TEACHING AND LEARNING IN A DIGITAL WORLD: A DEVELOPMENTAL EVALUATION OF VIRTUAL LEARNING ENVIRONMENTS IN THE UPPER GRAND AND YORK REGION DISTRICT SCHOOL BOARDS

JUNE 2012

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Summary of Report. This research report provides a developmental evaluation of a virtual learning environment (VLE) pilot program in the Upper Grand District School Board and York Region District School Board. An online survey was used to assess student pedagogical and motivational outcomes related to VLEs; teacher activities and outcomes were assessed using focus group methodology. Results show that students using VLEs show differences in motivation to use online technologies and feedback, and in satisfaction with access to technology, as compared to non-users. Teachers using VLEs are changing instructional practices, including how and when student feedback occurs. Barriers of time constraints, unreliable technology, and lack of access to technology impact teacher motivation and perceived ability to implement VLEs. There is evidence that using VLEs blurs the line between school and home for both students and teachers, moving teaching and learning from the classroom to the larger online environment. Limitations and recommendations are discussed.
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INTRODUCTION

RESEARCH GOALS
This research report provides a developmental evaluation\(^1\) of a virtual learning environment (VLE) pilot program in the Upper Grand District School Board and York Region District School Board.

The overarching goal of this research is to gain information to iteratively improve future VLE offerings. Specifically, this evaluation assesses pedagogical and motivational student and teacher outcomes related to the use of VLEs using both quantitative and qualitative indicators. In addition, some aspects of implementation of program delivery are assessed, particularly with respect to technical and informational support of VLE systems.

BACKGROUND
As advancements in information and communication technology have continued throughout the late 1990’s, e-learning has become an increasingly integral part of the Canadian education system\(^2\). E-learning has been defined as “the use of information and communications technology (ICT) to enhance and/or support learning in education”\(^3\). Several types of e-learning exist, including: web supplemented, web-dependent, mixed mode, and fully online modalities. The Virtual Learning Environment (VLE) is an important component of e-learning, as it is the computer-based system that delivers web-based education to students and facilitates student teacher interaction online\(^4\). Specifically, a VLE is a software system that combines methods of online communication, such as e-mail, discussion forums, and chat rooms, with the ability to deliver learning materials via the web\(^3\). Canadian schools have been equipped with the infrastructure to incorporate e-learning in the classroom\(^5\); however, little Canadian research has focused on evaluating the pedagogical and motivational outcomes for students and teachers who utilize VLEs\(^2\).

Defining Key Terms:

- **E-Learning**: The application of computer technologies in education. E-learning can take many forms, whether it is used face-to-face in classrooms, as a required part of classroom activities or course work (e.g., online discussions), or to deliver a course fully online. E-learning can include distance education as well as traditional in-class instruction\(^2\).

- **Virtual Learning Environment**: A designed information space, a social space where educational interactions occur in the environment, a place where students are actors as they co-construct the virtual space, a space that is not restricted to distance education but can also enrich classroom activities, an environment that integrates heterogeneous technologies and multiple pedagogical approaches, and a place that can overlap with the physical environment\(^6\).
EVALUATION OF VIRTUAL LEARNING ENVIRONMENTS

PREVIOUS RESEARCH RELATED TO VIRTUAL LEARNING ENVIRONMENTS

The next section reviews research related to VLEs; the variables discussed here provide a framework for the current evaluation. Previous research investigating VLEs has investigated the learning outcomes of students, as well as outcomes related to satisfaction, motivation, and collaboration. Researchers have also examined the perceived benefits and challenges of using VLEs in the classroom, according to both students and teachers.

Learning outcomes.

Learning outcomes are often measured as perceived learning outcomes, or as an overall grade at the end of a course. It has been found that students using a VLE achieved better learning performance, as measured by test scores, in comparison to students in a traditional learning environment. A similar study was conducted with 40 undergraduate students enrolled in an introductory neuroscience course utilizing a VLE, and were compared to students in the exact same course with the same instructor in a traditional learning environment. Students were evaluated weekly, and students in the VLE scored, on average, 14% higher on their examinations compared to their counterparts in the traditional learning environment. Learning outcomes of approximately 300 undergraduate students were compared in a sociology course from 2001. Students were either in a traditional learning environment without a VLE, or with a VLE. Students in the VLE scored higher on biweekly quizzes, the final exam, and on a course paper. In the current research, improvement in the quality of learning process and products is the ultimate goal of VLE programs. However, due to the limited scope of this pilot evaluation, learning outcomes are not assessed directly in the current research. Instead, shorter-term outcomes are examined as evidence of changes in learning.

Satisfaction.

Student satisfaction was discussed in the literature in two ways: 1) students overall satisfaction with a VLE, and 2) students’ satisfaction in relation to components of a VLE. In terms of overall VLE satisfaction, students seem to be as or more satisfied with education delivered through a VLE. Researchers found that junior high school students using a VLE reported higher levels of satisfaction than their counterparts in a traditional learning environment. In a UK study of 67 University nutrition students completing a questionnaire on asynchronous learning networks, 80% of students indicated that they would recommend the course module to a friend. Overall student satisfaction with VLEs tends to be high.

The evaluation framework is fully discussed in the Methods section, below.
Satisfaction has also been studied in terms of its relationship with other VLE outcomes, such as activity and teacher/classmate interaction. In a survey of approximately 1,400 University students taking an online course, researchers found that instructor interaction, classmate interaction, and VLE activity all had positive effects on course satisfaction\textsuperscript{11}. In a more recent study, researchers duplicated the significant interaction between instructor interaction and student satisfaction in a study of 496 University students\textsuperscript{12}. This study found no difference in satisfaction between students with high computer skill levels and students with low to any computer experience\textsuperscript{12}. Therefore, satisfaction can be viewed in relation to other variables, as well as a student's overall experience.

**Motivation.**

Motivation to learn can both increase and decrease when using a VLE, depending on the student. Some research has shown that by simply participating in a VLE, student motivation may increase. In a study of 292 first year undergraduate business students completing an online questionnaire, it was found that interest generated by the instructional medium (a VLE) increased student motivation\textsuperscript{13}. Researchers also found that lecture notes, bulletin board, online assessment, and other online tools were significant determinants of student motivation\textsuperscript{13}. However, other students may face motivational barriers to participating in VLEs. In 2010, researchers conducted phone interviews of key informants related to the delivery of Canadian curriculum via e-learning structures in Aboriginal high schools\textsuperscript{14}. The key informants were educators representing all of Canada, except Yukon. In the telephone interviews, participants indicated that in their perspective, many students lacked the motivation to study independently, and that students were often distracted by non-academic uses of technology, specifically social media\textsuperscript{14}. They also found that technological issues, such as slow downloading time, had the ability to sabotage student motivation, particularly with younger students. The participants indicated that setting clear expectations about students’ responsibilities and the importance of self-motivation before beginning a course through a VLE was often helpful\textsuperscript{14}.

Whereas in traditional learning environments the instructor is responsible for generating and maintaining student motivation, this relationship may not apply when looking at VLEs\textsuperscript{15}. Instead, students may be encouraged to take control of their own learning with the absence of an instructor, and, as a consequence, motivation is the responsibility of the student\textsuperscript{16}. Therefore, student motivation is an important factor to account for when evaluating VLEs, and may play an important role in additional VLE outcomes.
Collaboration.
Undergraduate engineering students working on a group problem-solving task tended to collaborate and communicate more when working in a face-to-face group compared to students using computer conferencing. However, the students collaborating online perceived the quality of their problem-solving processes to be higher and more task-focused than the face-to-face collaboration group. The researchers also found that students collaborating online presented more perspectives and argumentation than face-to-face collaborations. Therefore, despite lower quantity of collaborations, collaboration quality was higher in the computer conferencing group. Opposing results were seen in a 2005 study of Dutch primary students. Results determined that students in the computer-mediated group had more communication with each other; however, the quality of collaboration was higher with the face-to-face group. More specifically, students in the face-to-face group demonstrated more high-level elaborations when solving the math problem. This indicates that quality and quantity of collaborations in VLEs may differ based on educational level.

Perceived benefits and challenges of VLEs.
In addition to the commonly studied outcomes of VLEs, a variety of additional advantages and disadvantages identified by students and educators have been discussed. A survey completed by 1,200 UK University students and 450 University faculty determined that staff and students agreed that the advantages of VLEs were the availability and accessibility of content, as well as the flexibility and ability to work at one’s own pace. Additional advantages of particular interest to instructors and administrators include: saving costs and efforts of printing, improved control of assignment submission and feedback, and possible improved learning outcomes, as discussed previously.

In the UK study of students and faculty, faculty discussed technical issues as a limitation of VLEs, as well as the difficulty of managing student expectations for communication and feedback and developing key learning objectives online. Students were concerned with potential technical issues, in particular the difficulty of obtaining hardware, and decreased interaction with educators. Participants from a 2000 study mimicked these concerns, stating inadequate infrastructure, unreliable computers, and poor access to online material as disadvantages. Decreased motivation to attend class was also mentioned as a limitation of fully online courses.

Overall, previous research suggests that VLEs can be used to promote increased quality of learning products and processes, but that technical problems can create motivational and physical barriers to implementation. Much of the previous literature focuses on VLEs in post-secondary learning institutions; the current evaluation provides novel research on outcomes and implementation of VLEs in a Canadian elementary and secondary school environment.
METHODS

EVALUATION APPROACH

This pilot project evaluation uses a cross-sectional design using two inter-connected studies to compare student outcomes and teacher instructional practices in classrooms with and without VLEs.

VLE offerings are innovative and evolving, rather than a standardized pedagogy. Therefore, this evaluation takes a developmental approach to assessment of the VLE pilot program¹. Although this research involves evaluation of outcome goals, lack of goal attainment and unanticipated outcomes are viewed as evidence to help refine and evolve use of VLEs in the classroom, rather than evidence regarding program success or failure.

Outcome goals for the VLE pilot project were identified through a program logic model (see Appendix A). Broadly, attainment of shorter-term and longer-term outcome goals are assumed to contribute to the ultimate goals of improved instruction and increased quality of learning process and products.

This report also reviews evidence related to the activities assumed to underlie the VLE program. Evidence related to program implementation will help iteratively improve VLE offerings as more classrooms begin to use this technology.

STUDY ONE: STUDENT OUTCOMES

As shown outlined in red in Figure 1, the following student outcome goals were assessed using qualitative and quantitative self-report survey data:

- More modalities to access teacher feedback
- Increased personalization of learning (e.g., timing and strategies)
- Increase in perceived relevance of learning materials
- Increased awareness of rich resources
- Increased capacity to use communication and collaboration tools
- Increased understanding of benefits of technology to work and learning
- Increased engagement with learning

This study uses a cross-sectional approach, looking for impact of VLE services on student outcomes by comparing the responses of students from classrooms identified as “using” and “not using” VLEs. Both quantitative and qualitative data are used as outcome indicators, with student comments providing context for findings from group comparisons.
Figure 1. Student outcomes assessed in VLE pilot evaluation. Outcomes assessed in the student survey are outlined in red.

Study one sampling plan
Students were recruited from elementary and secondary schools in the Upper Grand and York Region District School Boards (UGDSB and YRDSB). Specifically, students were recruited to the study by classroom (i.e., classrooms with and without VLEs); the key difference between being identified as a VLE or non-VLE classroom was use or non-use of the UGDSB or YRDSB cloud services.
Student respondents were classified into “users” (n = 235) and “non-users” (n = 169) of VLE technologies. This classification was carried out by the IT Directors at UGDSB and YRDSB, based on criteria of school and teacher. This non-random recruitment of survey participants means that the results may not be representative of all students, and that findings may not be generalized beyond the current sample. However, the relatively large sample size means that the research should be able to detect small-to-moderate differences between groups 85% of the time\(^b\).

Classrooms were recruited to the study with the consent of the school’s principal and teacher. In addition, only students with parental consent participated in the study. In a school computer lab, students completed an online survey consisting of a mixture of closed- and open-ended items; the first screen of the survey provided student assent (see Appendix B).

**STUDY TWO: TEACHER OUTCOMES**

As shown in Figure 2, the following teacher activities and outcome goals (outlined in red) were assessed using thematic analysis of focus group data:

- Provide support for VLEs
- Use digital tools for participation in local and global learning communities
- Increased ability to use VLEs
- Increased motivation to use VLEs
- Increased use of VLEs in lesson design
- Increased opportunities for student assessment

\(^b\) Power calculation using G\(^*\)power (v3.1.3) gives \(\beta = .85\) assuming \(d = .30\), \(\alpha = .05\).
Study two sampling plan
All participants were teachers from the Upper Grand District School Board. Teachers identified as VLE users or non-users by the board IT Director were recruited to the study using an informational letter explaining the nature of the research. All participation was voluntary, and teachers completed an informed consent package before the focus groups began.

Focus group procedures and data analysis
A facilitator and note taker were present during each focus group. Participants were reminded that they would be recorded and to be respectful of others’ opinions. Focus groups were facilitated using a semi-structured interview format (see Appendix C). All focus groups were recorded using a digital recorder.

Focus group recordings were transcribed verbatim. Thematic analysis\textsuperscript{21, 22} was conducted on the transcripts to determine common themes between and within the two focus groups. Teacher outcome goals and anticipated VLE activities were used as sensitizing factors in the analysis and provide a framework for the focus group results.
STUDY ONE RESULTS: STUDENT OUTCOMES

STUDENT PARTICIPANTS

Online survey respondents were 404 students, ranging in age from under 10 (grade 6) to 18 years of age (grade 12) (Median = 13, M = 13.29, SD = 1.55). Students in this sample were 48% female and 45% male (7% preferred not to state a gender). Distribution of student respondents by grade is shown below in Figure 3.

![Figure 3. Student participants by age and grade.]

NOT MORE, BUT DIFFERENT: MODALITIES TO ACCESS TEACHER FEEDBACK

Online feedback more frequent in VLE group, but not total feedback.

Overall, there was no evidence of a difference in total number of “usual” feedback modalities reported by VLE users ($M = 1.75, SD = .85$) and non-users ($M = 1.72, SD = .74$). Only a third of students reported receiving online feedback on their assignments ($n = 144, 36\%$). Of these students, VLE users were significantly more likely to report receiving

\[ t(387) = 0.34, p = .73, d = .03. \]
feedback on online documents than were non-users\textsuperscript{d}. Of interest, 19% of non-VLE users reported receiving online feedback, whereas 52% of VLE users reported not usually receiving online feedback. These results suggest there was some overlap between the two groups.

Most students reported receiving comments on paper documents ($n = 273, 68\%$) and in person ($n = 274, 68\%$). However, VLE users were significantly less likely to report receiving feedback through paper documents than were non-users\textsuperscript{e}. There was also some evidence that VLE users were less likely to report receiving in-person feedback than were non-users\textsuperscript{f}.

Preference for paper feedback.
Students were asked about their favourite means of receiving feedback on assignments, selecting any or all of “paper”, “online”, “in-person”, or “other” feedback modalities\textsuperscript{g}. Overall, 100\% ($n = 405$) of students reported that their favourite means of receiving feedback of assignments was through comments on paper documents. Similarly, preference for online\textsuperscript{h} and in-person\textsuperscript{i} comments did not appear to differ by VLE-user status. Of importance, only 9\% ($n = 38$) of students reported that they would prefer to receive comments on an online document. About a third of students (32\%, $n = 128$) preferred to receive comments in-person.

Mirroring students’ reluctance to pick “online comments” as a favourite means of feedback, about half of students nominated online comments as their least favourite method of feedback. When asked to choose a least favourite means of receiving feedback, 26\% ($n = 95$) picked comments on paper assignments, 45\% ($n = 162$) picked comments on online documents and 24\% ($n = 86$) picked in-person comments.

Exposure to online feedback predicts increased preference for online feedback.
Logistic regression showed that students who reported that they usually received online feedback were significantly more likely to report wanting to receive online feedback\textsuperscript{j}. In

\[
\chi^2 (1, N = 404) = 35.36, p < .001, \phi = .30 \\
\chi^2 (1, N = 404) = 10.17, p = .001, \phi = .16 \\
\chi^2 (1, N = 404) = 4.12, p = .05, \phi = .10 \\
\chi^2 (1, N = 404) = 0.43, p = .51, \phi = .03 \\
\chi^2 (1, N = 404) = 2.23, p = .16, \phi = .07 \\
\chi^2 (1, N = 404) = 33.13, p < .001, \beta = 2.11
\]

\textsuperscript{d} That is, students could select multiple “favourite” feedback modalities.
\textsuperscript{e} \textsuperscript{f} \textsuperscript{g} \textsuperscript{h} \textsuperscript{i} \textsuperscript{j}
contrast, VLE user status did not significantly predict desire to receive online feedback\(k\). It appears that frequency of actually receiving online feedback is a better predictor of student preferences than VLE user groups.

Choice of “least favourite” feedback modality did not appear to differ by VLE-user status\(l\). In contrast, students who usually received online feedback were less likely to nominate online comments as a “least favourite” feedback modality, whereas those who did not usually receive online feedback were more likely to nominate online comments as a “least favourite” means of feedback\(m\). It appears that familiarity with online feedback may contribute to students reporting a preference for that modality.

Open-ended comments suggest that feedback preferences differ widely among students. A few open-ended comments supported the use of online comments and feedback:

- I think that my most favourite method of getting feedback about assignments is through an online document on places such as Google Docs because it allows us to organize our thoughts. It is a good place to store information for long periods of time. (VLE User)

- I like receiving feedback online so I can immediately fix the errors (VLE Non-user)

However, many other students reported that they found online comments inaccessible and confusing:

- I do not like getting feedback from an email because it is not descriptive and then I will not know how I could improve my mark. (VLE User)

- I do not like handing in assignments online. It is a hassle and it is confusing on where to hand it in. (VLE Non-user)

- I don't like being commented online because I don't go on computers that often. (VLE User)

\[\chi^2(1, N = 404) = 1.57, p = .21, \beta = -0.50\]
\[\chi^2(3, N = 362) = 0.89, p = .83, \phi = .05\]
\[\chi^2(3, N = 363) = 11.28, p = .01, \phi = .18\]
I don’t really getting feedback online because I cannot see my old work at the same time someone is editing it. Getting feedback on paper lets me have reference to it easily if I am not near a computer. (VLE User)

There appeared to be some degree of overlap between those who disliked all written comments (online or on paper). This subset of students preferred in-person feedback.

I like to be able to actually understand the emotions and actual directions he has for my documents instead of basic spelling corrections. (VLE User)

The reason I like getting feedback in person if I don’t exactly understand what my teacher meant I would be in person to ask him. I don’t like online because I get confused on things sometimes. (VLE User)

Another subset of students preferred options that reduced the chance that others would overhear the feedback.

It’s awkward when a teacher is telling you what you did well and what you need to improve on in front of your face, either alone or in front of other people. (VLE Non-user)

I don’t like asking questions online because anybody can see it and any of my classmates can see it as well. And if it is a simple question I could feel stupid if anybody else sees it. (VLE User)

Students are divided on the ease of different feedback modalities:

It is easier to get feedback online than being called by the teacher for your feedback and going back. (VLE User)

It’s easier going to the teacher’s desk and talking and going back to your desk than communicating online. (VLE User)

Rather than gaining more modalities for teacher feedback, student VLE users may be experiencing a shift towards online comments replacing paper and in-person comments. Taken together, the quantitative and qualitative findings suggest that despite this trend, online feedback should not replace opportunities for in-person and paper feedback. However, as students become more comfortable with online feedback modalities, preferences for online comments can be expected to increase with time.
MIXED EVIDENCE OF INCREASED PERSONALIZATION OF LEARNING IN VLE GROUP

Contrary to expectations, overall trends were that VLE users reported the same or less perceived autonomy, as compare to non-users. Multivariate testing showed no clear evidence that VLE user status influenced students perceived autonomy in personalizing when, where and how they completed school assignments (see Figure 4). Based on a univariate model, there was a marginally significant difference such that VLE users ($M = 4.42$, $SD = 1.77$, $n = 216$) reported less perceived control over when they worked on school assignments than non-users ($M = 4.74$, $SD = 1.59$, $n = 159$). This is a small effect size, and should be considered a relatively trivial effect.

![Figure 4. No evidence of increase in perceived autonomy in VLE group.](image)

Wilk’s $\lambda = .99$, $F(3, 371) = 1.72$, $p = .16$, $\gamma^2 = .01$.

$F(1,373)=3.25$, $p = .07$, $\gamma^2 = .01$. 
In accordance with the quantitative findings, only a few students reported in open-ended comments that online access increased autonomy over completing assignments.

We always have the freedom to use the technology to complete various assignments and tasks to our favour. We have 24/7 access. (VLE User)

Overall, about half of students “disagreed” that they had choice in where they worked, likely because they completed most of their work during school hours.

Of interest, there were two distinct peaks in the distribution of responses to the item assessing perceived choice in how assignments were completed (see figure 5). This distribution did not significantly differ by VLE-user status\(^p\).

![Figure 5](image)

**Figure 5.** Evidence of two populations of students, differing in terms of perceived autonomy.

It appears that there may be two distinct populations of students, who differ in perceived autonomy:

\[ F(1,373)=0.85, p = .36, \gamma^2 = .002. \]
Most of the time we are assigned when we are able to work on projects or work in or out of class or both. But on the other hand it is completely my responsibility on how and when I decide to work on things. I also can use my own tricks on assignments if it is not a specific way that the teacher would like. Once and for all I love school in general and especially assignments. (VLE user)

Teachers try to control the way students work on things, I have no voice when I want to do stuff the way I want. Stuff is shoved down my throat. (VLE Non-user)

Thus, there is no evidence that VLE access increases perceived autonomy over learning choices. These results suggest that simply providing learning materials in a new format is not sufficient to impact student perceptions of autonomy. That is, if students do no actually have choice about whether or not they use VLEs for a given project, or how the VLE is to be used, then VLEs do not actually increase autonomy over choices related to personalization of learning.

However, as described below, although VLE use does not appear to impact perceived autonomy over where, when, and how assignments are completed, there is evidence that VLE use does impact satisfaction related to technology and how assignments are completed.

Working differently yields different expectations for technology and Internet access at home and school.

Self-reported Internet and technology access and Internet use for completing school assignments differed between VLE users and non-users. Specifically, investigation of group differences for these outcome variables between VLE users and non-users showed an overall significant multivariate effect\(^q\). As shown in Figure 6, follow-up analyses indicated that VLE users were more satisfied with their access to technology at school\(^r\) and reported significantly more perceived access to the Internet when not at school\(^s\), as compared to non-VLE users. VLE users were also less likely to report using the Internet to complete school

\(^q\) Wilk's \(\lambda = .89, F(6,352) = 7.24, p < .001, \gamma^2 = .11\)

\(^r\) \(F(1,357) = 2.24, p = .03, \gamma^2 = .01\)

\(^s\) \(F(1,357) = 18.74, p < .001, \gamma^2 = .05\)
assignments during school hours\textsuperscript{1}, and were less satisfied with their access to technology at home\textsuperscript{2}.

Of interest, there was no evidence of a difference in perceived access to the Internet at school between VLE users and non-users\textsuperscript{3}. There was also no evidence of group differences in self-reported use of the Internet to complete school assignments outside of school hours\textsuperscript{4}.

![Average Score](image)

Figure 6. Differences in satisfaction and use of Internet and technology between VLE users and non-users. Means of bars outlined in red significantly differ ($p < .01$).

\textsuperscript{1} $F(1,357) = 8.62, p = .004, \quad \gamma^2 = .02$

\textsuperscript{2} $F(1,357) = 13.68, p = .004, \quad \gamma^2 = .02$

\textsuperscript{3} $F(1,357) = 2.45, p = .16, \quad \gamma^2 = .01$

\textsuperscript{4} $F(1,357) = 4.69, p = .14, \quad \gamma^2 = .01$
Thus, it appears that VLE users are learning more strategies for gaining Internet access outside of school, but are less satisfied with their access to technology at home (however they chose to interpret the term “technology”). It may be that access to VLEs and VLE technologies increase student expectations for what constitutes sufficient access to Internet and technology outside of the classroom.

High perceived access to technology for most students.
As shown in Figure 6, the Internet and technology is an integral part of students learning experience. Regardless of VLE classroom status, students as a whole reported that they had access to the Internet and technology at home and at school, and that they used the Internet to complete school assignments at home and at school.

Analysis of open-ended comments supported the quantitative findings. Many students were satisfied with their access to the Internet at home and at school.

Along with me, many students have access to the Internet at home. We have the technology with us all the time which allows for continuous learning. (VLE User)

Frustration with lack of reliable access.
Although many students are satisfied with their access to technology and the Internet, there is also frustration about technology availability and reliability, both at home and at school.

Just need a printer. Teachers expect us to print everything/most things but what if we don't have a printer at home? (VLE User)

Only use Internet at my house for unfinished work and if my Bell stick [mobile WIFI] will connect. (VLE User)

We don't always have access to the technology when we have the option to do it via the computers because other classes have them. (VLE Non-user)

With that WIFI at school, it will sometimes crash (cloud, google). (VLE User)

At School, the computers aren't always charged making it difficult for computer access at school. (VLE User)

Although overall access to the Internet and technology appears to be relatively high, reliable access is by no means universal. Personalization of learning can only occur to the extent to which students have the ability to access VLE and other online services at school and at home, and to which they are actually able to choose when, where, and how to complete school assignments.
SOME EVIDENCE OF INCREASED AWARENESS OF RICH RESOURCES FOR VLE USERS: BREADTH AND CURRENCY, BUT NOT RELEVANCE

Relevance of technology and learning resources is relatively high. Overall, most students reported that the resources they use for learning were up to date and relevant (M = 5.43, SD = 1.29), that there are “a lot of learning resources available” to them (M = 5.66, SD = 1.26) and that they see their classroom “as a 21st century classroom” (M = SD = 1.46).

However, there were some differences between VLE users and non-users\(^x\). For students in VLE classrooms, breadth of learning resources was reported as significantly greater than resources for non-users\(^y\). Similarly, there was some marginally significant evidence that VLE users more strongly rated their classroom as a “21st century classroom”\(^z\). There was no evidence of difference in perceived relevance of resources between VLE users and non-users\(^aa\).

![Figure 7. VLE users perceive greater breadth and currency of learning resources. Means of bars outlined in solid red significantly differ ($p < .01$); means of bars outlined with dashed red line marginally significantly differ ($p \leq .06$).](image)

\(^x\) Wilk’s $\lambda = .98$, $F(3,351) = 2.36$, $p = .07$, $\eta^2 = .02$

\(^y\) $F(1,353) = 6.14$, $p = .01$, $\eta^2 = .02$

\(^z\) $F(1,353) = 3.68$, $p = .06$, $\eta^2 = .01$

\(^aa\) $F(1,353) = 1.10$, $p = .29$, $\eta^2 = .003$
NO EVIDENCE OF INCREASED CAPACITY TO USE COMMUNICATION AND COLLABORATION TOOLS FOR VLE USERS

Overall, students rated themselves relatively well in terms of their ability to use technology. The six technical ability items showed good internal consistency, and were combined into an aggregate measure of perceived comfort and proficiency with technology\(^{bb}\). There was no overall evidence of differences in students’ perceived ability to use technology between VLE users and non-users\(^{cc}\).

![Average Score](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>VLE User</th>
<th>Non-User</th>
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<tbody>
<tr>
<td>I am good at using technology to communicate with other people.</td>
<td></td>
<td></td>
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<tr>
<td>I am good at using technology to work with other students.</td>
<td></td>
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<tr>
<td>I am good at using technology to carry out research.</td>
<td></td>
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<tr>
<td>I am good at using technology to have fun.</td>
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<td></td>
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<tr>
<td>I am good at using technology to learn.</td>
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**Figure 8.** No evidence of increased perceived ability to use technology in VLE users and non-users (except for fun). Means of bars outlined in solid red significantly differ \((p < .05)\).

\(^{bb}\) Cronbach’s alpha = .84

\(^{cc}\) \(t(362) = 1.10, p = .27, d = .12\)
No clear evidence of increased understanding of benefits of technology to work and learning for VLE users.

As shown in Figure 8, examination of the items individually only suggested group differences in terms of students’ perceived ability to use technology to have fun: non-users reported more confidence in than VLE users\(^{dd}\). This finding suggests indirectly that VLE users are more aware of “non-fun” (i.e., academic) uses of technology. Examination of open-ended comments also suggested that students recognized that technology had multiple work and learning benefits, although some students reported a lack of access to technology or frustration with reliability. However, there did not appear to be marked differences between the VLE and non-VLE groups.

> Working with other people on the technology is fun, but challenging. It is fun, because you get to complete the project with friends, but challenging because it is harder to split up the work equally. (VLE Non-user)

> I am pretty good at using tech but I am still learning a lot. (VLE User)

Thus, the current evaluation data does not provide clear evidence that providing opportunities for online collaboration and learning through VLEs necessarily leads to an increased capacity to use communication and collaboration tools, or to increased understanding of benefits of technology to work and learning. These findings suggest that mere exposure to VLEs does not necessarily improve student’s perceived ability to use technology or their understanding of the benefits of technology. However, as this evaluation assessed perceived and not actual ability, the exact effects of VLEs on student ability to use online collaboration and communication tools are still uncertain.

\(^{dd}\) \(t(361) = 2.30, p = .02, d = .24\)
INCREASED ENGAGEMENT WITH LEARNING: AGE AND AUTONOMY, BUT NOT VLE STATUS, PREDICT ENJOYMENT
Seeking help from teachers and peers and self-reported enjoyment of school assignments were assessed as proxies for student engagement with learning. There was no evidence of a difference in self-reported enjoyment of school assignments between VLE users and non-users. Comparison of median scores for seeking help depending on VLE user status showed no evidence that VLE user status influenced help-seeking frequency from teachers or other students.

To better understand this finding, student gender, age, and autonomy (i.e., choice over where, when and how assignments were completed) were examined as predictors of student enjoyment (i.e., engagement). Younger students were more likely to report enjoying their work, but there was no evidence of significant gender differences. Over and above the effects of age, perceived choice over when assignments were completed also predicted enjoyment, such that more choice was associated with higher enjoyment. These were both relatively small effects.

Similarly, frequency of asking teachers for help was inversely related to age, such that younger students (lower grade level) were more likely to ask for help from teachers than were older students. In contrast, there was no evidence of a relationship between age and frequency of seeking help from other students.

DISCUSSION OF STUDENT OUTCOMES
The results of the current evaluation suggest that
students who use VLEs are working differently than those not using VLEs. VLE users are spending more time completing assignments at home and report more access to the Internet at home, but are less likely to be satisfied with their home-based access to technology. VLE users are more satisfied with Internet access at school than non-users, report awareness of a greater breadth of learning resources, and more strongly agree that their classroom is a “21st century classroom”. VLEs are also changing how students and teachers interact, with online feedback providing a communication modality that still causes apprehension in some students, but that is more strongly embraced by “experienced” users.

Contrary to expectations, there was no clear evidence that VLEs increased student capacity to use collaboration and communication tools, or their understanding of the benefits of technology to work and learning. However, this may reflect a lack of student confidence, rather than an actual lack of capacity building. A comprehensive assessment of actual student skills was beyond the scope of this evaluation, but differences in perceived and actual ability to use technology should be considered as VLE programs are expanded within schools.

Similarly, there was no direct evidence that VLEs increased engagement with learning. This may reflect how “engagement” was operationally defined in the current research. However, this finding may also reflect that fact that student engagement depends not on merely using VLEs, but using them well.

Although most students reported that they had access to technology at home and at school, the reliability of that access can be a barrier to using VLEs. Indeed, motivation to use VLEs or any kind of educational technology appears to depend in large part on the perceived utility of that technology, including reliability. The idea of unreliable technology as a barrier to use is mirrored in study two below, describing the results of teacher focus groups.

Overall, there was some evidence that students using VLEs are experiencing a richer learning environment. Specifically, there was evidence that VLEs are changing the ways in which students manage their work and in how students and teachers interact. Although not all evaluation outcome goals for students were attained, overall the evaluation findings suggest that VLEs are being successfully implemented in classrooms, creating a blended learning environment that reflects a “21st century classroom”.

The **Research Shop**

**EVALUATION OF VIRTUAL LEARNING ENVIRONMENTS**

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STUDY TWO RESULTS: TEACHER OUTCOMES AND ACTIVITIES

PARTICIPANTS
Focus Group 1 consisted of teachers identified as “VLE users”, and comprised three female and five male teachers. Focus Group 2, the “VLE non-users” group, consisted of teachers identified as not using cloud technologies in the classroom and comprised of seven female teachers. Both groups had primary and secondary school representation.

OVERVIEW OF FOCUS GROUP RESULTS
Thematic areas were developed based on focus group results, using the program logic model as a framework for interpretation. An overview of results is shown in Figure 9; thematic areas are discussed in detail below.

CONTINUUM OF TECHNOLOGY: USE OF VLES AND OTHER TOOLS
Although focus groups were divided into “VLE users” and “non-users”, technology was used to some extent by all teachers. However, the amount and type of technology varied between and within the focus groups. Teachers generally fell into two categories: those who fully integrated technology into the classroom, and those who used technology to supplement a traditional classroom. Teachers who had fully integrated technology into the classroom were using the UG cloud, a board developed cloud system, or Google Docs to save and exchange data,
communicate with parents, students, and colleagues, and to post notes and class exercises. They were also using additional programs to supplement the cloud, such as online programs or word processing programs. Common additional programs discussed within both focus groups included: Wikis, Word, PowerPoint, Prezi, Bitstrips, Blogster, Glogster, and back channeling. Teachers who used technology to supplement a traditional classroom were generally using the cloud for one task only, or not using the cloud at all. They were however still using additional programs as mentioned above.

Teaching with VLEs: Technology as an integrated space.
Both focus groups contained participants that used technology to supplement a traditional classroom, but only the VLE user group had participants that had fully integrated technology into the classroom.

"Popplet, the cloud, email, wiki spaces, note and exercise are all online, all the PowerPoint’s, all the classroom notes are online. We’re using Prezi in class, we use group work assignments, we put up PowerPoint and four different groups fill out a slide each. (VLE User)."

"So, I try to use technology. I don’t really know much about the cloud. So, my background is in research and academics, and I mean, I really, it was all about Microsoft Office, PowerPoint, Excel, and so I generally try to use things that I find that in the real world people would use, and I had never heard of the cloud before this year. So I was like, I don’t even know if that’s something were giving people to use. Google docs I’ve used. But the cloud, I don’t exactly how that fits with it, I don’t know really much about it so. (VLE Non-user)."

Questionable benefits of VLEs reported by less intensive users.
Despite all teachers using technology to some extent in both focus groups, participants from the VLE non-user group were more likely to question the benefit of using VLEs in their lesson design.

"Like I can see, ok we could use it in class and we could all be on the cloud and they could be collaborating, but couldn’t they just sit together in a group and work on it? Do they need to be on the computer to do it? I don’t know. They could actually talk because that helps the other thing that we’re really, really working on increasing accountable talk in the classroom, so to me, it just I’m not totally sure. Like, what the benefit of it is. (VLE Non-user)."

Overall, technology was a part of every classroom, but the type and amount varied greatly. Teachers using VLEs tended to be VLE advocates and heavier users of cloud technologies. Although non-users were still less certain of the pedagogical benefits of VLEs, this group was still working to integrate technology and cloud services into the classroom.
SYSTEMIC SUPPORT FOR VLES IS LACKING
An assumption of the VLE pilot program is that teachers will receive professional development support; this support is an activity of the VLE pilot program, as detailed in the program logic model (see Appendix A). However, participants from both focus groups indicated that they were lacking the support they needed to use VLEs in the classroom, both from a technical support standpoint and from a training and professional development standpoint.

Technical support access can be slow and unresponsive, but peer mentorship difficult due to lack of permissions.
In terms of technical support, both groups indicated that there was a “tech coach” at each school as well as the board IT department that could be contacted by phone. The tech coach structure was similar to a sports coach, as it was a voluntary position on top of regular duties. Although teachers report that having a support person available locally helps provide more timely access, this position does not necessarily resolve the problems posed by lack of administrator permissions in the IT environment.

Both groups discussed their frustration with not having the access to do simple technology fixes. Ideas for improvement include increased access to the IT environment to facilitate quick troubleshooting.

Or give us access right? So I do the computer stuff at our school and I mean I don’t mind sending the tickets and sometimes I can troubleshoot but sometimes I feel like it’s the blind leading the blind. Like I’m not a computer expert by any means. But if I had access, there are things that I could fix. Um, but they don’t you know, the IT department, the board, doesn’t want to give that up to us so that we could troubleshoot some of those little problems. (VLE Non-user).

When technological issues cannot be resolved using in-school support, calling in IT support from the school board can be a lengthy and frustrating process.

I mean, if I have a problem in the beginning with setting up the assignment on the cloud, I was like OK, I’ve obviously done something wrong, I’m getting this feedback that this didn’t work, so, I emailed and asked for help, and I didn’t get a response for a while, and that’s fine, everybody’s busy, but it took several days and a couple of emails and finally a phone call and in the emails was “well, I could come in and work with you” and I’m like I just really need the 30 second fix. And when I phoned and got somebody in their car, I got a 30 second fix cause they didn’t want to talk on their phone a lot and I sound like I’m complaining, I don’t mean that, I just mean, it took a while to get the 30 second fix because I didn’t really know what I was doing. (VLE User).
Both focus groups also recognized how valuable their students could be in the technical support area. Several examples of students learning technology together, or a student educating a teacher were discussed.

*I didn’t know how to use blogster when I introduced it to my class, and we learned it together and they became the experts and they taught each other and they taught me.* (VLE Non-user).

Lastly, teachers from both groups discussed the challenges associated with being a tech coach. When tech coach positions are informal, these technology advocates report that it can be challenging to find the time to provide support on top of existing responsibilities. An ideal situation for both groups would be to have a full time tech coach at each school who’s sole job responsibility would be to troubleshoot, support, and train in technology related areas. An improvement over the current situation would be to formalize the role of tech coach as a teacher duty.

*I think the system that they’ve put in with the, with the tech coaches, and the teacher librarian and tech coaches and placing a person, or having one person at each school, one person, it’s a tall order, but having that person at a school who can support people before they have to go and call the board office with some sort of tech problem. Unofficially, that’s what I do, is that if someone is having trouble with a program or a web 2.0 something, they send me an email. I get emails almost every day, on tech support. That’s one, that’s one other correspondence that does not have to go to the IT department at the board. But if it’s not recognized that way, the support is not recognized that way. The tech coach position is a pretty airy-fairy sort of title that’s given to a person who might want to take some initiatives, and, I’ve thought of a lot of things, and I’ve thought of a lot of ways to help, and (name) and I even thought of putting a tech coach position as a duty. So, instead of me sitting for 20 minutes every 2 days in the cafeteria and watching students in the cafeteria, have me go around and solve people’s computer problems. Give someone in the school the power to go around help somebody with a program, help somebody in a class immediately. Like oh my god, I’m having trouble with my program, give (name) a call, get him to come to the classroom and fix it so your lesson can get up and running.* (VLE User).

Overall, most participants wanted improvement in technical support, and agreed that a dedicated technical support person was needed in the school.

Desire for more formal training and professional development.

When discussing professional development, both groups spoke about wanting more professional development available to them, and suggested several ideas, but most commonly PD days. More ad hoc training was not popular with many teachers.
I think just simply is making it available that they, it’s there, they can get it, they can play with it. I think it should be something maybe an intrinsic thing, that they would just want to learn, and want to play with it, and then support them with optional PD’s, so whether they go to a half day workshop, whether they get paid for it, or even unpaid so they can go on a weekend, but maybe partnering with some of these manufactures that bring in all this wonderful stuff. Just make options available for training sessions. I think that would be good. (VLE User).

Differences between the focus groups were seen in terms of training. Both groups spoke about the typical technology training they received, saying that teachers who identified themselves as “tech savvy” were trained first, and then a “train the trainer” or peer-learning model followed. Training was not formal and for the average teacher was less than 2 hours total. Differences were seen between groups in that teachers from VLE user group were more likely to be trained first and then train teachers from the VLE non-user group; however, one teacher from the VLE non-user group did identify themselves as the “tech person” for their school.

The VLE user group spoke extensively about the importance of collaborating with other teachers to build technology capacity, while this topic was not discussed in the VLE non-user group. Similar to working with students to gain knowledge, teachers believed that working with each other would overall improve their technology knowledge.

One of the things that we did was make part of every staff meeting a technology piece. So, that you know, one last year was just being exposed to what the cloud was, and so on, and you know, how different, and different people would take on the role of teaching whoever had expertise would teach. What they were doing in the classroom. So there might be various programs that were available or this is how you use the smart board or you know, all these kinds of things. I’m struggling to find examples of what it was, but it was just help build capacity that way. (VLE User).

Overall, teachers were taking training into their own hands, but wanted more professional development in the technology field and hoped that it would come in the form of a PD day.

GETTING CONNECTED: TECHNOLOGY FACILITATES TEACHERS’ PARTICIPATION IN LOCAL AND GLOBAL LEARNING COMMUNITIES

There is strong evidence that technology is facilitating teacher participation in online learning communities, although this participation cannot be attributed solely to the VLE pilot program. Both focus groups spoke about how technology has made connecting with local and global learning communities easier and more accessible. The most commonly used tool spoken about was the social media site Twitter. Many teachers identified themselves as using Twitter for educational purposes only. They followed other teachers and educators and used the site as a news channel for education.
I use [Twitter] mainly as a professional tool as well. And that’s my, and I’m considered what you call a leech. So I have the account and I’m following 50 on twitter, ah 50 people and all I do is every morning I wake up and whatever, and each day I’ll scan through and looking for those great ideas, that’s, you know, and now that my 8 year I’m trying to give back to the community as well. If I do a great lesson, I’ll tweet that, or I found a great article or whatever. So I’m trying to share but initially it was because it could be overwhelming, but all I did was each day just go on and, someone mentioned, where did they do one? Perfect. You click on it and it’s just opened my eyes to so many more examples, so it’s a great, you know, I try to stress that now, I try to stress that to teachers, you don’t have to follow Ashton Kutcher, right? There’s great people doing great things, and you don’t have to, it’s not a lot to give back, all it is scrolling down each day, finding stuff that interests you. (VLE User).

Participants from the VLE non-user group shared the same idea about Twitter, saying it made them feel less overwhelmed with all of the teacher resources and information that are available.

I have in the last year I’ve gone on Twitter for use it just for professional purposes so I’ve connected myself to lots of teachers out there, and teaching website, and you know, people who send stuff, and boy has that been useful. So that I don’t have to search the entire web for program ideas or articles and stuff like that um. I get it on twitter a lot now, and I can take as I’ve been explaining to colleagues like, take 5 minutes, 5 minutes in a week and just search through and see something that’s interesting and you go click on it and then oh, hey I can use it in this class. Done. I didn’t have to search the whole web to find that that. It’s kind of like fishing. You get what comes up, but at least it is something. It’s something, whereas I feel really overwhelmed, like there’s just too much out there and there’s so many neat programs but how are you ever supposed to learn them all unless you’re taking your own personal time. (VLE Non-user).

Participants from the VLE non-user group also spoke about connections beyond Twitter, saying that technology made collaboration easier between teachers within and between schools.

We do a lot. Like with my teaching partner, we’re constantly emailing back and forth. What have you tried this year? You know, and he’s got a really good wiki space. He asked, he said I could piggyback off and I was so, you know, I want to do my own, and that didn’t happen. So yeah, I think we’re very collaborative. (VLE Non-user).

It’s true, because the online, like I still collaborate with people I went to teachers college with, online. So, and again, you’re not in the same school, there’s no competition there, so you, you’re like trading things and it’s great, but that’s online. (VLE Non-user).

Overall, technology made connecting with educators from local and global communities an easier option for participants. Connecting teachers with online communities that support VLE implementation in the classroom may provide a means of peer learning, providing teachers with models for using VLEs and information about how to overcome barriers to implementation. Indeed, as described below, the perceived ability and motivation of teachers to use VLEs in the classroom appears to depend in large part on overcoming such barriers.
MOTIVATION AND ABILITY TO USE VLES MAY DEPEND ON REACTIONS TO PERCEIVED BARRIERS

Overall, most teachers believed they had the ability to use VLEs in the classroom; however, teachers faced several barriers which inhibited the amount of technology that could actually be incorporated. The focus groups faced many of the same barriers, but approached them differently. Participants from the VLE user group were more likely to overcome or adjust to the barriers, while the VLE non-user group was more likely to allow the barriers to limit the amount of technology used in the classroom. Several barriers were discussed, with time, equipment issues, and access to technology being the most prominent. Understanding and addressing these barriers is essential to supporting and promoting increased use of VLEs as part of a larger blended learning strategy.

**Lack of time.**

Lack of time was the most discussed barrier to integrating technology into the classroom by participants in VLE non-user group. Many teachers found their workday stretched beyond regular work hours already, and the thought of integrating technology into their day was overwhelming and was considered something that could be delayed.

To be honest that is why I haven’t started using the cloud. I went to the training, I know how to log in, I know how to use it, but to me it’s another thing to then add on to my day, and I’m trying to use as much technology as I can with the kids, but I don’t have time to add one more thing at this point. I’m thinking maybe next year I’ll try and integrate that, but you have to set your limits too. (VLE Non-user).

Well you can really invite them so far, like when I think of the smart board. I'll come into your class, how about you take my class and I'll come into yours and do that, and then we’ll all get together and just, and it’s like oh well you know, this week’s busy and stuff, and I don’t know. People I’ve dealt with, they say they feel guilty that they’re not using the smart board which is kind of a bit, at the time, was the big push, um, but I don’t know that they don’t miss it. They don’t see the holes in their program, and it’s one more thing. They’re, they feel swamped with what they’re doing and its one more thing. Yeah, I should be using it, but its like I should be eating more fibre, but you know what I just can’t. (VLE Non-user).

Time was not discussed as a barrier to technology use in the VLE user group, other than one participant mentioning that it was no longer a valid excuse to not using technology in education. Negotiating a middle ground between “not enough hours in the day” and “time is not an excuse” is essential to removing perceived time barriers to VLE implementation. One means of reducing time-related barriers could be to more support and resources for training, thereby reducing the perceived learning curve of using new technologies.

**Unreliable technology.**
Participants from both focus groups spoke about issues with a variety of technology, including the wireless Internet, the cloud and hardware such as netbooks, mice and USB keys. One teacher identified their classroom as being unable to connect with wireless Internet, making it impossible to use any online resources. Other participants spoke about the unreliability of the cloud, with one teacher joking:

*The UG cloud makes me want to drink sometimes, because it crashes at the worst possible times.* (VLE User)

Another participant spoke more specifically about cloud reliability issues, saying:

*I have some of the same frustrations with the cloud where, it wouldn’t let kids log on, and it just, the kids were starting to get frustrated with it as well, but we kind of persevered through. The ah, you know, I’d say, “well just try it again. Try it again”. And eventually sometimes they would get on, sometimes we would just leave it for the time so that is a bit of an issue and there were some things that I did because this is my first year using it.* (VLE User)

Both groups also discussed the barriers they faced with hardware, such as missing keys on the netbooks and mice being stolen from the computer lab.

However, as schools continue to improve their wireless infrastructure, technology reliability should increase. With limited resources, keeping technology usable and up-to-date will always be a challenge. However, in order to reduce this perceived barrier to VLE implementation, ensuring access to usable hardware and reliable online resources must remain a priority.

**Limited access to technology.**
Participants spoke about their own access to technology, as well as the perceived access that their students had.

*Student Access*
Teachers from both focus groups discussed their students varying access to technology. Interestingly, no one discussed concerns about their students not having access to a computer at home, but instead there were concerns about Internet access. Internet access in both groups included high speed, rocket sticks, dial-up, and no Internet access. Location was the most common reason for limited access.
I teach in a school that is probably the wealthiest school in elementary at least, but these kids live in these you know the, by and large there’s a lot of really wealthy kids at that school, but they have really crappy Internet access. (VLE User).

Student’s limited Internet access affected the teacher’s ability to integrate technology into education. When not all students have reliable access to the Internet, it can be difficult to require students to use VLE resources outside of school.

I’m in high school and I know more and more of the textbooks are becoming online as well, but there are still like, you know. I had a girl in Grade 11 and she came in because they moved her and she doesn’t have Internet and probably won’t for another 2 weeks, and our textbook and all our resources are all online. So, that is definitely a challenge. (VLE Non-user).

We’re kind of out in the country, so there’s some access like, there’s a lot of kids that live in the country who are on dialup. Like, dialup! And so they don’t want to, like for me to say you can check out this video, they’re like “yeah, right”, because that would take them several hours to see it, you know. A 10-minute video. (VLE Non-user).

In order to ensure that students without Internet access would not be disadvantaged, teachers promoted various ways of obtaining Internet. One teacher spoke about going above and beyond job requirements to ensure all students had Internet access, saying:

It’s really hard to expect them to take it upon themselves to really bump up their levels in terms of their projects and what not if they don’t have access at home. It certainly encourage them, check your email in the library because they always have access at this point in time, or give the option of coming in early in the morning and just working with my classroom, which I volunteer my time to allow them access. But it’s not for everyone. (VLE User).

Many teachers, especially of older grades, talked about students bringing in their own personal devices to compensate for the limited computer access at school, and the benefits and challenges associated with it. Personal devices were discussed as a solution for days where computers were needed, but not available, or for situations where a full computer was not required to incorporate technology into a lesson or assignment.

A lot of kids have iPods. Like when I mentioned back channelling, I found it really easy to do that out of a class of 25, at least I didn’t count, but probably 18, 19 had something and then I just said, you have a device you have to share it like that’s just the rule, if you don’t want to share it then you have to put it away. And then that way hopefully everyone was able to have access to it. (VLE Non-user)
Many potential challenges were raised in relation to bringing personal technology to school, including what forms of technology were appropriate, parental consent, and inequality.

*I find that if that is a day I know we need computers I tell them to bring it, but out of a class of 30 I’d say maybe 5 bring in like a laptop, like, a lot of them at our high school have an iPhone, but if you don’t know if you can use, but that is something they can actually really work on. (VLE Non-user).

*Like in my area, not all kids can afford it, so here’s Tommy bringing, the inequality comes in hugely in my school. (VLE User)*

Parental consent was another issue, and teachers discussed a policy change where students in certain grades could bring in personal devices. Despite the policy change, some parents were hesitant, or the policy was not communicated to them.

*I have grade 5 kids and I want the laptop to be brought in. Well mom and dad grew up in the generation where no way are you bringing in that 600$ piece of equipment, its going to, you know, be torn to pieces, and there was no communication to parents, so when we go to parent council and say “we can’t keep up, we need your help” and especially you know in some schools where we’re at in the south end, you know the kids have these things at home, but mom and dad just don’t know that its all right and that were encouraging it nowadays, so that piece came out and yeah, it’s a great policy, but there’s been no communication to parents so they’re like whoa. (VLE User)*

Overall, teachers from both groups reported that students had access to personal devices and computers at home, but reliable Internet connections are a challenge, especially for students in rural areas. Teachers face several barriers with students bringing in personal devices but are trying to overcome the challenges, as personal devices are a solution to limited computer access at school.

*Teacher Access*

Student and teacher access to technology varied by school and grade level. All teachers had access to a computer at their school; however, perception of whether the access was sufficient for their needs was mixed. Several participants in each group spoke about having shared access to a set of netbooks that could be signed out on a period basis to a class. Other teachers had access to a desktop in their classroom, could use the computer lab in their school, or chose to bring in their personal computer. Reliable access is a concern for some teachers, particularly when computers are shared across classrooms or between colleagues.
It’s hard to start a new project; like, what I’m hearing sounds fantastic but once I start into it I want to be able to keep working on it. And to not have the computers accessible to us is a huge, huge dilemma. (VLE User).

Issues with sharing netbooks were raised as well, as netbooks would be locked if they were not properly logged off from the previous class, or the batteries would be drained if they were not properly charged. Participants also spoke about how technology had great potential to supplement learning, but if they didn’t have access to it, they would miss those teaching moments.

How do whales eat? Give me a minute. Google, we’ve got a YouTube video, the, you know, the bailing whale thing, I’m like wow that is so amazing, but if I have to go down the hall, I get the data projector, get the computer, I’m lucky, cause I don’t tell people, but it’s, other people have to share it. So you’re going to miss those moments. You’re going to miss all of what it can do for you. (VLE Non-user).

I agree that if something is not in your class, that’s, like, it just becomes as you said, it’s too much time, or energy, or you can’t count on it, whereas if you know it’s always there and, cause you said often you don’t need it for a whole lesson, it might just be a certain clip, like, you want it for 10 minutes or 15 minutes just for 1 little thing you’re going to use. (VLE Non-user).

In addition to computer access, teachers also had concerns with the technology quality. Although all participants had access to a computer, the technology was not up-to-date. The teachers spoke unapprovingly about the system running on the computers in the school board, and reported a need for more current technology.

Well that’s part of the problem with the board IT. They have a windows XP computer, Microsoft doesn’t even support XP anymore, but that’s what we’re forced to, we’ve got. (VLE User).

Teachers did recognize the difficulty of maintaining current technology, but pointed out that low cost was not necessarily the best indicator that technology would be useful or appropriate for teaching. For example, one teacher reflected that WordPerfect was still used:

Because it’s free and Microsoft Office costs money. (VLE Non-user).

Teachers from VLE user group spoke more about having access to technology that they did not find useful, such as SMART boards and document cameras, as compared to the VLE non-user group. VLE users, as a group, wanted more input into technology decisions to ensure that what they were receiving was useful and had staying power and not just the technology of the moment.
So it’s just that top down is still very being pushed on as when it comes to buy the technology, and sometimes it doesn’t fit. We have to have that say where, I don’t want one, I want a laptop. We have the data projectors now, that was shoved in there too. Well, how are you suppose to run a data projector on a desktop computer when, in elementary and a primary level, to fit your smart board. (VLE User)

Teachers from the VLE user group also saw the purchasing of unused technology as financially wasteful. When talking about SMART boards, one participant said:

We have a room of the thousand dollar stands for them, full of thousand dollar stands, because then they suddenly realize they wanted them mounted, and we spend thousands on that too and they’re still not using them. (VLE User)

But it was, everyone wanted one because it was the sexy piece of tech, it’s like document cameras now, everyone wants a document camera. That things a freaking overhead that’s overpriced. (VLE User)

Overall, teachers from the VLE user group wanted to be involved in technology decisions because they wanted technology in the classroom that would be beneficial to their students and improve their education experience.

Teachers from the VLE non-user group seemed to face more barriers with their Internet access, describing it as slow, unreliable, and even inaccessible. One participant was unable to access wireless Internet in the classroom, and therefore was required to travel to the computer lab to integrate technology into the curriculum. Internet speed was also an issue:

Yeah, so there’s a volume that’s allowed on the Internet, really, it’s just not big enough. So even if you want every teacher in the building, lets see, as an ideal, using technology, that’s just not possible, because if everyone did, the system is not fast enough, like, the capability. (VLE Non-user).

I actually stopped bringing my own laptop to school because I was just like, every time I tried to use the Internet, it took a really long time. (VLE Non-user).

Teachers wanted to use their personal devices at school because they were faster and had more up-to-date software, but barriers such as slow wireless Internet, inability to connect their computer via Ethernet, and inability to print from their personal devices prevented them from doing so.

Motivation to use VLEs: Comfort with technology and perceived utility of VLEs as teaching tool.
Overall, participants from both groups were motivated to use technology, but participants from the VLE non-user group were more likely to let the barriers previously discussed limit their use. The link between technology knowledge or comfort and motivation was discussed in both groups, with many teachers thinking that young people were more comfortable with technology.

Like, if I have a technology question I’ll go and say “hey, you’re young, what do I do about this” or “do you know anything about this?”, and because it is more second nature to people who are in their 20’s than it is to me. But it doesn’t mean that I’m averse to using it. I’m eager to use it. (VLE User).

And it’s about your comfort level too, like and what your own internal motivation is. Like, I feel like, some of the things that I try in the classroom it’s because I think oh that looks cool. I’m going to see if I can figure out how that works. If I’m not thinking and I’m not motivated to do it, then it’s not going to happen. (VLE Non-user).

Participants from both groups spoke about teachers from their schools that were not using VLEs. Most teachers were understanding as to the reasons for others not incorporating the latest available technology, or for incorporating technology slowly.

Speaking for the people who have been teaching for over 20 years, we’ve seen a lot of things come and go, and you know, it’s like, everything gets touted as the new greatest thing, and then you watch and it’s there for a year or two and then its gone. And I’m not saying technology is like that, but I don’t think that we should be looking down on people who sort of go, you know what, I’m going to check it out, and see how it works. I think you have to give respect to people who have been around for a really long time because they have a lot to offer too. (VLE User).

However, non-VLE users in particular pointed out that some teachers avoid using new technology because they are not sure how it would fit into their existing lesson structures. Providing more professional development information to teachers about how VLEs can be incorporated into a blended learning environment, rather than replacing existing practices may help motivate apprehensive teachers to try new instructional practices.

A lot of effort has been put into the way that they’re doing things. Like that effort was put in before and so a big part of it too is acknowledging how do we take what people who aren’t using technology, the stuff that they are using, how do we take? It’s not that there’s not value in the way that they’re doing it, but how can we take the good stuff out of that and put it together and put it into some technology. Um, cause I think that’s the thing is some kind of people get defensive or that sort of thing, cause they have put a lot of effort into what they’re doing now, and they’ve put a lot of thought into it. It’s, they don’t want to just toss all the work that they’ve done and start something new so I think its something more like how are we going to mesh it together. (VLE Non-user).
Overall, all teachers in both focus groups were motivated to use technology, but barriers had to be managed before technology could successfully be integrated into the classroom. Most teachers believed they had the potential ability to use VLEs, but barriers of time, unreliable technology, and access, were highly salient for those not using VLEs. Barriers to implementation related to time pressure can be addressed through training and support. Improving the reliability of technology in schools, and associated access to that technology, requires ongoing investments in infrastructure and hardware. Student access to technology depends on multiple factors, including location (rural vs. urban) and cost (of personal devices); lack of student access remains an issue, and must be considered as VLE offerings increase.

STUDENT ASSESSMENT AND SUPPORT: CHANGING EXPECTATIONS AND TIMELINES OF COMMUNICATION
Technology has changed the way that teachers can assess and support students. Pencil and paper marking is no longer the only route for assessing work and providing feedback. In this respect, VLEs are helping teachers develop increased opportunities for student assessment. Additionally, the ability to communicate with teachers outside of school hours has changed teachers’ ability to support students in their schoolwork. While the opportunities to assess and support students have improved, teachers saw associated benefits and challenges.

Assessment of work using VLEs: More feedback or more uncertainty?
In the VLE user group, the benefits and challenges of online assessment and feedback were discussed, whereas the VLE non-user group only discussed the challenges they had encountered with online assessment. One teacher from the VLE user group spoke about how technology made it easier to assess students, and how this improvement benefited the class:

Use of technology such as the smart clickers, or there is online forums, I can very easily mark straight answer questions, like simple math questions, multiple choice, true false, I can run all of those assessments super quick, which would allow me to then pin point where my lessons are struggling so that I can turn and focus my attention there. (VLE User)

In terms of providing feedback, technology opened up additional avenues to provide feedback. One teacher spoke about their process of providing feedback to their students, saying:

We use the cloud a fair amount and I used it a lot for publishing and giving descriptive feedback. And so I would put the little post it notes on and the kids would get to, and they would get to school the next day and they would pull up what they, their draft copy they had done and look at the suggestions I had made or whatever so. It was a lot of back and forth with that. (VLE User)
However, in the VLE non-user group, participants spoke about the challenges of assessing students when they had access to their work from school and home.

*How do you assess things that they’re doing at home? Cause technically I’m not allowed to assess anything they do at home. So if they’re doing work on the cloud or you know, how do I know that they’ve done the work? So I still haven’t wrapped my head around that yet… So like, I can see it on home, if they’re doing the cloud at home, but how do I know who did that work at home, like I can’t really assess that. (VLE Non-user)*

*And technically that negates it. As soon as they go home, it’s no longer you can’t evaluate it. (VLE Non-user)*

Participants from the VLE non-user group did not discuss whether or not they had experienced any benefits from technology when assessing students. It appears that some teachers are uncertain about how and when assignments completed in VLEs can be assessed for grades. Providing teachers with more information about school board policies related to online and offline assessment could help mitigate this perceived challenge.

**Student support: Negotiating changing work-life balances.**

Technology has drastically changed the way that students and teachers communicate. Communication is now no longer restricted to school hours, and most teachers from both groups discussed the challenge of this. Although participants from the VLE user group tended to discuss working past school hours as beneficial or to not voice their concerns about working late, the VLE non-user group were more likely to voice their disapproval. II However, overall both groups discussed the challenges associated with supporting students after hours.

*If I’m on there marking, which I do, and I happen to get an email or someone pops up and says Mr [Name] I’m working on my paper right now. If I can solve that problem at 10:30 at night for 2 or 3 students a night, that’s 2 or 3 students I do not, that don’t take 25/30/45 minutes out of my day the next day when I’m trying to get through my teaching day. And I’m there anyways and it might take me a minute to solve a student’s problem in the time I was sitting down and doing stuff. Great. I think that’s awesome. So that problem is solved. (VLE User)*

II Of interest, willingness to work late into the evening answering student email was split along both gender lines and VLE-user status (i.e., male VLE users did not see evening work as an issue; female non-VLE users reported that their other responsibilities made this impossible). It may be that differential distribution of household responsibilities across genders contributes to perceived time pressures related to VLE implementation.
I don’t want to be doing school work. These are my, you know, I’m up at 6 in the morning, I don’t get home until 7 at night, I do my homework until 8:30, and giving me access until 10:30 or 3 o’clock in the morning isn’t doing me a favour. I don’t want it. I don’t want that, because there’s an obligation you’re going to use it. (VLE Non-user)

One teacher noted the issue that students might have surrounding the same topic, saying:

We’re doing exactly to them that were complaining that they’re doing to us. Now the division between their work life and their private life is blurred. (VLE User)

The additional avenue of providing online feedback also increased some students’ expectations of turn around time on their assignments and tests. One teacher spoke about the possible backlash from students that can be expected if feedback is not received in a timely matter:

There’s certain nights that I don’t have time to get on there, and now the next day the kids are saying “you didn’t email me back, you didn’t give any feedback. (VLE User)

To manage the challenges associated with work-life balance, teachers from the VLE group in particular reported that having open communication with students and colleagues surrounding expectations was important.

That’s part of the teaching bit is that you constantly remind them that you aren’t attached to that. Like, same thing, I say you know, Mr [Name] gets busy, right, and I tell, I’m like straight up, listen March madness is on, nothing got done. (VLE User)

Overall, the improved ability to support students outside of school hours needs to be managed and expectations need to be communicated; most teachers spoke about this as a challenge in their day, regardless of VLE user status. As discussed above, both teachers and students are finding that evolving and shifting boundaries between “school-time” and “home-time” can create challenges to maintaining a healthy work-life balance. The issue of whether or not to provide ongoing feedback outside of work hours depends very much on teacher preferences related to work/life boundaries. However, regardless of feedback schedules, or modality of feedback, managing student expectations remains essential to a successful learning environment.

DISCUSSION OF TEACHER ACTIVITIES AND OUTCOMES
Somewhat unexpectedly, participants in both focus groups shared many of the same thoughts and qualities in relation to VLEs. Both groups were using technology in the classroom, although this ranged from full integration into lesson plans to an add-on to a traditional classroom. Both groups experienced barriers to using technology, however, participants in the VLE non-user...
group were more likely to let these barriers affect their technology use. Teachers in both groups were also motivated to use technology, but again, barriers threatened the VLE non-user group more. Important perceived barriers were lack of time and concern about access to reliable technology. Regardless of VLE user status, teachers report a need for more systemic support for using VLEs and other technology in the classroom. In particular, teachers not yet using VLEs report a need for more support in negotiating ways to provide online learning experiences for students while maintaining their own work-life balance. Providing both informational and technical support to teachers using VLEs and technology in the classroom should increase motivation and ability to create blended learning environments.
CONCLUSIONS

The results of this pilot program evaluation show that VLE opportunities are changing instructional and student learning practices. Students using VLEs work differently than those not using them; learning shifts from the classroom to anywhere there is an Internet connection and a connected device. Changing access results in changing expectations. Students using VLEs are more satisfied with their access to technology at school, but less satisfied with their Internet access at home.

The increasing adoption of VLEs reflects the increasing amount of time that society spends connected to the Internet. Thus, reliability of Internet access, both at home and at school, becomes a primary concern for both students and teachers. At school, reliable Internet and device access is a concern not only for VLE users, but for all students and teachers. From accessing a learning portal, to collaborating on a shared project, to a simple Google search during class to settle a contentious issue, reliable Internet access is seen as a necessary but elusive aspect of daily classroom life.

Indeed, apprehension about unreliable technology and lack of support appears to be a key barrier to VLE adoption for both teachers and students. More formalized training and support structures are necessary, especially as increasing numbers of teachers use VLEs.

Some expected differences between VLE users and non-users did not occur. For example, there was no clear evidence of increased capacity to use online communication and collaboration tools for students using VLEs. Given the number of key similarities between the two groups, both for students and teachers, it appears that although VLEs provide a novel learning environment, even “non-users” are doing a great deal of work online. These evaluation results also suggest that the anticipated outcomes of this pilot program (i.e., the program logic model) likely do not reflect all actual outcomes. Ongoing developmental evaluation of VLE programs would assist in identifying unanticipated outcomes related to VLEs, both positive and negative, and in improving and evolving future VLE offerings.

Although the VLE pilot program is not meeting all expectations for implementation of activities or teacher and student outcomes, overall the program is providing new opportunities for teaching and learning in a digital world. Students using VLEs perceive a greater breadth and currency of classroom resources, and teachers using VLEs are developing innovative means of instruction and assessment. While many students and teachers remain apprehensive about the benefits and barriers of VLEs, findings from both student survey feedback and teacher focus groups suggest that increased exposure to e-learning and VLEs increases both student and teacher
comfort with these technologies, and subsequently increases motivation to engage more deeply with technology.

A summary of student and teacher outcome goals and associated evidence is provided below:

→ VLEs may increase potential modalities for teacher feedback, but many students still prefer paper or in-person feedback
→ Students using VLEs are working differently, using more Internet at home, and have different expectations, such that they are more satisfied with Internet at school, less satisfied with technology at home
→ VLEs provide access to rich resources and “21st century” learning, but not necessarily more relevant resources
→ VLE exposure may not yet be sufficient to increase students’ perceived capacity to use online collaboration and communication tools
→ Perceived autonomy over when assignments are completed predicts student engagement, regardless of VLE user status
→ Access to technology is high for most students, but reliability of technology and Internet access remains problematic
→ Many teachers not yet using VLEs are using other technology in the classroom, but are still unsure about the costs and benefits of VLE implementation
→ Teachers are not receiving professional and technical support necessary for widespread VLE implementation
→ Online communities of learning are an important professional development tool for teachers, regardless of VLE user status
→ Teachers using VLEs are assessing students differently, and also communicating with students differently (both timing and modality of feedback and communication)

LIMITATIONS OF THE REPORT
This evaluation is not based on a random sample of teachers, or students, and the results cannot necessarily be generalized beyond the current sample. This developmental evaluation provides findings related to expected and unexpected student and teacher outcomes, and some information about program implementation. However, this report does not necessarily capture all student and teacher outcomes related to use of VLEs at UGDSB and YRDSB.
RECOMMENDATIONS

- Provide VLEs to students as part of a blended learning environment, maintaining in-person and paper feedback as well as offering online feedback.
- Consider issues of student access to the Internet and associated technology when implementing VLE projects (e.g., have an offline option for students without access).
- Continue improving reliability of access to VLEs by upgrades to both software (i.e., portal stability) and hardware (i.e., wireless and device infrastructure).
- Reduce the barriers to using technology for all teachers:
  - Provide more extensive and formalized professional development and training so that teachers feel digitally literate, preferably during PD days;
  - Increase the amount of technical support available to teachers so that technical problems can be solved quickly in the classroom;
  - Recognize the time required by teachers to integrate technology into the classroom.
- Support increased VLE offerings while remaining sensitive to the needs and preferences of both students and teachers who are less comfortable with technology and online learning.
REFERENCES


APPENDICES

APPENDIX A: PROGRAM LOGIC MODEL

Virtual Learning Environments (VLEs): Teaching and Learning in a Digital World

<table>
<thead>
<tr>
<th>Activities</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>Provide professional development for teachers:</td>
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<tr>
<td>Support for VLEs</td>
<td>Increased ability to use VLEs</td>
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<tr>
<td>Use digital tools for participation in local and global learning</td>
<td>Increased motivation to use VLEs</td>
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<td>communities</td>
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<td></td>
<td>More modalities to access teacher feedback</td>
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<td></td>
<td>Increased personalization of learning (e.g., timing and strategies)</td>
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<td></td>
<td>Increase in perceived relevance of learning materials</td>
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<td></td>
<td>Increased awareness of rich resources</td>
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<td>Improved engagement with learning</td>
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<td>Increased use of rich resources</td>
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<td>Improved instruction</td>
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<td>Increased quality of learning process</td>
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<td></td>
<td>Increased quality of learning products</td>
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| Provide students with VLE opportunities:                                 |                                                                           |
| Teacher support (in-person and online)                                    |                                                                           |
| Any-time access to learning materials                                     |                                                                           |
| Exposure to rich learning environment                                      |                                                                           |
|                                                                            |                                                                           |
|                                                                            |                                                                           |
|                                                                            |                                                                           |
| Provide students with digital literacy training:                          |                                                                           |
| Opportunities for online collaboration                                     |                                                                           |
| Opportunities to explore diverse digital tools                            |                                                                           |
| Information and models for digital citizenship                            |                                                                           |
|                                                                            |                                                                           |
|                                                                            |                                                                           |
| Improved digital citizenship                                               |                                                                           |

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<tr>
<th>Ultimate Goals</th>
<th>Short Term Goals</th>
<th>Long Term Goals</th>
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<tr>
<td>Increased opportunities for student assessment</td>
<td>More effective use of technology</td>
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<td></td>
<td>More effective use of technology</td>
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<td></td>
<td>Improved digital citizenship</td>
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<tr>
<td>Increased use of VLEs in lesson design</td>
<td>Increased quality of learning network (e.g., responsive, inclusive)</td>
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<tr>
<td>Increased quality of learning process</td>
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<td>Improved instruction</td>
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<td>Increased quality of learning products</td>
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<td>Improved digital citizenship</td>
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APPENDIX B: STUDENT SURVEY

Learning Environment Evaluation Survey

Purpose and Benefits of this Research
We are interested in how you feel about the places you learn – both at school and at home.

We are seeking the opinions and experiences of grade 6-12 students who are enrolled in schools from the Upper Grand and York Region District School Boards

Your responses to the following questions will help researchers from the University of Guelph and the Upper Grand and York Region District School Boards evaluate different kinds of learning environments. We will ask you about your learning habits and preferences. By contributing to this research, your feedback will help shape how classrooms look and work in the future.

Nature of the Survey
This survey will take about 20-30 minutes to complete. The survey will include questions about your use of technology and the Internet in your classroom and at home. The survey also contains questions about how you seek feedback and complete your schoolwork

No Anticipated Risks
There are no anticipated risks to you if you choose to complete this survey.

Survey is Voluntary and Anonymous
Your answers are anonymous – there is no way to link your responses back to you once the survey is submitted. The survey is completely voluntary, and you may choose not to answer any question(s) that make you feel uncomfortable.

Any Questions?
If you have any questions about this survey, now or in the future, please ask your teacher or your parent/guardian at any time.

By clicking “next” and entering the survey, you agree that you have read the information provided and would like to participate.

Next
Classroom Matching (for VLE status)
Q1.1 What is your teacher's name?
Q1.2 What is your school's name?

Feedback modality and frequency
Q2.1 Pick the option that best reflects how often you ask for help.

<table>
<thead>
<tr>
<th>How often do you ask for help from teachers?</th>
<th>Never</th>
<th>Less than monthly</th>
<th>Monthly</th>
<th>Weekly</th>
<th>Daily</th>
<th>Few times a day</th>
<th>Hourly</th>
<th>More than hourly</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often do you ask for help from other students?</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</table>

Q2.2 How do you get usually get feedback from your teacher about assignments? Pick all that apply.
- Comments on your paper document
- Comments on your online document
- Comments in person
- Other (please specify) ________________
Q2.3 If you had the choice, what would be your favourite method of getting feedback from your teacher about assignments?
- Comments on your paper document
- Comments on your online document
- Comments in person
- Other (please specify) ____________________

Q2.4 If you had the choice, what would be your least favourite method of getting feedback from your teacher about assignments?
- Comments on your paper document
- Comments on your online document
- Comments in person
- Other (please specify) ____________________

Q2.5 Need to explain your answer? Please do so in the space provided below.
Assignment personalization
Think about where, when, and how you usually complete your school assignments. Use the scales provided to rate how much you agree with the following statements.

<table>
<thead>
<tr>
<th>Q3.1</th>
<th>I get to decide where I work on my school assignments.</th>
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</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q3.2</th>
<th>I get to decide when I work on my school assignments</th>
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</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q3.3</th>
<th>I get to decide how I work on my school assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q3.4</th>
<th>I enjoy working on my school assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>

Q3.5 Need to explain your answer? Please do so in the space provided below.
Internet access
Think about your access to the Internet at home and at school. Use the scales provided to rate how much you agree with the following statements.

Q4.1 I have access to the Internet when I'm at school

Strongly Disagree  Disagree  Somewhat Disagree  Neither Agree nor Disagree  Somewhat Agree  Agree  Strongly Agree

Q4.2 I have access to the Internet when I'm not at school

Strongly Disagree  Disagree  Somewhat Disagree  Neither Agree nor Disagree  Somewhat Agree  Agree  Strongly Agree

Q4.3 I use the Internet to complete school assignments during school hours

Strongly Disagree  Disagree  Somewhat Disagree  Neither Agree nor Disagree  Somewhat Agree  Agree  Strongly Agree

Q4.4 I use the Internet to complete school assignments outside of school hours

Strongly Disagree  Disagree  Somewhat Disagree  Neither Agree nor Disagree  Somewhat Agree  Agree  Strongly Agree

Q4.5 Need to explain your answer? Please do so in the space provided below.
Technology access
Think about your access to technology at school and at home. Use the scales provided to rate how much you agree with the following statements.

Q5.1 I have enough access to technology at school.

Q5.2 I have enough access to technology at home.

Q5.3 Need to explain your answer? Please do so in the space provided below.
Effective Use of Technology

Q6.1 Think about how you use technology at school and at home. Use the scales provided to rate how much you agree with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am good at using technology to communicate with other people.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>I am good at using technology to work with other students.</td>
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<tr>
<td>I am good at using technology to carry out research.</td>
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<td>I am good at using technology to have fun.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>I am good at using technology to learn.</td>
<td>○</td>
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</tbody>
</table>

Q6.2 Need to explain your answer? Please do so in the space provided below.
Classroom resources

Think about your classroom and the resources available to you. Use the scale to rate how much you agree with the following statements.

Q7.1 The resources I use for learning are up-to-date and relevant

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Q7.2 There are a lot of learning resources available to me.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</table>

Q7.3 Need to explain your answer? Please do so in the space provided below.

Q7.4 I see my classroom as 21st century classroom

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</tbody>
</table>

Q8.1 Is there anything else you would like to tell us about your learning environment at home and/or at school?
Demographics

Please tell us a little about yourself.

Q9.1 I am:
☐ female
☐ male
☐ prefer not to answer

Q9.2 My age is:
☐ 10 or under
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ Over 18

Q9.3 I am in grade:
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
APPENDIX C: FOCUS GROUP INTERVIEW GUIDE

1) Greeting/small talk
2) Introduction
   a. Welcome and informed consent
   b. Overview and group rules
      i. No “right answers”
      ii. Focus group methods mean sharing your opinion in a public forum, and you are not expected to share any private information or opinions that you would not wish to be public.
      iii. We as researchers will treat all data as confidential, but we are recording these interviews and please don’t discuss anything you would prefer not be public.
      iv. After the group today, please respect each other’s privacy and don’t talk about what other people disclosed.
3) Introductory question – “What kind of experience have you had with Virtual Learning Environments (VLEs)”?
   a. Grade taught
4) Transition question – “How technology in the classroom and VLEs impact your communication with your community? Local/global?”
   a. Follow up with probes
5) Content questions:
   a. Support
      i. What do you need support with?
      ii. Do you see this as an integral part of your teaching practice?
      iii. What are general barriers/facilitators to implementation (probe)?
      iv. What works & not? What is easy & hard?
   b. Teacher comfort level with technology/virtual spaces.
      i. Perceived skills. Why?
      ii. Motivation to use. Why?
      iii. What impact has this had on other teachers in your school?
      iv. How does this impact collaboration in your classroom and beyond? (motivation)
   c. Lesson design
      i. How do lesson plans differ from past practice? Do you get more or less done? More or less collaboration?
   d. Assessment
      i. How has technology and VLEs changed assessment practices?
      ii. Are you able to gather authentic student data better using the Cloud or other tools?
      iii. Are there other tools you are already using that can do what you are doing in the Cloud?
      iv. Does this tool make inquiry-based learning better (i.e., student voice)?
v. Do students find that their learning is more engaging and authentic?
vi. Does this tool enable you to house an inquiry-based learning environment in your classroom?

6) Ending questions
   a. All things considered, what did you like most and dislike most about VLEs?
   b. Have we missed anything?