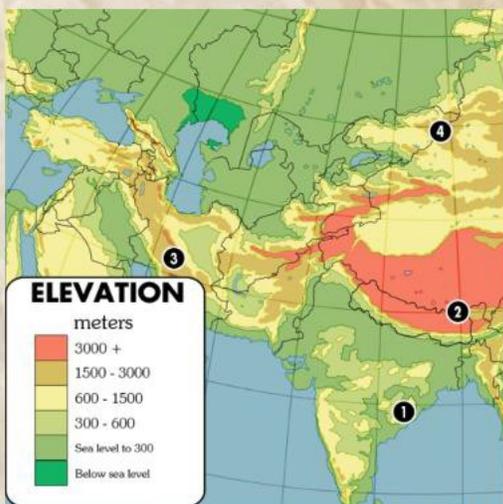
Level 1 – Himalayas

Question:





 My feather is located near the highest mountain peak in the world. Please help me find it.



1 Jindhagada Peak
2 Sagarmatha
3 Zard Kuh-e Bakhtiari
4 Belukha Mountain



Level look:



Animal Encounter:



Topic of Facts:

- Farming, and the animals they dominantly use to assist their living conditions and agriculture.
- Glaciers and the mountains that exist in the area.
- The Purpose of Yaks

Level 2 – Nile

Level Question:

Here's a picture of me right before I lost my feather. Can you figure out where I was?

Location	Month	Average Temperature (°C)	Average Precipitation (mm)
1 Khartoum, Sudan	JAN	24	10
	FEB	26	10
	MAR	28	10
	APR	30	10
	MAY	32	10
	JUN	34	10
	JUL	36	10
	AUG	36	10
	SEP	34	10
	OCT	32	10
	NOV	30	10
	DEC	28	10
2 Kampala, Uganda	JAN	10	135
	FEB	10	135
	MAR	10	135
	APR	10	135
	MAY	10	135
	JUN	10	135
	JUL	10	135
	AUG	10	135
	SEP	10	135
	OCT	10	135
	NOV	10	135
	DEC	10	135
3 Marble Bar, Australia	JAN	24	10
	FEB	24	10
	MAR	24	10
	APR	24	10
	MAY	24	10
	JUN	24	10
	JUL	24	10
	AUG	24	10
	SEP	24	10
	OCT	24	10
	NOV	24	10
	DEC	24	10

1 Khartoum, Sudan
2 Kampala, Uganda
3 Marble Bar, Australia
4 None of the above

August 4th

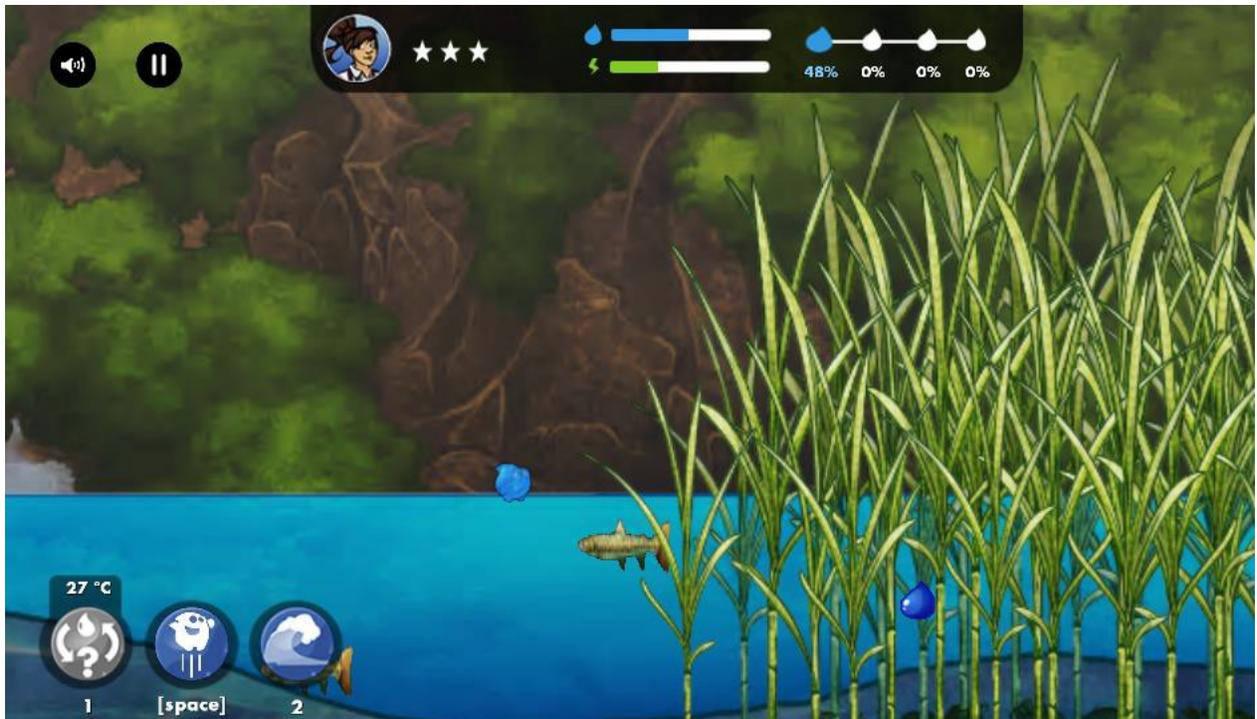
Level Look:

27 °C

1 [space] 2

10% 0% 0% 0%

Animal Encounter:



Topic of Facts:

- Rainforests /the Nile
- Deposition, Erosion And Rapids
- Human made reservoir lake Nasser, Aswan dam, silt
- Crops (cotton), irrigation

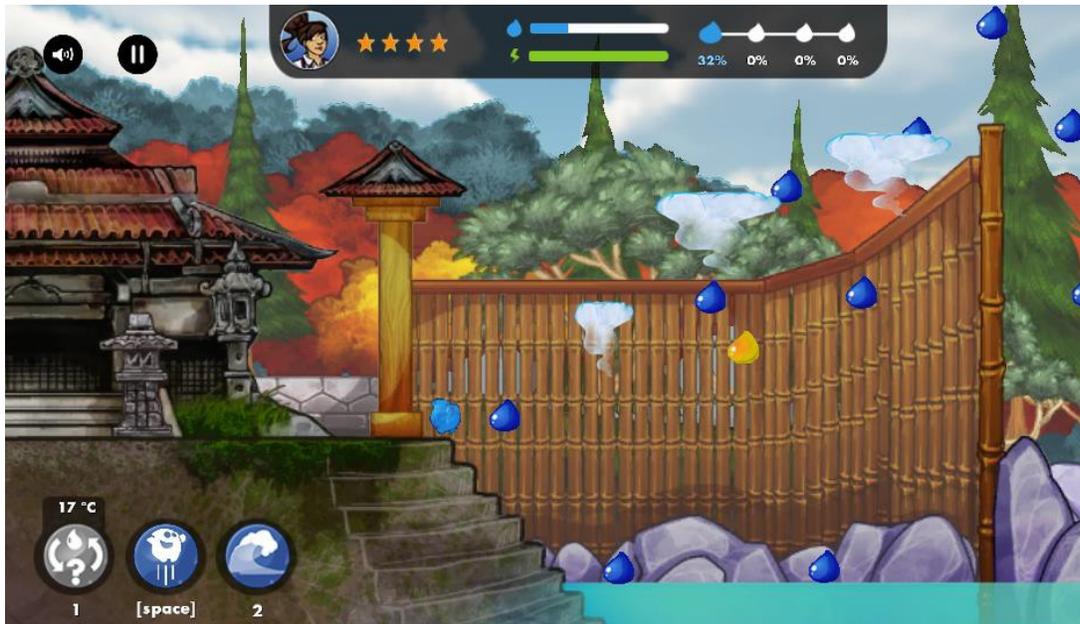
Level 3 – Japan

Level Question:

I dropped my feather near a volcano that now seems dormant. I've seen many volcanoes in my travels. This particular one is called a "stratovolcano."

1 Mt. Nantai, Japan 2 Mauna Kea, Hawaii, USA 3 Mt. Fuji, Japan 4 Crater Lake, Oregon, USA

Level Look:



Animal Encounter:



Topic of Facts:

- Volcanic activity in Japan
- Tree variety (biodiversity) in Japan
- Dams, water damage prevention (rocks by riverbanks, vegetation)
- Buoys in Sea

Level 4 – Iceland

Level Question:

I think my feather is on an island at a high northern latitude, but I remember that it was surprisingly warm.

Arctic Circle
Tropic of Cancer
Equator
Tropic of Capricorn

WATER CURRENTS
Warm
Cold

1 Falkland Islands
2 Moscow
3 Vancouver Island
4 Iceland

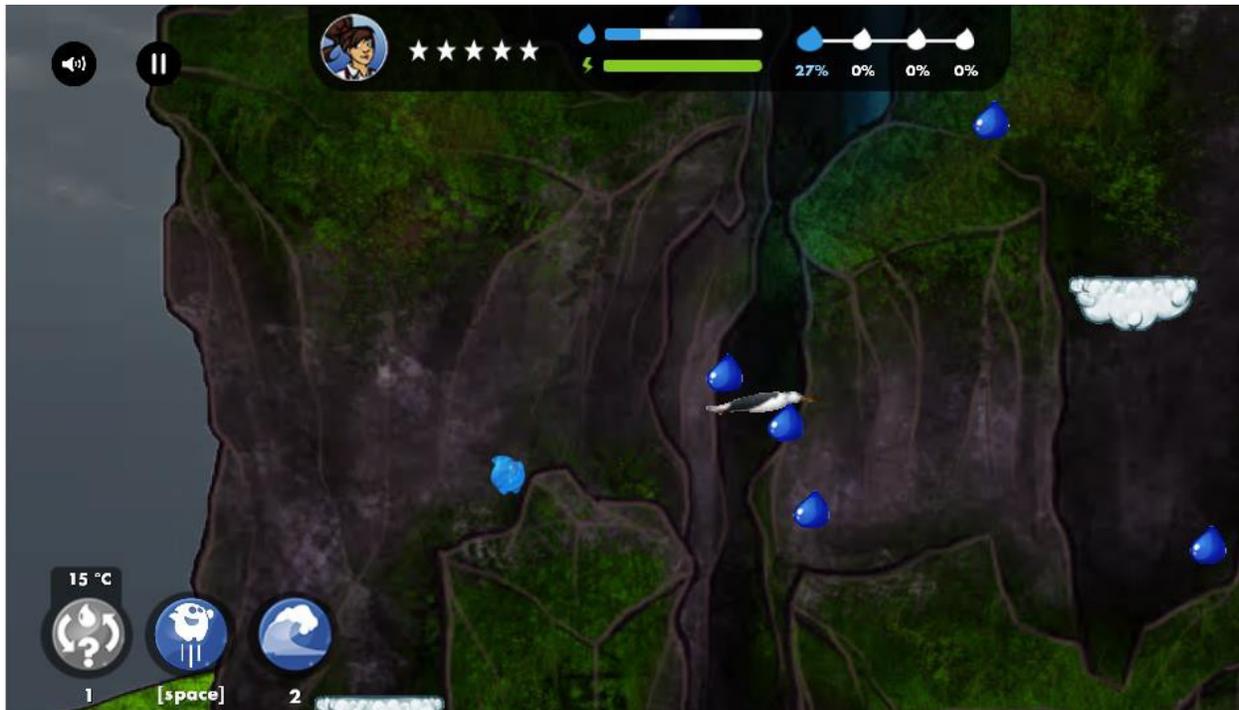
The image shows a world map with four numbered locations: 1 Falkland Islands, 2 Moscow, 3 Vancouver Island, and 4 Iceland. Red arrows indicate warm water currents, and blue arrows indicate cold water currents. A legend identifies red as 'Warm' and blue as 'Cold'. A speech bubble contains a question about a feather found on an island at a high northern latitude that was surprisingly warm. The map also shows the Arctic Circle, Tropic of Cancer, Equator, and Tropic of Capricorn.

Level Look:

15 °C
1 [space] 2

The image shows an underwater scene with a sheep swimming. The temperature is 15 °C. There are several icons: a question mark, a sheep, and a globe. A progress bar shows 0% for four different items. The sheep is swimming towards the right.

Animal Encounter:

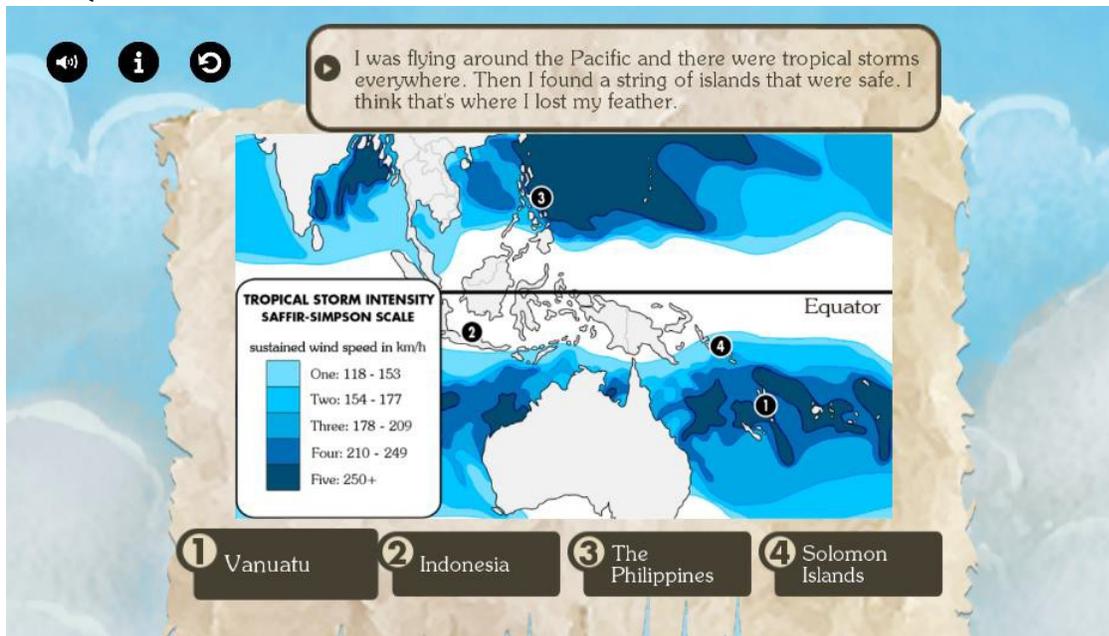


Topic of Facts:

- Strong winds over small currents, rock formations, aeries
- Fjords, geothermal, geysers
- Crevices and caves

Level 5 – Indonesia

Level Question:



Level Look:



Animal Encounter:



Topic of Facts:

- Islands, palm oil, mangroves, fish
- Tropical forests, hot lava, volcanoes
- Oxen, animals and farming

Level 6 – Costa Rica

Level Question:

I lost my feather somewhere that was hot and humid during the month of July.

Location	Month	Average Temperature (°C)	Average Precipitation (mm)
1 Samara, Costa Rica	JAN	29	~10
	FEB	29	~10
	MAR	29	~10
	APR	29	~10
	MAY	29	~10
	JUN	29	~10
	JUL	29	~10
	AUG	29	~10
	SEP	29	~10
	OCT	29	~10
	NOV	29	~10
	DEC	29	~10
2 Las Vegas, USA	JAN	~8	~10
	FEB	~8	~10
	MAR	~8	~10
	APR	~8	~10
	MAY	~8	~10
	JUN	~8	~10
	JUL	~8	~10
	AUG	~8	~10
	SEP	~8	~10
	OCT	~8	~10
	NOV	~8	~10
	DEC	~8	~10
3 Santiago, Chile	JAN	~17	~10
	FEB	~17	~10
	MAR	~17	~10
	APR	~17	~10
	MAY	~17	~10
	JUN	~17	~10
	JUL	~17	~10
	AUG	~17	~10
	SEP	~17	~10
	OCT	~17	~10
	NOV	~17	~10
	DEC	~17	~10

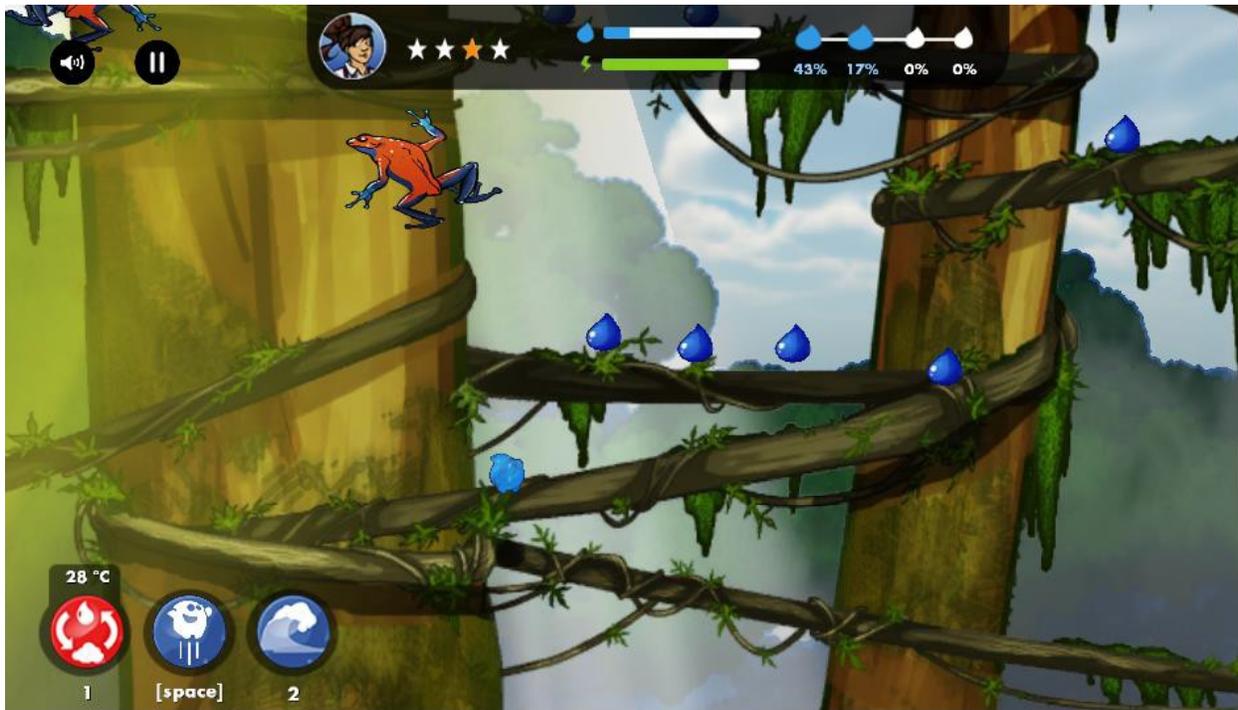
- Samara, Costa Rica
- Las Vegas, USA
- Santiago, Chile
- None of the above

Level Look:

30 °C

1 [space] 2

Animal Encounter:



Topic of Facts:

- Volcanoes, forest, ants
- Camouflage
- Chocolate and cocoa

Appendix C

Overview

Day 1 - Play with partner.
Double entry journal

Day 2 - Independent play
- Recap ... Likes? Frustrations?
3 learnings?
2 want to know more
1 Question

Day 3: Model What's Where? Why There? Why Care?

- Independently complete organizer using another location

Day 4-7 - Teaching Concepts
ex. land forms pop density

Day 8 - Complete Human Systems / Natural Processes
section of student guide.

Day : Culminating Activity

Survoi

A2
A2.1

Himalaya

Groupe de 2.

Feuille de route avec le
Vocabulaire spécifique
pour chaque région.

- A la fin, demander aux
élèves de réaliser une
Carte postale de la région
visitée.

7^e Année.

3^e périodes

Jeu

Explorer le concept

Application

Restitution (Affiches, Vidéos)

Mise en situation: Vidéo (ex sur le
séisme, tremblement de terre)

Grade 8 Geography: Sustainability

Unit Overview: 8 - 50 min. lessons

- pre-teach features of sustainability
- discuss (sus. communities + ways they can be more sus.)
- intro game, play game, use "what's where"
- review game, pair students, stu. obs., students share
- Using discussion ques. ask students if they have? what they've noticed
 - ↳ Cont. to play game completing activities at each level
- final assessment
 - ↳ Students will choose a community, they will research ways the community can be sustainable + suggest ways in which it could become more sustainable.

Grade 7 Language Arts: Classifying/Review Ideas

Unit Overview: 8 - 50 min. lessons

- intro. the game + play whole class obs. of what they notice Model how to gather + where where?
- Mini lessons on various styles of note taking
- Play game. Take Notes. Try to see their prof. style (2-4 days) → self assess w/ stu. succ. criteria
- Final Assessment
 - ↳ Stu. will learn how to review their notes + research further to present their feat region in digital format. Stu. will create a bullseye their region
 - ↳ Assessment bullseye

Lakehead Overview:

Devices: iPads

Apps: Padiet, Binder, eLearning, Kaseely, iMovie, Office 365

Learning Goal: I will demonstrate an understanding of significant patterns in the Himalayas, both natural processes and human activities that change those features and determine the impact of tourism on the region.

Day 1 - Students are researchers - Individual experiments with collaborative apps
- Preteach how to observe using devices
- Play game, keep track with Padiet what they like + what they learn
- Preteach Binder + Padiet apps

Day 2 - Objective target: Story + features - How to do it?
- Record when they achieve/what on Story (Padiet) + ring bell + cheer!
- Show info on how they achieved objective through collaborative

Day 3 - Using eLearning + Himalaya map of I (could expand to other map tools)
- Let's do the coats - download to Binder / other sharing system
- Can collaborate in pairs
- Formative assessment: Create success criteria for goal + show evidence

Culminating Activity: Choose Binder (Summative assessment)
- iMovie, Photo Story, Info gather (and edit) resources that
- Will show understanding of learning goal
- Will need a pre-lesson on media expectations
- Individual event

- STUDENTS WORKING IN GENDERED PAIRS
BY GRADE.

LESSON 1

1. PROVOCATION → LANDFILL TASK → TEASE OUT IDEAS; CONCEPTS
SURROUNDING GEOGRAPHIC PERSPECTIVE,
SUSTAINABILITY; LIVABILITY
→ Co-construct S.C. for C.Activity → DEFINITIONS.

LESSON 2

→ Game Intro (approx 45 mins)
↳ Students will learn basics of game → objectives, game play and student activity guide.

LESSON 3

→ PICTURES ACTIVITY
↳ Introduce Activity through visual screenshots of ~~game~~
game
↳ Play game (laptops/iPads)
→ Student activity consolidation & discussion → Physical Features - "how does the physical land/object affect the livability?"

LESSON 4

→ Students will have ~~basic~~ understanding of terms associated w/ plate tectonics
↳ Students will have an understanding of livability and be able to explain elements/factors of livability they experienced in game (Hawaii)

LESSON 5

→ Game play → Envelope discussion/debate → debrief
↳ See Saw Discussion.

LESSON 6

→ Game play → Co-construct Geo Perspective / Sustainability anchor chart (guided discussion)

Culminating Activity

→ Students will be introduced to CA and use co-constructed anchor chart to complete application project.

* STUDENT CHOICE → Model, Minecraft, Essay etc.

"Playing to Learn" Overview

Game: "Sprite's Quest: The Lost Feather"

Grade 7

Geography & History

↳ Bridge the learning between the two as Geog. has already been taught.

Lesson #1: Let student play & listen to conversations & reactions, no pre-teaching
(1 pd.)
↳ Google Forms to get opinions

Lesson #2: Play Himalayas Level; Compare w hardships & environmental challenges settlers faced in New France
(2 pds.)
↳ Use Discussion Q's from Student Guide

Lesson #3: Play Nile River Level; Compare w use of land in N.F. & settlements along the river
(2 pds.)
↳ Use Discussion Q's
↳ (possible Flipped classroom)

Lesson #4: Reading Visuals; Play Iceland Level; Use Iceland picture & guiding Q's from Teacher Guide to analyze/infer
(2-3 pds.)
↳ History Connection: Find pictures from battle/event & use analyzing skills to draw conclusions

Lesson #5: Through the eyes of the Artist; Screen Shot where you get a star & find real life image of that place
(2 pds.)
↳ Critical Thinking / Media Analysis: Compare images, accurate depiction? descriptive writing

Lesson #6: Play Game; let student play & record conversations & observations → compare w initial - has it changed?
(1 pd.)
↳ Post Google Forms to get opinions

- Students will work in pairs.
- A combination of 10 laptops and 5 ipads will be used.
- Gr 7 Program will be done with both classes.
- It will be done in the classroom
- 40 minute periods, for 12 periods

Lesson 1: Introduction of Key terms and concepts for the first location.

and introduce the format of the program.

ie. game → facts → stars + water drops → exit

card at end of period

ie. 3 terms learned in that level. + 2 phrases and 1

sentence about what was learned

Lesson 2: Photos of the 6 different locations are projected on SIB.

- students choose from the names and match them to the pictures.

whole grp - students identify the physical features of the land (picture).

student continue with game at location.

- students will complete 2 follow up activities of the 4 choices.

Lesson 3: display the photos for the next location (as a whole group).
- features of the second location.
pairs → students play the next ~~level~~ location completing two follow-up activities.

⊛ We will provide a checklist/framework so that students will do a specified number of follow-up activities.

⊛ Lesson 4: same as lesson 3 but for location 3.

Lesson 5: student individually complete culminating for the first 3 locations ~~are~~ already studied.

ie. Graphic organizer (Him.),
reading a map and graph (Ni.)
and climate graph (Ja.)

Lesson 1:

- How would students like to learn?
- Minds on: "Placemat activity" on
What is sustainability in Geography?
What is standard of living?

THE GAME: "Explore the world & learn it."

- each person with a device, playing HAWAII level.

- Stop everyone after 5 mins to discuss the controls & "rules". ^{rules} resume play for 20 mins

- Reflect on what they noticed - whiteboards?

- Exit Card on Goals of the game.

Lesson 2: ① Minds On - Goals & Success Criteria ^{what did the designer want us to learn?}

② Partner Play - two people per device.
Roles: 1) "driver" 2) Recorder (to gather info)

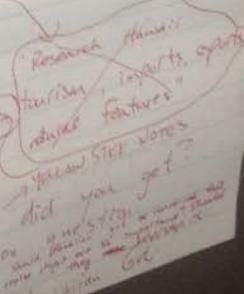
Roles switch every 3-5 minutes

③ Play game 20 minutes

④ Consolidation:
10 minutes - categorizing/organizing into
- Round Robin in Groups to share what they learned (share document)
- Large Group share
Assign Research for HW.

Lesson 3: "Studying Hawaii"

Students → present HW findings
Group Task → present HW findings
Sorting Activity: how far did you get?
Minds On: Survey - how far did you get?
Finish Level 1? choose 1 discussion
Debate: Persuasive Argument/letter to Hawaiian Gov
Personal



Learning Goal: The class will practice critical thinking when exploring new ideas, reviewing new concepts and comparing experiences using media to investigate liveability in China.

S.C. - see notes

Day 1 - play the Game using IPAD's - create 6 experts (experienced gamers) to assist students with playing and understanding the game 40 mins

Day 2 - go over population pyramids, use Canada to analyze and look at trends, shape of data 40 mins

Day 2a - Watch Video of China to give schema on China - use notes on IPAD's ~~take in~~ phones to take notes during the video that focus in the Dams, Industry, Pickers, Apartment blocks and Reformation
- develop a graphic organizer from notes to take notes during the next time they play the game

* Day 3 - Play the game using the graphic organizer
(80 mins) to record information - focus on 5
stars to help record information

Day 4 - Population Pyramids on China
from Culminating task. - using
IPAD's and Game and Culminating
task together to complete.

Grade 7/8

- Day 1 - Discuss theme focus
• What's Where • Why There • Why Care?

- Day 2 - Play Himalayas
• learn game / controls / objective of game
- follow a template (provide) / discuss expectations : "look fors" (ie. prayer flags, Yaks, etc...)
- allow 40 minute play
- complete template as a class

- Day 3/4 - Himalaya Debate
- class divided into 4 or 5 groups ^{→ judges/moderator}
- internet investigate
- present

- Day 5 - Play Nike
- provide template / review procedures
- students to take their own notes as information is provided
- independently complete template

- Day 7/8 - Consolidate Learning
- i.e. Activity Guide Nike Discussion Topics
- students to select ^{required} ~~questions~~ # of questions to complete (must have completed text to complete/select)

- Assessment - debate (oral communication/participation)
- completed template
- completed discussion questions

- students to play on Chromebooks

Appendix D

Assessment Ideas

- 1 Movie → Travel Commercial for one of the places
- Inquiry based project → Formulate Questions as the play
 - ↳ what lead you to this Q from the game?
 - ↳ (e) Yak poop & sustainability for community
 - ↳ Choice based product (Written, Digital, Drama, etc.)
- Jigsaw → each group looks at the Level from a different lens
- Media Literacy → critical thinking about the game; not just blindly playing

Assessment 2

STEP 1: Let them play! OPTION A

STEP 2: What's Where, Why There, Why Care

A: Retell + connect to world

Debate

OPTION B

STEP 1 Preknowledge PPT

STEP 2 - Go and play!

A: Retell + compare locally
photo essay

Group 1

- use of debate
- research / inquiry style project
- travel brochure, promoting tourism of specific area
- fact finder, staying on track, moving forward (progressing)
- completing discussion questions
- mapping assignment, locating destinations

Assessment

- Learning Skills - Collaboration,
Independent Work,
Initiative

- Co-create success criteria and learning goals surrounding the students ability to work with others and have a positive mindset when playing the game.

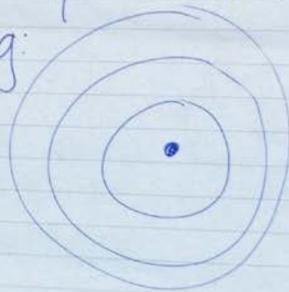
Content Goals - Choose appropriate questions from culminating activities for assessment purposes.

- Inquiry Based Learning

Assessment Ideas

- student driven criteria/lists
- student friendly levelling language, e.g:

- bulls eye
- [expert
- ... successful
- ... needs practice
- ... support



- conversations documented with technology, e.g:
- record chats with Idoceo
- grade class
- Seesaw
- fresh grade
- adobe voice

Assessment

- Learning Skills - Collaboration,
Independent Work,
Initiative

- Co-create success criteria and learning goals surrounding the students ability to work with others and have a positive mindset when playing the game.

Content Goals - Choose appropriate questions from culminating activities for assessment purposes.

- Inquiry Based Learning

1. Use easelly to create an infographic of details they collected from one particular location.

2. Use iMovie (trailer) to create a travel movie about 1 location

3. See Cut Task for Him....

L Debate

L Create & for other locations

- Self reflection through Google Forms
- placemats
- exit tickets → 1 sentence, 2 phrases, 3 key words, what you learned
- Padlet → observations / comparisons on pictures
- add to the game → what's missing, what would you add
- screencast / take pics in game to explain what they see (Ppt?)
- photo essay
- podcasting, blogging

Appendix E

Interview Questions

1. How long have you been teaching?
2. Do you have a master's degree?
3. Have you done any administrative work?
4. Have completed any additional qualification (AQ) courses? If so, which courses?
5. When did you complete your Bachelor of Education (BEd) degree?
6. What subject did you major in in university? What are your teachables?
7. Can you please give us some information about your school? What is the student population? The socioeconomic status of students?
8. Can you please tell us a bit about your class? How many students do you have on IEPS? With behavioural issues? Do you have any support for these students in the form of EAs or pull out programs?
9. The students in your class on IEPs and/or those on the autism spectrum? What are they normally doing? Do they often play games in the classroom (when other students are not?)
10. What types of things did you have to wrangle to do this project? (e.g. booking labs or computer carts, speaking with other teachers, requesting exclusive internet use in the school)
11. Did you use Ipads? Computers? When students completed the activities, did they use Ipads and computers? Ipads and paper? Just Ipads or computers? What was the reasoning behind this choice?
12. Did you look at any of the teacher resources? The activity guide? What parts did you use? Was anything helpful particularly? Would you like to have seen something that wasn't included in the guides?
13. Walk us through your lesson sequencing – what did students do? What was the pace? What was the culminating activity? Did they complete a final project?
14. How long did you initially plan for? How long did you end up spending? What changed (if anything)?
15. How did you evaluate the unit?
16. What was your best and worst day with the game? What would you change about the worst day with the game?
17. We weren't there every day. How many times did things not work (internet down, couldn't access computers, lab not available, etc.)
18. Can you please talk about a few students who excelled with the game? A few who didn't do well? A student who you had a set of expectations about (thought they would love or hate the game) and who acted contrary to your expectations?
19. Did you get the sense that students were making connections between the game and the real world?
20. What did you notice about student interactions with one another?
21. How did you organize the room for the game play?
22. Given everything that happened with this project, would you consider doing something like this again? Why or why not?
23. Would you have used this game in the classroom if it were not for this workshop/project and why?

24. Would you use *Sprite's Quest* in your class in the future?
25. Can you talk a bit about your experience with the workshop? What you liked, what you didn't like, what you would change, what you found helpful...
26. You are principal of the world and you have everything you want, how would you do this? – last question -
27. What kinds of supports would you need in the future to make using games in the classroom possible?
28. What is your teaching philosophy? What is your responsibility to your students? What is your relationship with the parents of the students in your class like?
29. Any other specific questions about the teacher and their activities in the classroom.

Appendix F

PLAYING TO LEARN

TEACHER SURVEY



Your name: _____

Your school: _____

Your board: _____

The gender you identify with (select one): Female

Male

Other

1. What devices do you have access to at home and use regularly? (Select all that apply)

Television Desktop computer Laptop computer iPod

Radio Game console/device Cell phone MP3 Player

Other _____

How do you communicate with other people?

	Never	Rarely	Sometimes	Often	Very Often	Only
	0	1	2	3	4	5
2. Face to face	<input type="checkbox"/>					
3. By email	<input type="checkbox"/>					
4. By social media (e.g. Facebook, Twitter)	<input type="checkbox"/>					
5. By phone	<input type="checkbox"/>					
6. By text	<input type="checkbox"/>					

7. By chat/instant message

8. Other

How are you most likely to express yourself?

	Never	Rarely	Sometimes	Often	Very Often	Always
	0	1	2	3	4	5

9. Write/Journal

10. Talk to a friend

11. Post on social media (e.g. Facebook, Twitter)

12. Take pictures, video, audio

13. Create art/ make crafts

14. Other

How often do you watch or view online?

	Never	Rarely	Sometimes	Often	Very Often	Always
	0	1	2	3	4	5

15. Television Shows

16. Movies

17. YouTube videos

18. Content on websites you like (eg. reddit, imgur, blogs)

19. Social media content (eg. Facebook, Tumblr)

20. Online research for school

21. Other (What?) _____

22. Name your three favourite websites or social media sites

a) _____

b) _____

c) _____

How accurate are the following statements?

	Not at all	Very little	Somewhat	Mostly	Very Much	Completely
	0	1	2	3	4	5
23. I feel comfortable using the computer at home	<input type="checkbox"/>					
24. I am confident with using the computer at school	<input type="checkbox"/>					
25. I am confident I can fix the computer if I run into problems	<input type="checkbox"/>					
26. I only feel comfortable using software I already know	<input type="checkbox"/>					
27. I feel comfortable using the computer to talk to other people	<input type="checkbox"/>					
28. I enjoy learning to use new software on the computer	<input type="checkbox"/>					

How often do you play?

Never 1-2 times 1-3 times /week 5-6 times 5-9 hours

	0	/month	2	/week	/week
		1		3	4
29. Board or card games	<input type="checkbox"/>				
30. Video games on a console	<input type="checkbox"/>				
31. Video games on the computer	<input type="checkbox"/>				
32. Multiplayer online games	<input type="checkbox"/>				
33. Games on handheld devices	<input type="checkbox"/>				
34. Games on tablets or phones	<input type="checkbox"/>				

35. Do you have children in your home who play videogames? (Select one)

No

Yes

If yes, what have they played? Name 3 games.

a) _____

b) _____

c) _____

36. What is your experience with using videogames in the classroom? (If any)

37. What about other technologies for classroom teaching and learning? What have you used that you found most successful?

38. What barriers, if any, are you are facing using technology generally? Videogames specifically?

39. What supports do you currently have for using videogames in the classroom, if any?

40. What further supports do you feel you need to use videogames in the classroom?

41. Have you received any explicit training on how to use videogames in the classroom? If so, what was its focus? What were you asked to do?

42. Why did you decide to participate in Playing to Learn? What are you hoping to gain through this experience?

43. What impact do you think that using games might have on your students' learning?

44. In your opinion, how might videogames impact student engagement?

45. In your opinion, how might videogames impact students' intellectual development ?

46. Are there students in particular whose learning you think will be particularly affected by using videogames in the classroom?

47. What type of classroom environment do you envision as best for using videogames to support learning?

48. Have you experienced any pressure to use videogames in the classroom?

This is the end of the survey. Thank you.

Appendix G

PLAYING TO LEARN

STUDENT PRE-SURVEY



Dear Student,

This survey is about your experiences with media, computers, videogames and other technologies in the classroom and at home, and your understanding of physical geography.

Your name: _____

Your teacher's name: _____

The gender you identify with (select one): Female Male Other

Age (select one): 11 12 13 14

Grade (select one): 7 8

1. What devices do you have access to at home and use regularly? (Select all that apply)

- Television Desktop computer Laptop computer iPod
 Radio Game console/device Cell phone MP3 Player
 Other _____

How do you communicate with other people?

	Never 0	Rarely 1	Sometimes 2	Often 3	Very Often 4	Always 5
2. Face to face	<input type="checkbox"/>					
3. By email	<input type="checkbox"/>					
4. By social media (e.g. Facebook, Twitter)	<input type="checkbox"/>					

How do you communicate with other people?

	Never	Rarely	Sometimes	Often	Very Often	Always
	0	1	2	3	4	5
5. By phone	<input type="checkbox"/>					
6. By text	<input type="checkbox"/>					
7. By chat/instant message	<input type="checkbox"/>					
8. In person	<input type="checkbox"/>					
9. Other	<input type="checkbox"/>					

How are you most likely to express yourself?

	Never	Rarely	Sometimes	Often	Very Often	Always
	0	1	2	3	4	5
10. Write/Journal	<input type="checkbox"/>					
11. Talk to a friend	<input type="checkbox"/>					
12. Post on social media (e.g. Facebook, Twitter)	<input type="checkbox"/>					
13. Take pictures, video, audio	<input type="checkbox"/>					
14. Create art/ make crafts	<input type="checkbox"/>					
15. Other (what?) _____	<input type="checkbox"/>					

How often do you watch or view online?

	Never	Rarely	Sometimes	Often	Very Often	Always
	0	1	2	3	4	5
16. Television Shows	<input type="checkbox"/>					
17. Movies	<input type="checkbox"/>					
18. YouTube videos	<input type="checkbox"/>					
19. Content on websites you like (eg. reddit, imgur, blogs)	<input type="checkbox"/>					
20. Social media content (eg. Facebook, Tumblr)	<input type="checkbox"/>					
21. Online research for school	<input type="checkbox"/>					
22. Other (what?) _____	<input type="checkbox"/>					

23. Name your three favourite websites or social media sites

a) _____

b) _____

c) _____

How accurate are the following statements?

	Not at all	Very little	Somewhat	Mostly	Very much	Completely
	0	1	2	3	4	5
24. I feel comfortable using the computer at home	<input type="checkbox"/>					
25. I am confident with using the computer to do my school work	<input type="checkbox"/>					
26. I am confident I can fix the computer if I run into problems	<input type="checkbox"/>					
27. I only feel comfortable using software I already know	<input type="checkbox"/>					
28. I feel comfortable using the computer to talk to other people	<input type="checkbox"/>					
29. I enjoy learning to use new software on the computer	<input type="checkbox"/>					

How often do you play?

	Never	1-2 times /month	1-3 times /week	5-6 times /week	5-9 hours /week
	0	1	2	3	4
30. Board or card games	<input type="checkbox"/>				
31. Video games on a console	<input type="checkbox"/>				
32. Video games on the computer	<input type="checkbox"/>				
33. Multiplayer online games	<input type="checkbox"/>				
34. Games on handheld devices	<input type="checkbox"/>				
35. Games on tablets or phones	<input type="checkbox"/>				

36. Name your three favourite video games

a) _____

b) _____

c) _____

37. Do you think video games could be useful for teaching things in school? (Select one)

No

Yes

38. If you answered yes to the previous question, what do you think video games would be good for teaching in school? school? (Select all that apply)

- Important facts about the topic
- Teaching about how different ideas and information are connected
- Letting people learn through experience
- Learning about computers
- Working with other people
- Making learning fun

39. How many times have you used a videogame to learn about something in school before? (Select one)

- Never
- 1-2 times
- 3-4 times
- 5+ times

Physical Geography Terminology

40. What does 'weathering' mean? (Select One)

- a) a distinct layer of soil encountered in the vertical section
- b) work performed according to a binding contract between two parties
- c) a flowing mixture of water and debris that forms on the slopes of a volcano
- d) the breaking down of rocks, soil, and minerals through contact with the earth's atmosphere
- e) I don't know

41. What does 'erosion' mean?

- a) rain that becomes more acidic than normal
- b) the process by which the surface of the earth is worn away
- c) when water is turned into gas
- d) a fracture of the earth's crust
- e) I don't know

42. What are 'tectonic plates'?

- a) plates that glide over the Earth's mantle
- b) a permanently frozen layer of rocks
- c) a line of bold cliffs
- d) an area of diminished precipitation on the downside of a mountain
- e) I don't know

43. What are the phases of the 'water cycle'?

- a) liquid, gas, land
- b) liquid, solid, gas
- c) liquid, solid, ether
- d) solid, gas, bubbles
- e) I don't know

Answer two or three questions in this section as best you can.

44. What do the arrows show on the diagram?

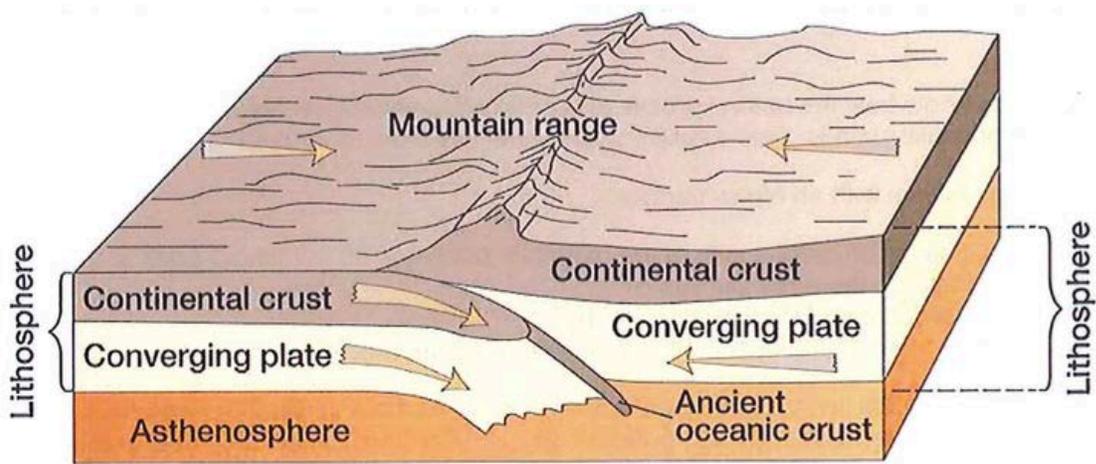
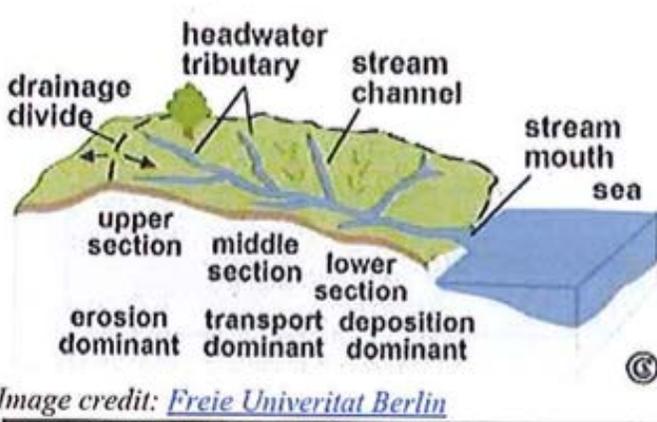


Image credit: 2005 Pearson Prentice Hall, Inc.

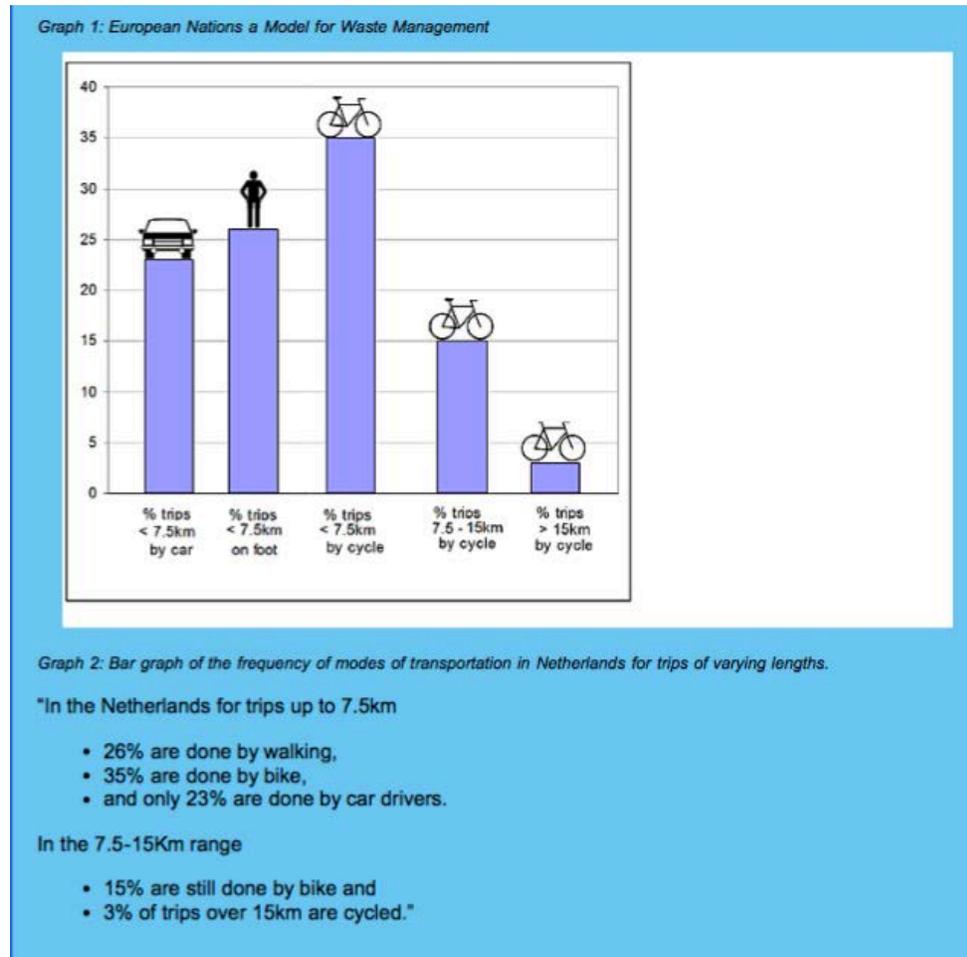
45. Which direction is the water flowing and how do you know?



46. What is the disadvantage of living on the west side of the island of Sumatra? What proof can you find on the map?



47. What information, if any, is missing from this graph?



48. How could plate tectonics be used to explain the hot springs found in both Iceland and Japan?

Answer two or three of these questions as best you can.

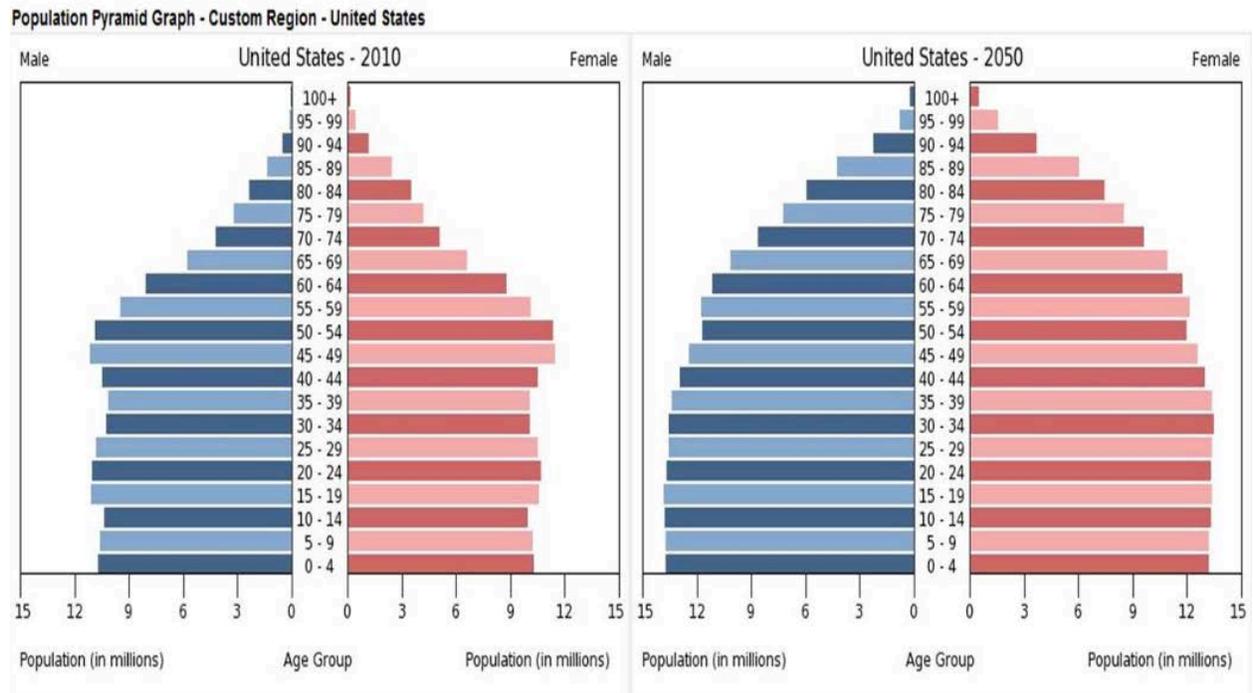
49. What does 'place' refer to in geography?

50. What does 'liveability' refer to in geography?

51. What types of things might geographers look at to understand liveability in a particular area?

52. What is 'sustainability'?

53. Briefly describe this graph's pattern.



Appendix H

PLAYING TO LEARN

STUDENT POST-SURVEY



Dear Student,

This survey is about your experiences with the game *Sprite's Quest* and your understanding of physical geography.

Your name: _____

Your teacher's name: _____

The gender you identify with (select one): Female Male Other

Age (select one): 11 12 13 14

Grade (select one): 7 8

1. What did you most like about *Sprite's Quest*?

2. What did you most dislike about *Sprite's Quest*?

3. What three things did you learn through playing the game?

a) _____

b) _____

c) _____

4. If you could change one thing about *Sprite's Quest*, what would it be?

5. Did you play *Sprite's Quest* outside of the classroom?

No

Yes

6. Please explain your response to the previous question. If yes, why? If no, why not?

7. Would you be interested in using a game like *Sprite's Quest* in the classroom again? (Select one)

No

Yes

8. Please explain your response to the previous question. Why or why not?

9. A game makes geography _____ to learn about compared to other types of activities in class. (Select one)

More interesting

Equally interesting

Less interesting

10. Please explain your answer to the previous question.

Physical Geography Definitions

11. What does 'weathering' mean?

- a) a distinct layer of soil encountered in the vertical section
- b) work performed according to a binding contract between two parties
- c) a flowing mixture of water and debris that forms on the slopes of a volcano
- d) the breaking down of rocks, soil, and minerals through contact with the earth's atmosphere

12. What does 'erosion' mean? (Select One)

- a) rain that becomes more acidic than normal
- b) the process by which the surface of the earth is worn away
- c) when water is turned into gas
- d) a fracture of the earth's crust

13. What are 'tectonic plates'?

- a) plates that glide over the Earth's mantle
- b) a permanently frozen layer of rocks
- c) a line of bold cliffs
- d) an area of diminished precipitation on the downside of a mountain

14. What are the phases of the 'water cycle'?

- a) liquid, gas, land
- b) liquid, solid, gas
- c) liquid, solid, ether
- d) solid, gas, bubbles

Physical Geography Short Answers

15. What does 'place' mean in geography?

16. What does 'liveability' mean in geography?

17. What types of things might geographers look at to understand liveability in a particular area?

18. What is 'sustainability'?

Questions directly related to the videogame

19. What are three geographical objects someone might find in Hawaii?

- a) _____
- b) _____
- c) _____

20. Choose one of the objects above and explain how and why it is important for people living in that area.

21. What are three geographical objects someone might find in New York City?

- a) _____
- b) _____
- c) _____

22. Choose one of the objects above and explain how and why it is important for people living in that area.

23. What are three geographical objects someone might find in The Himalayas?

- a) _____
- b) _____
- c) _____

24. Choose one of the objects above and explain how and why it is important for people living in that area.

25. What are three geographical objects someone might find in Costa Rica?

- a) _____
- b) _____
- c) _____

26. Choose one of the objects above and explain how and why it is important for people living in that area.

27. What do the arrows show on the diagram?

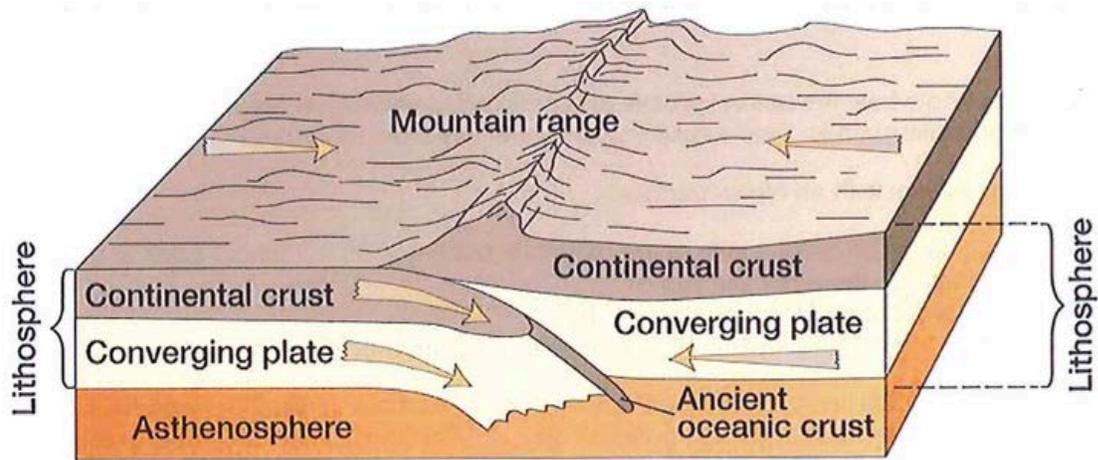
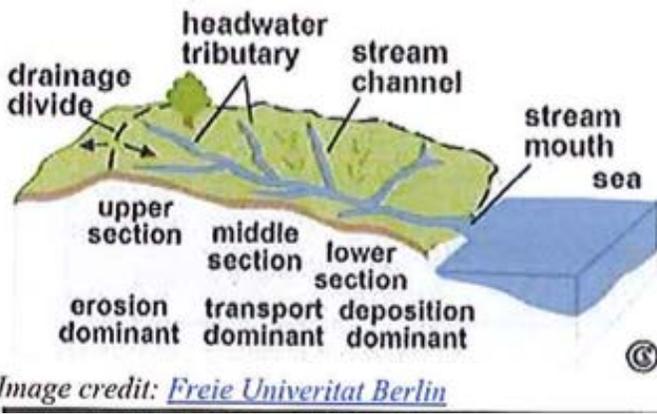


Image credit: 2005 Pearson Prentice Hall, Inc.

28. Which direction is the water flowing and how do you know?



29. What issues would Hawaiians face given that they rely on imports for many of the goods they use in their daily lives, such as oil?

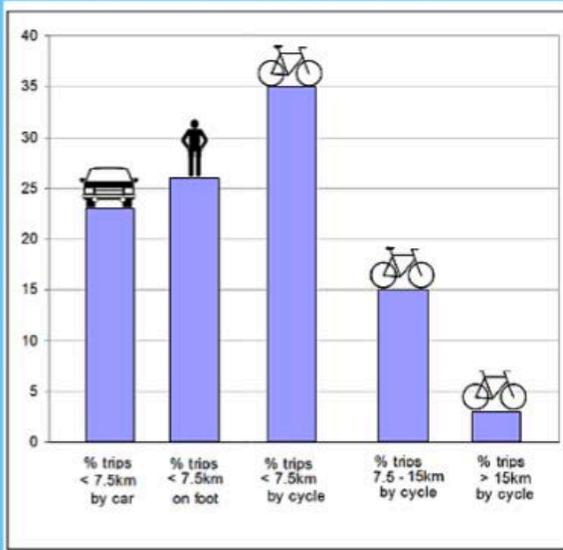
30. Why won't our typical local farming techniques (tractors and large fields) work in mountain ranges? Why are different crops grown in different regions?

31. What is the disadvantage of living on the west side of the island of Sumatra? What proof can you find on the map?



32. What information, if any, is missing from this graph?

Graph 1: European Nations a Model for Waste Management



Graph 2: Bar graph of the frequency of modes of transportation in Netherlands for trips of varying lengths.

"In the Netherlands for trips up to 7.5km

- 26% are done by walking,
- 35% are done by bike,
- and only 23% are done by car drivers.

In the 7.5-15Km range

- 15% are still done by bike and
- 3% of trips over 15km are cycled."

_____ This is the end of the survey.

Thank you.

Appendix I

Nom [REDACTED]

Le Japon et le climat - Géographie 7^e

La quête de Marius - Région 3 : le Japon

Où est quoi? Pourquoi là? Et puis après?

Choisis un élément aperçu pendant le jeu. En répondant aux questions dans le tableau ci-dessous, tu en viendras à expliquer et à analyser l'importance spatiale de ton élément.

Consigne tes pensées dans le tableau ci-dessous ou bien parle de tes idées avec une ou un élève qui a déjà complété le même palier que toi dans cet endroit dans le monde.

Où est quoi? Pourquoi là? Et puis après?	
Endroit et palier du jeu	Région 3 Japon
Quel élément as-tu choisi?	J'ai choisi les Écureuille volante ✓
Où se trouve cet élément?	On le trouve en région 3 palier 3 et c'est quand tu arrive dans le partie avec les arbres. C'est comme → printemps. l'automne
Qu'y a-t-il autour de cet élément? Décris l'endroit où tu as trouvé cet élément.	Parce que c'est où il y a beaucoup d'arbres ✓ et des écureuille ✓ - Parce que il sont là ✓ car il vie là. - Car en l'automne il y a des beaucoup d'écureuille dans les arbres.
Pourquoi là? Pourquoi cet élément se trouve-t-il à cet endroit-là? Donne une raison pourquoi cet élément se trouve dans cet endroit dans le monde.	- les effets positifs sont que: il vit là dans les arbres. - les Effets négatifs est que: non parce ✓ que il peut frapper tout le monde (T)
Et puis après? Quels avantages (effets positifs) et inconvenients (effets négatifs) cet élément peut-il avoir sur l'endroit où il est situé?	

1

Dante's What's There, Why There, Why Care Activity

8R3

What's Where? Why There? Why Care?

SUSTAINABILITY: *Meeting our needs without compromising the ability of future generations to meet their own needs*

Game Location & Level	Egypt Level 2
What is the object you selected?	Markets
Where is it? Describe the location where the object was found. What's around it?	<ul style="list-style-type: none"> • Egypt • Rooftops • Rats • Stores • Sandy • Dusty
Why should we care about it?	Because markets are important to us.
Think about the ways that this object is used to increase sustainability in the human environment.	Because we need markets because we benefit from them a lot because they sell things we use in our everyday life.

Dali's What's There, Why There, Why Care Activity

Name: _____

Name: _____

Student Activity: What's Where? Why There? Why Care?

Choose an object that you saw in the game. By answering the questions in the graphic organizer below, you will explain and analyze the spatial significance of the object you selected.

Record your thinking in writing in the chart below or share your ideas in a conversation with someone who has completed the same level and location.

1. Game location and level	Indonesia, Volcanoes, Trees, Mountains, Palms, Sun, etc.
2. What is the object you selected?	Oil extraction
3. Where is it? Describe the location of where the object is found. What's it around?	In the Indonesia level
4. Why should we care about it?	You should care because Oil extraction fuels cars, etc.
5. Think about the ways this object is an example of the challenges and/or opportunities of the natural environment	Oil is found under water and under ground. It is made of old, old animals, plants.

Reflect on It:

Complete a brief reflection on the game-based on completion of the game or whatever level they have achieved.

1. List 3 things you enjoyed about the game.
2. List 3 things that you didn't enjoy/like about the game.
3. How do you think this game can be used in the classroom when learning units in geography? Would it be beneficial, why or why not?
4. If you could design the seventh level of the game, what would it look like?

3 things you enjoyed:
It's Fun, Helps learning, good mechanics.

3 things that you didn't enjoy:
The joystick, you can get easily stuck, It gets boring after awhile.

How do you think this game can be used in the classroom when learning units in geography?
Yes, because it is adventurous and you have to explore to learn.

If you can design the 7th level of the game, what would it look like?
It would look like a desert, so you turn into gas and go into the Pyramids.

Cassie's What's There, Why There, Why Care Worksheet

Sprite's Quest Notes, China

- Largest Nation Exporter
- 20% of world in China
- Yangtze River is longest in Asia flowing from Himalayas to Ocean
- Boats carry goods & people down the Yangtze connecting communities
- One side of the dam is higher water
- 34 hydro turbines at 3 Gorges Dam produce more electricity than any ~~one~~ power plant on earth
- Reforestations around the reservoir are reducing landslides, flooding, etc
- Sediment blocked by the dam is preventing nutrients from traveling down the river, decreasing habitat for wetland animals.
- Over 1.2 million were relocated when the dam was built due to flooding
- Over 42% of China's sewage is dumped into the Yangtze river making it undrinkable
- When the dam flooded to be built some temples were moved or submerged

Facts From Sprite's Quest Compiled on Paper

Graphic Organizer
Sprite's Quest - Zone 1: The Himalayas

Geographic Facts found at the beginning of the levels – fill in the blanks

Glacial runoff provides some populations with a consistent supply of fresh, clean water.

Many people who live in the Himalayas use Yak patties to heat their homes.

Terrace farming is used in hilly areas around the World to curb erosion.

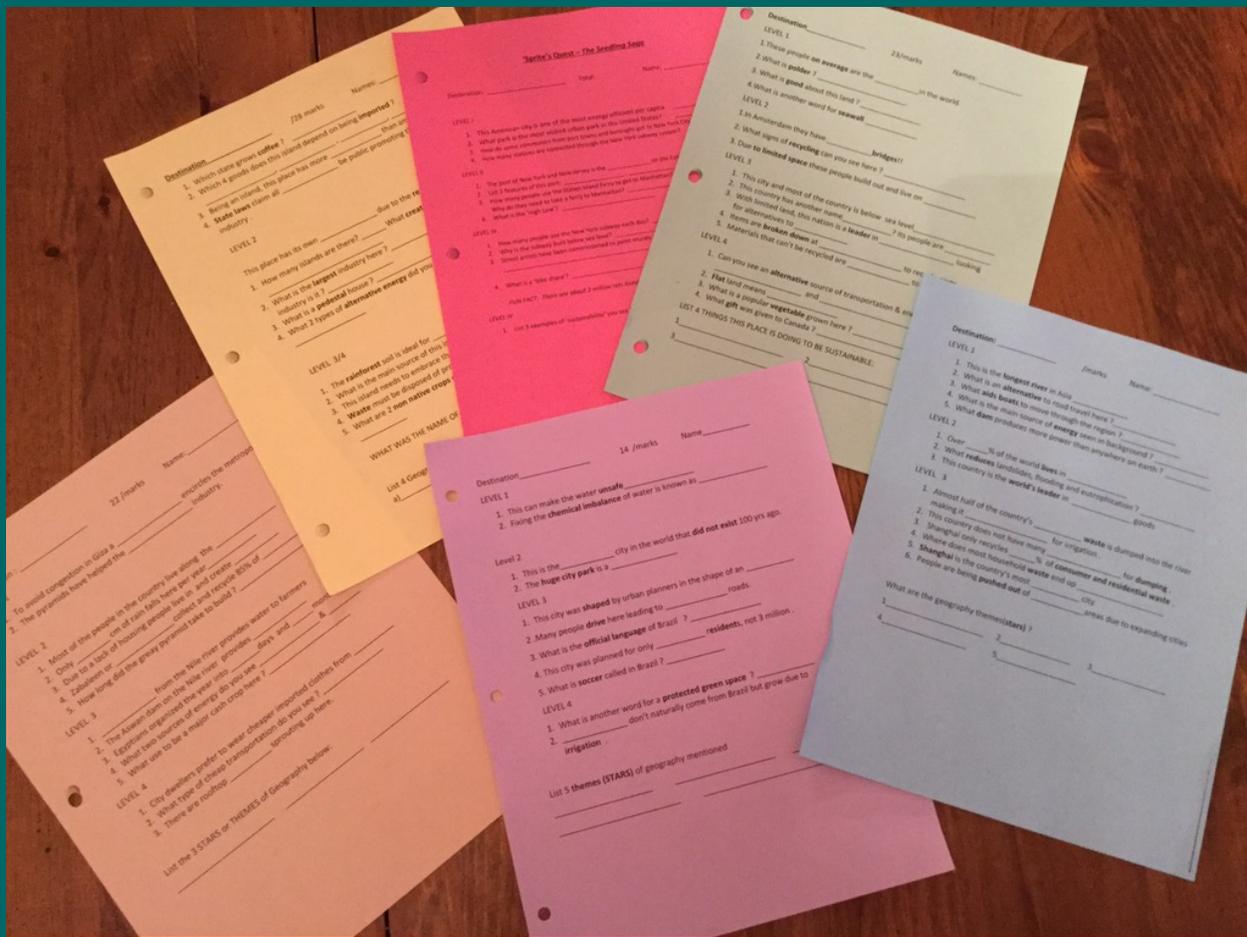
Level One	
Temperature:	<u>15° 10°</u> Star: <u>Mountain</u>
What You See:	<input checked="" type="checkbox"/> caves <input checked="" type="checkbox"/> glaciers <input checked="" type="checkbox"/> hills <input checked="" type="checkbox"/> mountains <input type="checkbox"/> rice terraces <input checked="" type="checkbox"/> trees <input checked="" type="checkbox"/> clouds <input type="checkbox"/> grass <input checked="" type="checkbox"/> houses <input type="checkbox"/> prayer flags <input checked="" type="checkbox"/> rocks <input checked="" type="checkbox"/> yaks
Yellow Droplet:	This fresh <u>water</u> is runoff from the <u>glacier</u> .
Yellow Droplet:	Prayer <u>flags</u> are placed in the wind to <u>spread</u> goodwill and compassion to all beings who pass by.
Yellow Droplet:	<u>Fishes</u> keep about 25% of their catch for their <u>families</u> ; they sell the <u>rest</u> to the local community.

Jackie's Graphic Organizer to Complete During Game-Play

*Sprite's Quest
Play Accountability Sheet*

Location: <u>Brasilia</u>	Name: 
Level <u>2</u>	
What do you notice? (temperature; other weather; landscape; vegetation; water)	Temp. 28°C
What man-made structures did you see?	tall buildings made of metal rods,
Other points of interest?	
What obstacles did you encounter?	Seagulls, Soccer balls, Wind,
Yellow Rain Drop Trivia	The lemon seedling needs soil, which isn't so dry. In a place like Brasilia, look for a well irrigated area. Creating public green spaces is very important to city planners; the huge city park is a popular destination for residents
Yellow Star Information	

Kelly's Play Accountability Chart



Walter's Sprite's Quest Quizzes

'Sprite's Quest – The Seedling Saga

Name: _____

Destination: _____

Total: /27 marks

LEVEL I

1. This American city is one of the most *energy efficient* per capita.

2. What park is the most visited urban park in the United States?

3. How do some commuters from port towns and boroughs get to New York City? _____
4. How many stations are connected through the New York subway system?

LEVEL II

1. The port of New York and New Jersey is the _____ on the East coast.
2. List 3 features of this port: _____, _____, _____
3. How many people use the Staten Island Ferry to get to Manhattan?

- Why do they need to take a ferry to Manhattan? _____
4. What is the 'High Line'? _____

LEVEL III

1. How many people use the New York subway each day? _____
2. Why is the subway built below sea level?

3. Street artists have been commissioned to paint murals around New York City. Why? _____
4. What is a 'bike share'? _____

FUN FACT: *There are about 2 million rats living in New York City!!! (2015)*

Questions While Playing the Game:

What questions would you ask people that live near the Three Gorges Dam?

- Is it loud?
- Is the water polluted?
- Are there a lot of ships that move through the dam?
- Do you get any of the electricity from the dam?

Aside from creating electricity, might there be other benefits or opportunities created by the dam's reservoir? ~~Aside from creating electricity~~ ^{opportunities created} some other benefits or opportunities created by the dam would be that it creates jobs, and it creates money.

If you were to see the landfill to where your garbage is sent, would it change your attitudes towards waste disposal? IF I saw the landfill where my garbage was sent it would change my attitudes towards waste disposal because all that garbage will just keep building up and if we live in a smaller city I could only imagine how much garbage is in China's landfill and how much pollution.

What benefits and challenges are created for residents living in very high density communities where most are living in large apartment buildings? The challenges that are created for residents living in very high density communities where most are living in apartment buildings would be that there are apartment buildings that are tiny, streets are crowded, and pollution. Some benefits are not having to pay for money compared to people that live in houses and grocery stores and schools are probably close by.

Jerry's Questions for Students While Playing the Game

Natural Processes

With a partner, decide on which region you will be playing and learning about. As you play the game, fill out the chart as best you can. Remember that a natural process is something that exists or occurs in nature e.g. weathering, erosion, deposition, plate tectonics.

Region and Level you are using as an example	What natural process is occurring? Describe how it is happening in the game?	What do you think the impact of that natural process has on the environment? to humans?
Iceland	Ocean and wind currents make Iceland	strong winds blow over warm water currents, which results to the water evaporating and increases the climate. The more wind
Iceland	The island and the rock formations such as cliffs or peaks were formed by volcanic activity	eruptions are create large rocks forming by drying out from magma to rock. This effects habitats by creating more landforms and gets in the way of human
Iceland winds	the northern lights result from cosmic particles in earth's atmosphere colliding with charged particles released by solar	People in this area use the particles around them to their advantage by attracting tourists to the northern lights and making
Iceland	fjords were created by melting glacier ice forming a new inlet with steep sides	When the glaciers melt, the land is changed by ice carving in creating fjords, a new land form, and can also ruin habitats and
Iceland	thawing and freezing opens up cavesses in the ground which forms cave	This thawing and freezing creates cracks into the ground which can open up to a cave, and can be a source of protection towards
Iceland	Geothermal ground water can break through the earth's crust in the form of hot springs, even in these cold conditions	Geothermal ground water or a heat pump produces hot springs that can be used as sources of energy and heat for people in the area. Energy and heat

that blows means faster evaporation rates, and much warmer climates

activity

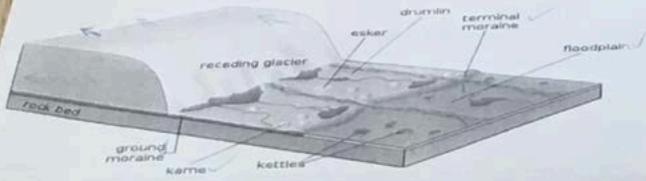
money of eco tourism

human activities

plants and animals

ICELAND: NATURAL PROCESSES

The Iceland levels show the geographic process of glaciation. This diagram shows how the process works.



When a glacier moves, it also drags, with it, the objects that it has covered over the years. A receding glacier, which could also be called a retreating glacier, can greatly impact an environment. Based on the diagram provided, describe the following Glacial concepts.

Receding glacier: glacier moving backwards-draggi

Kettles:

Esker: holes in the ground without water-dry like

Drumlin: cracks in the earth that help the water travel.

Terminal Moraine: ground that was pushed up to create a hill

Floodplain: swampy area

Ground Moraine: left over ice from the glacier

ame: little hills

Dennis's Natural Processes Activity Part One

ICELAND: EXPLORING GLACIERS

1. Using the diagram provided, if you were to place an arrow on the glacier, in which direction would you have it pointing to show movement. Describe why you chose that direction.

2. Why might a receding glacier leave lakes and drumlins behind?

3. You live in an area of Ontario where there is much evidence of Glacial activity from many years ago. Describe an area where you believe there might be evidence of glacial activity.

ICELAND: WHILE PLAYING

Iceland : Natural Processes			
WHAT I SEE:	Description of what I see.	Description of the surrounding environment.	Why I think this is important to the region:
Weathering			
Erosion			
Pressure			
Climate			
Weather			

Dennis's Natural Processes Activity Part Two

China - Over view

Physical Features (bordering countries, Climate and landscapes)

Mostly Mountains/Deserts, subArt.c in the north
4 largest country by land

History of Culture (dynasty's, War and Colonization):

~~Shang was last~~, ~~Qin~~, Ming opium war, Sui
Qing was last, Qin, Shang 2 oldest, Xia was 1st Dynasty

Politics (CCCP and Communism):

CCCP, KMP current president is Xi Jinping
were controlled by a Dynasty/Pictator for long time

Economy (Famine, US Relationship):

famine in 1960-61 one of the world largest
richest country, owns most of USA Dept

Culture (Revolution + Student Protests + Human Rights):

not as many human rights

more people moving to city and out of farming

Military Buildup:

Opium War

China believes in economy and building cheap goods
over building weapons

Strong military

longest lasting Dynasty

Jerry's Overview of China Activity

Appendix J

The Nile

1. The Nile levels show the natural river processes of erosion, transportation, and deposition. Use appropriate geographic terminology to explain what evidence of this process you see in the game.

In the game it shows that many stream channels flow into one main river, and erosion wears down rocks.

2. How do river systems affect other natural processes of this area?

Erosion can wear down rock and change the land.

3. How might this river system affect the people who live in or visit this area? What challenges/opportunities does it offer?

The Nile can help because it's moving water can generate hydroelectricity.

The Nile — Reading Graphs

Graphs communicate information in a concise way that allows the reader to see the relationship between/among two or more sets of data. Read the following graphs and map to understand the challenges and opportunities for people who live along the Nile River.

Remember to read the key elements of each visual (e.g., title, labels of axes, legend, use of colour).

Tips for Reading Graphs

Graph 1: Populations along the banks of the Nile River 1996 projected to 2025

Graph 2: Amount of water flowing in the Nile River System

2.3

Japan Discussion

Level 1

- 1.1 The lake at the base of the volcano flows into a waterfall that then becomes a mountain stream/river (water flows downhill). Why would you want to live near water?
- 1.2 Why might vacationers be drawn to natural hot springs or onsen?
- 1.3 Onsen are a large tourist draw as are ecotourism, luxury, and relaxation. How do the physical features and climate make Japan a desirable destination for ecotourism?
- 1.4 Would you feel comfortable living near a dormant volcano?

Level 2

- 2.1 Should tourists be encouraged to see wildlife in its natural habitat? What might change your perspective?
- 2.2 What types of climate and landforms lend themselves to the development of a tourism industry? What impact can tourism have on that environment?
- 2.3 How could you explain the similarities between the climate in Japan and in Ontario?

Level 3

- 3.1 Why is it important to control natural flooding?
- 3.2 Which looks more appealing to you as a place to live—rural Japan (at the beginning of the level) or urban Japan (at the end of the level)?

Level 4

- 4.1 The bay shown in this level of the game has a large industrial zone with many key shipping ports, lots of ocean freighters, shipping cranes, and trains. What Japanese products do you know of that are exported to Canada?
- 4.2 Disaster warning! How have the Japanese adapted to living in an environment that is at risk for earthquakes and tsunamis?
- 4.3 How might the population density and distribution along Japan's coastline affect the lifestyles for families in Japan?

What's Where? Why There? Why Care?

Name: [REDACTED]

Game location and level

What is the object you selected? Where is it?

Prayer flags; Start of first level Himalayas after bridge.

Describe the location where the object was found.

On a bridge above glacier water and rocks, placed in wind.

What's around it? Why should we care about it?

There is a wooden bridge, glacier water, grassy hills, clouds.

We should care about it because when placed in the wind to spread goodwill and compassion to all beings who pass by.

Think about the ways this object is an example of the challenges and/or opportunities of the natural environment.

The challenges may include it being in a time of sadness and depression, which is why they are brightly coloured. Opportunities include making beings happy and hopeful for when they don't feel good.

Learning Activities from Barry's Class



Learning Activities from Barry's Class Continued

The “Big 3” Geography Concepts

1) SENSE OF PLACE

- Each place is unique (characteristics – human or natural)
- Not every place has an equally strong sense of place

2) LIVEABILITY

- A term describing “elements of a society”
- Liveability measures the experiences people have living in a place:
 - A. Transportation choices (mobility)
 - B. Affordable housing (homes)
 - C. Variety of job opportunities (employment)
 - D. Recreation & cultural services & events (things to do)
 - E. Use & protection of the natural environment (nature)

3) SUSTAINABILITY

- Our use of resources (human or natural)
- Using resources so that we meet the needs of today without compromising the needs of future generations
- We must live within the limits of available resources

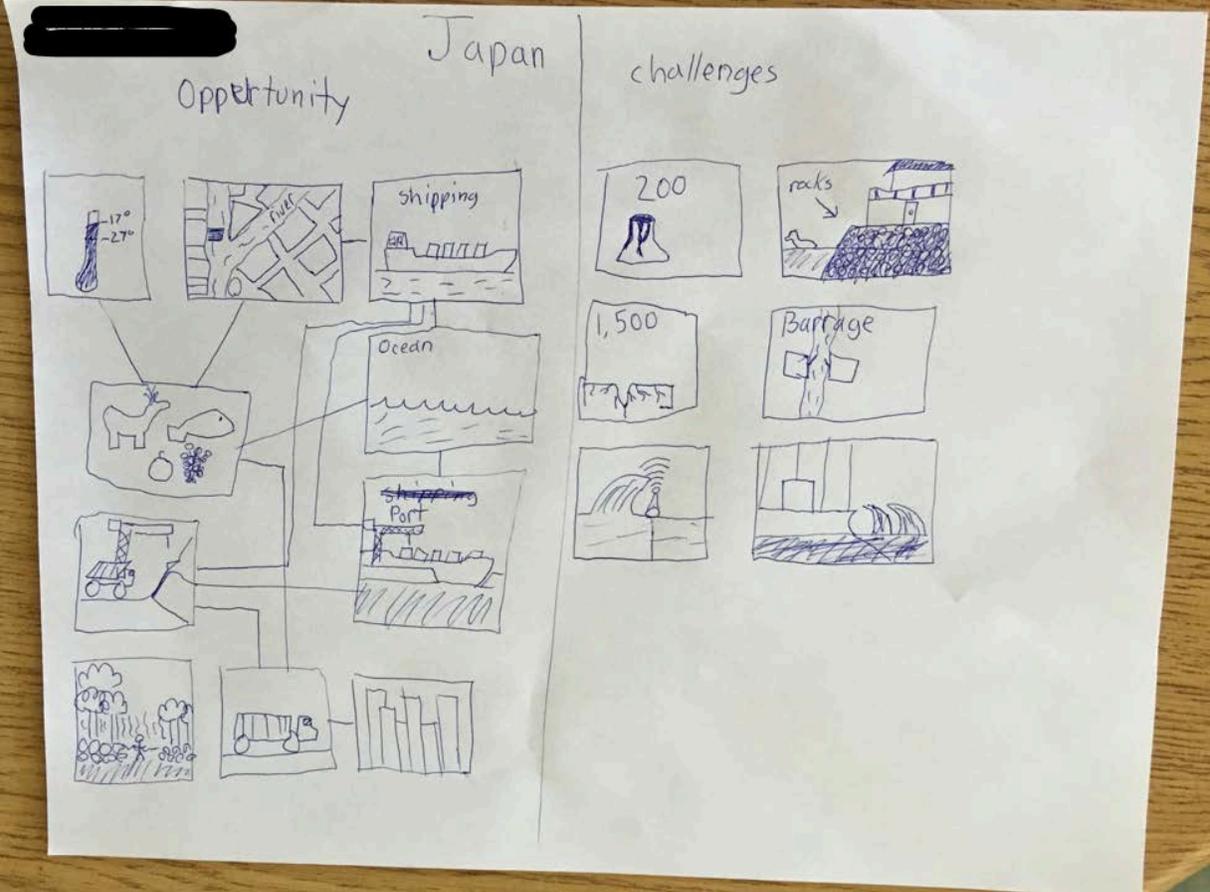
THE GOAL OF ANY COMMUNITY IS TO BE LIVEABLE: *SOCIALLY/CULTURALLY, ECONOMICALLY, & ENVIRONMENTALLY SUSTAINABLE!!!*

- ✓ **Socially:** people need things to do that bring them joy and happiness
- ✓ **Economically:** people want opportunities for financial growth
- ✓ **Environmentally:** people want a healthy environment for future generations

Your task

1. Choose to play any level of Sprite's Quest
2. At some point within the next two periods, set aside some time find a factor that **ENHANCES** or **HINDERS** liveability in the game.
3. **IDENTIFY** what it is, **EXPLAIN** how it helps/hinders liveability and **EXTEND** it to real life.
4. Hand it in by the end of Period 2

Dali's Class: Culminating Activity



Graphic Organizer in Elizabeth's Class

Tuesday March 19, 2016

Environmental View - Environmentalist

The environmentalist would probably disagree with having people climb Everest because once someone has stepped foot on Everest something will change. Everest has a lot of garbage on it and he will be looking as well. I think that the Environmentalists do not think it is a good idea to let the climbers climb Everest.

Economic View - Yak Herder

I feel like the yak herder would not want people climbing the mountain because the yak herder wants to try and preserve his/her home for the yaks and himself. And as well he doesn't want garbage being dumped everywhere because it could be possible that the yaks could eat it and get sick.

Should there be a limit to the number of climbers allowed on the mountain?

Social View - Mountain Climbers

I feel that the Mountain Climbers would be happy to do the expedition but they would need to be try to leave as little things possible on the mountain so then when other people climb Everest they will not have their garbage. As well the mountain climbers might climb Everest for popularity.

Political View - Local Leader

I feel like the Local Leader would enjoy doing the Everest expedition because it would attract more attention to the area and more people would focus on that part of the world and what happened, and possibly gain more money from tourists ^{and} gain a larger population for the area.

To which of these views do you connect? Why does a geographer need to look at all of them?

I connect with the yak herder because I can see why I don't want people pecking the mountain. And there is so much garbage on Everest and it could make the yaks sick if they ate all that garbage there. So personally people should not climb Everest. A geographer needs to look at all ~~the~~ points of view and decide what best for everyone and Everest.

Jackie's Limit to Number of Climbers Allowed on the Mountain Activity

Choice Board

Culminating Map

- Read and do activities on Sprite's Quest on reading photos
- When answering questions, include how tourism creates opportunities and challenges

infographic

- Use app easel.ly or web version
- Choose a location and determine the affect of tourism on that location using the information you know about that location

Kahoot

- Create a kahoot about a location (s)
- Include how tourism affects a location

imovie

- Use imovie
- Choose a location and determine the affect of tourism on that location using the information you know about that location

SKIP

Barry's Culminating Activity: Map, Infographic, iMovie or Kahoot Entry

The Himalayas

The Himalays takes up 0.4% of the Earth's surface

In 2012 56% of people climb the Himalayas mountain, mount Everest the tallest mountain in the world. This has given Nepal a lot of money because it could cost you \$35000 to \$85000

9.04% of the Himalaya is covered with glaciers, with 30-40% additional area being covered with snow.

The Himalays can be one of the most dangerous spots on Earth due to a natural process that occurs frequently this is called avalanches. They send tons of snow down the mountain destroying anything in its path

Due to the hills near the Himalays farmers have been using alot of terraced farming

The Himalays is one of the worlds best access to ecotourism due to people that live there have not destroyed there enviorment

People that live below the mountains us yaks. Because yaks are the most common animals that live there they use them for fuel using there patties and using them for trasportation

The higher you go in elevation winds become very strong and could knock you off your feet and also higher you go the colder it gets, up to -19 to -36 without the wind shield

People that live in the Himalayas dont have access to all of the things that we do such as power and WiFi to do our basic needs and the people there are living fine and this shows that you dont always need to relye on the internet

The Himalayas was created about 70 million years ago and was created by divergent

People that live below the mountains they use the glaciers for water to drink and to clean cololthes

Nina's Culminating Activity: Infographic, Sample One

Infographic- Japan

Facts about Japan.

- Japan belongs to the continent of Asia. Japan is an island nation surrounded by the Sea of Japan to the East and the Pacific Ocean to the West.
- Japan is the 10th most populous country in the world with a population of over 127 million people.
- Japan is located in the far east of Asia continent.
- Japan was founded as a distinct and original nation in 1990.
- Japan has the world's third-largest economy, behind the US and China.
- Japan is the world's largest consumer of Amazon rain forest timber.
- Japanese people live in an average of four years longer than Americans.
- Japan does not share land borders with any countries.
- Japan is an island nation in the Pacific Ocean with high-rise-filled cities, imperial palaces, mountainous national parks and thousands of shrines and temples.

How was Japan created?

- Japan is the result of the several organic movement of the countries in the world.
- Japan is made up of 6,852 islands.
- Japan is also created by the natural disasters that occurs in Japan for example an earthquake.
- The Japanese Islands were formed, and continue to form at a convergent plate boundary with a significant subduction zone beneath continental crust.
- The Pacific plate is being subducted beneath the North American plate. And Japan is on the North American plate.

Statistics of Japan.

This pie graph means the amount of a international marriage in Japan.

This graph means of the population of Japan by age group.

Why is Japan unique and important?

- Japan is such a unique region because for example the children from the age of 6 years old, go to school by themselves.
- Japan is such an important region because for example Japan might have a cold season and it is important because they have a hot spring bath for everyone.

What can other cities learn from Japan?

Other cities can learn that Japanese hot spring is not always about going out of town to have fun but it can also benefit our health. Other country can learn Japan's other kind of resources. Other cities can learn that Japan always experience the different kind of disaster in the world so they should learn and help them to improve their normal living back again as they used too.

Which people have changed Japan to suit their needs and wants?

- The people have changed Japan to suit their needs by building cities, growing crops, and building harbors.
- The people have changed Japan to suit their wants like money, to get what they need some people is trading with other county and earn their money.
- The people have changed their land by farming it using it's resources.
- The people have change their tourist spot to make it more attractive by taking care of it, making it beautiful, and improving their place for example their hot spring and their cherry blossom place.
- Americans have changed Japan by not giving Japan the proper exports during world war II.

By:

Nina's Culminating Activity: Infographic, Sample Two

THE NILE

Other Cities Can Learn...

Rivers are helpful because...

- Tourists come to sight see and go river rafting-make an income
- Can import goods
- Can export goods-make an income
- Create hydroelectricity
- Have great soil to plant
- Fresh water to drink

1. Stocks fish to feed communities.

2. Controls droughts in Egypt.

3. Provides hydroelectricity to Egypt.

Reservoirs, like the one in Lake Nasser, were created to help people.

The water of the river, that goes at high speeds, break down and erode the soil.

Erosion occurs at the meanders of the Nile River.

Can import and export food, materials, and other necessities.

2. Runs through 10 countries, Tanzania, Uganda, Rwanda, Burundi, Ethiopia, Eritrea, Sudan, Egypt, South Sudan, and Congo-Kinshasa.

1. River Rafting.

2. Sight seeing.

1. Draws tourists for 2 main reasons.

Deposition occurs all over the Nile.

The water tides move sediments.

1. Deposits sediments in to the soil, making it very nutrient rich.

2. Carries and deposits sediments, building layers of silt and sand.

1. Grown to supply food for their family.

2. Rubber, cotton, and other cash crops are grown, to be sold for money.

Farmers use the land on the edge of the Nile, in Egypt, because of the fertile, rich, and nutrient soil.

The Nile River was formed by 2 main streams, the Blue Nile and the White Nile.

15% Of the water comes from the White Nile

85% Of the water comes from the Blue Nile.

3.1 million Litres of water is discharged every second.

100s Of animal species live in and around the Nile

1. River Rafting.

2. Sight seeing.

1. Draws tourists for 2 main reasons.

Since it is so big, it is unique for two main reasons.

This is the biggest river in the world with the length of 6,670 km.

These two streams created 2 different rivers. The river bank got eroded, causing the 2 rivers to join into one giant river.

Nina's Culminating Activity: Infographic, Sample Three

Appendix K



Single Device Use During Game Play and Game-Based Learning



Multiple Device Use During Game Play and Game-Based Learning



Report Prepared November 2016, IRDL, York University