TECHNOLOGY & HIGH SCHOOL SUCCESS

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Year One Report

Alberta

Government of Alberta

Technology and High School Success: Year One Report

This document is available on the Internet at:
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Overview

Call for Proposals

The Technology and High School Success (THSS) initiative is a part of Alberta Education's ongoing research into best practices in classroom technology implementation. This two-year project is being carried out in the 2008/2009 and 2009/2010 school years. The project began with a Call for Proposals in July 2007, which called for the applicants to focus on exploring the use of technology to improve student engagement and success in high school. After a competitive process, Alberta Education awarded 24 jurisdictions and charter schools with funding to carry out their proposals. (Table 1)

The THSS initiative involves over 22,000 students and 420 teachers at over 70 schools. The majority of classes involved in this initiative are Grade 9 to 12.

Table 1: Project Jurisdictions

	Jurisdiction
1	Boyle Street Education Centre
2	Calgary Catholic School District
3	Canadian Rockies Regional Division
4	Chinook's Edge School Division
5	Edmonton Catholic Separate School District
6	Edmonton Public School Board
7	Elk Island Catholic Separate Regional Division
8	Fort Vermilion School Division
9	Grande Prairie and District Catholic Schools
10	Grande Prairie Public School District
11	Grande Yellowhead Regional Division
12	Grasslands Regional Division
13	Greater Southern Public Francophone Education Region
14	Greater St. Albert Catholic Regional Division
15	High Prairie School Division
16	Lethbridge School District
17	Livingstone Range School Division
18	Medicine Hat Catholic Separate Regional Division
19	Northern Lights School Division
20	Northland School Division
21	Peace Wapiti School Division
22	Rocky View School Division
23	St. Thomas Aquinas Roman Catholic Separate Regional Division
24	Westwind School Division

Goal and Expected Outcomes

The overall goal of the THSS initiative is to examine the use of technology to improve student engagement and success in high school. The expected outcomes are:

1. An increased understanding of the use of technology to improve student engagement and success;
2. An increased understanding of the use of specific technologies in student success in high school;
3. An increased understanding of issues and considerations that impact the successful implementation of classroom technologies in secondary school environments; and
4. The development of promising practices that can be shared across the education system.

Provincial Research Team

In May 2008, Alberta Education issued a Call for Proposals to Alberta post-secondary institutions to design and conduct research in conjunction with the THSS initiative. The grant was awarded to a team from the University of Alberta, the University of Calgary and the Galileo Educational Network. This provincial research team is evaluating the project from a macro (provincial) perspective.

The researchers are employing a mixed method case study approach to address a number of research questions related to effective uses of technology to improve student engagement and success in high school. Engagement and high school completion are seen as the key components of success.

The major research question addressed is:

What is the relationship between the effective use of technology and student engagement/school success?

Participants

The research conducted in this study includes school jurisdictions situated all around Alberta in a variety of urban and rural settings. Each of these jurisdictions has a unique project with their own jurisdiction goals. The 23 projects involved in this report include students and teachers from Grades 7-12, the majority of which are in high school. Other participants include various jurisdiction personnel involved in the projects, such as district administrators, school-based administrators, team leads and technical support advisors/teams.

Research Methodology

Purpose

Improving high school completion rates is a strategic priority for the Government of Alberta and Alberta Education. Recognizing that completing high school has far-reaching benefits both for individuals and society as a whole, Alberta Education is working with stakeholders to explore innovative strategies to improve high school completion rates. In 2007, a Call for Proposals was issued to all publicly funded

school jurisdictions and charter schools for research-supported proposals that would explore the use of technology to improve student engagement and success in high school.

Objectives

In conjunction with the participating jurisdictions, the goal of this research is to examine the use of technology to improve student engagement and success in high school. As part of this goal, researchers have examined data from various sources. They used data collected by the schools and jurisdictions, such as attendance, course completion rates and retention rates. In addition, researchers also developed measures to determine the amount of engagement and self-directed learning that is occurring within the project.

Aims of Research

The aims of the research are to:

1. Gain an increased understanding of the use of technology to improve student engagement and success;
2. Gain an increased understanding of the use of specific technologies in improving student success in high school;
3. Gain an increased understanding of issues and considerations that impact the successful implementation of classroom technologies in secondary school environments, including but not limited to such issues as technical deployment and support, administrative support, professional development, appropriate pedagogical models, facility requirements, etc.;
4. Make a contribution to the research base regarding the use of instructional technologies including distributed learning for high school completion;
5. Aid in the development of promising practices that can be shared with the educational system;
6. Examine teaching practice (more student-centered instruction);
7. Examine ICT skills (for both teachers and students);
8. Examine parental satisfaction;
9. Examine the individual effectiveness criteria of the 24 individually funded initiatives and how they self-assess the results; and
10. Map the findings to the International Society for Technology in Education's (ISTE) Essential Conditions to successfully leverage technology in schools.[1]

[1] The necessary conditions to effectively leverage technology for learning, as recommended by ISTE, are available online at http://www.iste.org/Content/NavigationMenu/NETS/ForStudents/2007Standards/Conditions/NETS_for_Students_Essential_Conditions.htm

Methodology: Mixed Methods Case Study

For this study, researchers are using a mixed method case study approach. A recognized strength of this research methodology is the combination of quantitative and qualitative data collection and analysis methods with a bounded system.

Given that each of the districts has different goals, objectives, timelines and skill sets, the mixed method case study approach provides a way to establish generalizable themes arising from each particular case context (i.e., demographics, type of technology, subject of study, and so on). The case study is a flexible approach to examining each of the individual projects within its relevant context in order to provide the most comprehensive perspective on the THSS initiative as a whole.

In order to identify the effective practices and approaches that are being used within the projects, researchers are employing a range of quantitative and qualitative data collection techniques. For example, standardized online surveys are being used to measure students' engagement, technology use (student and teacher) and attitudes (student and teacher) regarding the effective use of technology. Additionally, structured classroom observation protocols, interviews, focus groups and surveys are being used to gather quantitative and qualitative data from jurisdictions involved in this study. This array of data is analyzed and triangulated with information that is, or has already been, collected by the schools or jurisdictions (e.g., attendance, retention, grades, and logs).

A participatory evaluation model is employed in which the jurisdictions will partner with the research team to enable data collections across the different participating schools across their jurisdiction.

Using current data related to the successful integration of technology into schools (i.e., ISTE's Essential Conditions and findings from Alberta Education's SuperNet Snapshot Study and the Emerge One-to-One Laptop Learning initiative), the research team has identified and made explicit key indicators that reflect the relationship between technology integration, student engagement and school success. In conjunction with the school jurisdictions, researchers are measuring these key indicators in order to provide an evaluation of the effectiveness and impact of the overall initiative.

To date, students have taken part in an online survey and several focus groups as well as being involved in classroom observations. Teachers have participated in an online survey, focus groups and interviews, as well as in classroom observations. Interviews have been conducted with district administrators, school-based administrators (principals and vice-principals), project team leads and technical teams/advisors. Data collected by the schools and jurisdictions (e.g., attendance, course completion rates, and retention rates) has also been used.

Classroom observation protocols have been developed to determine the amount of engagement and self-directed learning that is currently occurring in this initiative. Using these protocols, researchers indicated the type of technology usage occurring in the classroom, whether technology is being used by

students or teachers, the length of time the technology is used and how on task/engaged students appear to be during the classroom session. Researchers have indicated the level of student engagement that appears to occur as *disengagement*, *ritualistic compliance*, *academic engagement* and *intellectual engagement* (Table 2).

Table 2: Levels of Student Engagement

Level of Engagement	**Observable Behaviour**
Disengagement	Inattention, attending to an alternative activity, off-topic conversation or misbehaviour.
Ritualistic Compliance	Working on assigned activities without enthusiasm or personal investment.
Academic Engagement	On-task behaviours that signal a serious engagement in class work. These include attentiveness, doing the assigned work, and showing enthusiasm for this work by taking initiative to raise questions, contribute to group activities and engage peers.
Intellectual Engagement	An absorbing, creatively energizing focus requiring contemplation, interpretation, understanding, meaning-making and critique which results in a deep, personal commitment to explore and investigate an idea, issue, problem or question for a sustained period of time.

Initial Results

During the course of the data collection activities, researchers have encountered positive responses from the majority of schools visited. There are some exciting innovations taking place in some of the locations, such as the use of interactive whiteboards to enhance the learning experience by encouraging student engagement through interactive games and competitions. As well, students are leading discovery style learning using the interactive whiteboard and effectively teaching their peers.

Differing levels of technological integration are occurring in the various jurisdictions involved in the initiative, with more ritualistic use of technology in many divisions. In those cases, the teachers are the main user of the technology and are employing the technology using traditional methods (i.e., using the interactive whiteboard to display notes which students then copy). A small number of jurisdictions are using technology in innovative, intellectually engaging ways – where students research and create the lessons/materials which they then present to their peers using the interactive whiteboard.

Some students have commented that they have a greater interest in the classes that use technology, as they can learn to "do by doing." Other students have expressed a desire to return to school after initially dropping out because technology helps them to learn and has rekindled their interest in their education. Many teachers report that students are now in charge of their own learning, and as a result, seem more engaged in the process. Some examples of this type of commitment and engagement include students creating and maintaining their own stock portfolios on-line, thus using technology to complete a "real-world" task. In another instance, students used technology to create their own multimedia public service announcements to inform other students of health concerns.

Key Findings

In 2009, the research team conducted 27 observations to evaluate the use of technology in the classroom. Classroom observation data includes documenting the type of technology used in the classroom, who the main user(s) of the technology is/are, the length of time the technology is used/percentage of class time in which the technology is used, the nature of the learning task the students are engaged with and how on task/engaged students are during the classroom session/during the use of technology.

Preliminary analysis of **classroom observation data** reveals the following:

- The most common technology used by both teachers and students was the interactive whiteboard. In 18 of the 27 classroom observations, teachers used presentation applications such as PowerPoint for information and content delivery. Students, on the other hand, were most frequently observed using a browser to conduct Internet searches.

- The typical levels of student engagement[2] observed during the first and second thirds of classroom time are "ritualistic compliance" (an average of 43% of students observed working on assigned activities without enthusiasm or personal investment) and "academic engagement" (an average of 42% of students were attentive, doing assigned work, displayed enthusiasm for work, actively participated). When "intellectual engagement" was observed (i.e., an average of 11 % of students demonstrated a deep personal commitment to exploring and investigating an idea, issue or problem), it usually occurred during the final third of class time.

    - Student engagement was rated on a four-point scale from "passive" to "flow". "Passive" is the type of cognitive investment required for copying notes and recalling information. "Flow" is characterized as the type of work that is absorbing, creatively energizing, and requires thought processes that demand analysis, synthesis, conjecture, reasoned judgment, creation and innovation. In classrooms, researchers documented the level of student engagement by watching and asking students. Additionally, researchers documented the amount of time and the number of students who were engaged at each level from passive to flow levels of cognitive investment.

- The instructional practices observed in 11 of the 27 (40%) classroom observations:

    - Required high levels of *intellectual investment* by students (measured from "passive" to "flow");
    - Had an *instructional style* that was responsive to learning as it emerged; and
    - Had tasks and activities that demonstrated high levels of *authenticity* (had value beyond school in real-world contexts).

Student Survey Results

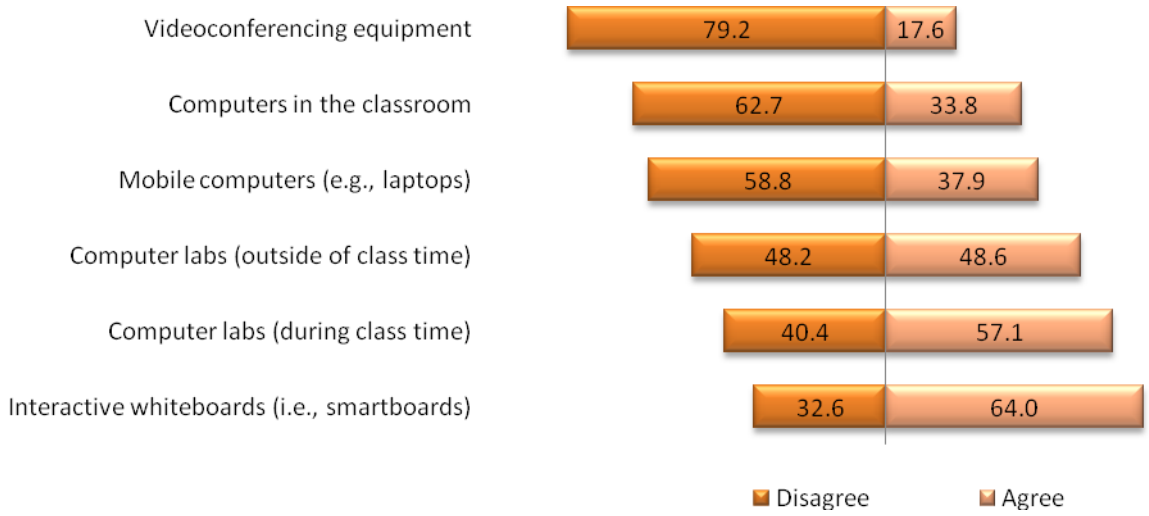
An online student survey was conducted in all jurisdictions with a range of questions encompassing students' perceptions of their experience with technology (frequency of use, main user(s)/teacher or student, access, their opinion of technology use, and level of interest in technology use) and their engagement in the classroom (questions ascertaining students' behavioural and emotional engagement in the four core subjects of Math, Language Arts, Science and Social Studies).

[2] Table 2, page 5

Preliminary analysis of **Student Survey data** (n = 1106 respondents) reveals the following trends:

Figure 1: Student Access to Technology (percentage)

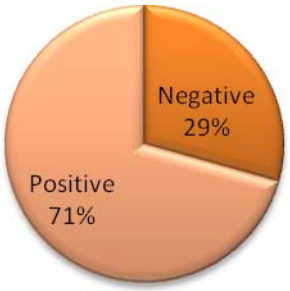
Survey question: Do you feel that you have enough access to the following types of technology?



In only two cases did the majority of students report that they had sufficient access to technology. Sixty-four percent of students reported having sufficient access to interactive whiteboards and 57% reported having sufficient access to computer labs (during class time). L**ess than 50%** reported having access to videoconferencing (17.6%), computers in the classroom (33.8%), laptops (37.9%), or computer labs outside class time (48.6%).

Figure 2: Opinion of Technology Use in the Classroom

Survey question: Overall, what is your opinion of the technology (e.g., watching video online, visiting websites, using computers) used in your classes?

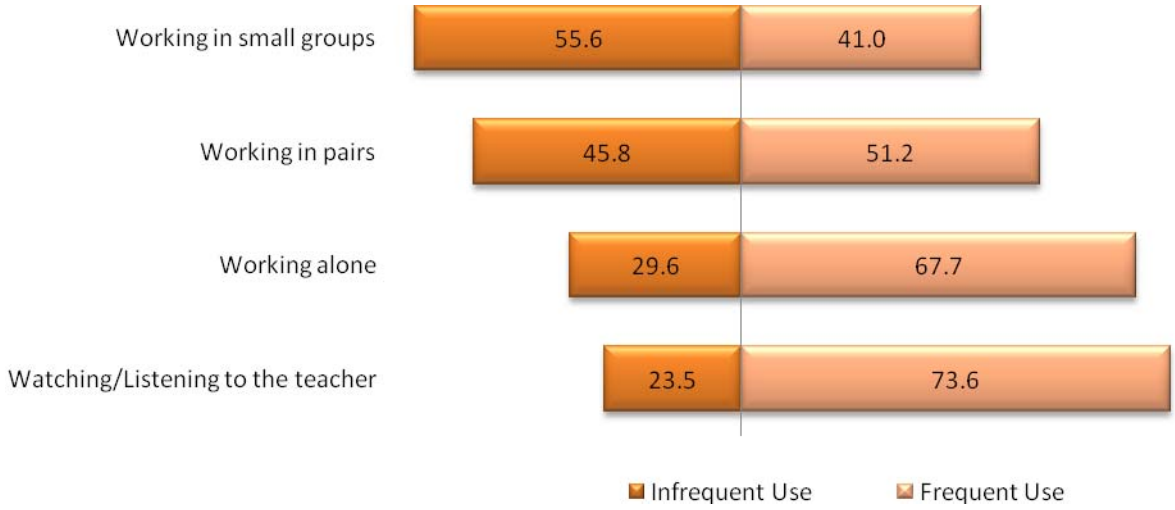


Seventy-one percent of students indicated they have a positive opinion of the technology used in their classes and reported it increased their interest in topics they are studying as well as increased the

amount they are learning about those topics. A five point scale was used in this question. The 'top two' responses; i.e. 'positive' and 'very positive' were combined to create the positive portion of the graph; the 'bottom three' responses; i.e. 'very negative', 'negative' and 'neutral' were combined to create the negative segment. Neutral responses are considered negative as respondents tend to acquiesce on scales of this type; thus a neutral response was interpreted to be a negative response.

Figure 3: Use of Class Time (percentage)

Survey question: When you are using technology in class, how often are you:



The survey required students to respond to questions regarding their use of various types of technology during class time. Many types of technology were listed in the survey, the range covered items as diverse as multimedia content (movies or animations) to virtual field trips to web quests to the use of interactive whiteboards. Students could select options from technology use occurring once a month, to more than once a month to weekly or to daily usage. **Over 65% of the students indicated they spent the majority of their class time working alone; 74% reported spending the majority of their class time listening to or watching the teacher present material to the entire class. Approximately half of the students felt that their access to technology was insufficient.** This preliminary finding is consistent with the classroom observations.

Teacher Survey Results

Teachers in the various jurisdictions were surveyed, with each of the jurisdictions sending an invitation to participating teachers (researchers did not send invitations and thus are only aware of the number of survey respondents and not the number of invitees). The survey included questions on the following topics/areas: knowledge/comfort with online technologies, types of access and equipment available, the use of technology as a delivery mode in teachers' various classes, the teachers' pedagogical

approach(es) and technology's role in that approach, professional development (as relating to technology development and usage), technical support and future instructional technology usage.

Preliminary analysis of **Teacher Survey data** (n = 128 respondents) reveals the following trends:

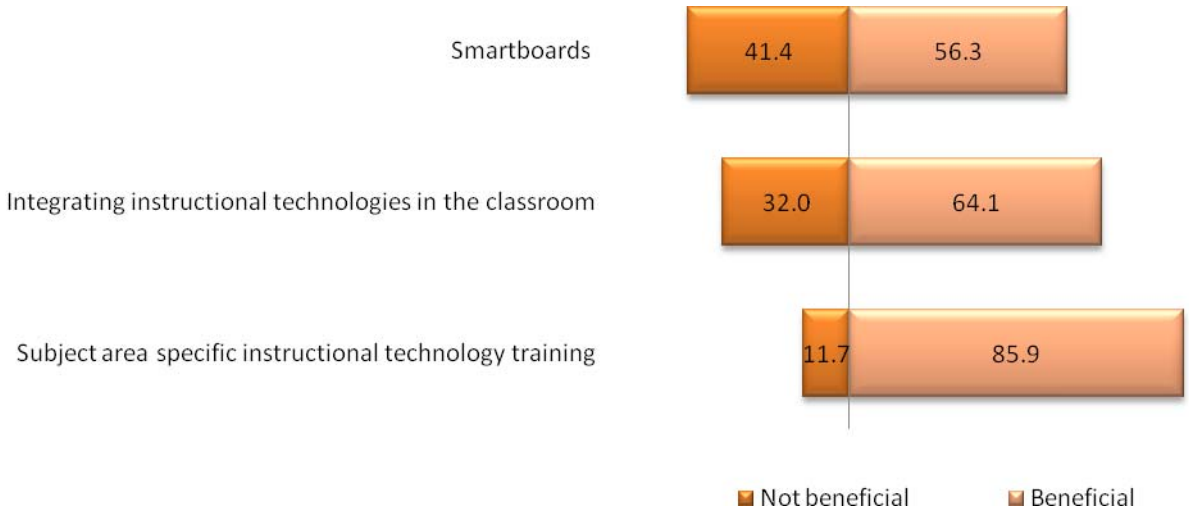
Figure 4: Teacher's Comfort with Technology

Survey question: How comfortable are you using technology for instructional purposes?

Almost 75% of the teachers self-reported that they were comfortable using technology for instructional purposes (self-report indicates comfort with technology, but does not indicate actual usage).

Figure 5: Benefit of Additional Professional Development (percentage)

Survey item: How beneficial do you feel additional training in the following areas would be?

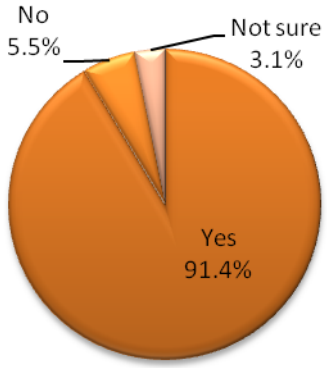


Teachers were asked to indicate the adequacy of their training/professional development to make full use of instructional technology in their classes, how beneficial they felt additional training would be and whether they had had the opportunity to discuss best practices in the use of instructional technology. A majority of teachers indicated additional professional development would be beneficial: (i) in the use of

interactive whiteboards (SmartBoards) (56.3%), (ii) in integrating instructional technologies in the classroom (64.1%) and (iii) within the context of their own subject discipline (85.9%).

Figure 6: Changes to Teaching Strategies

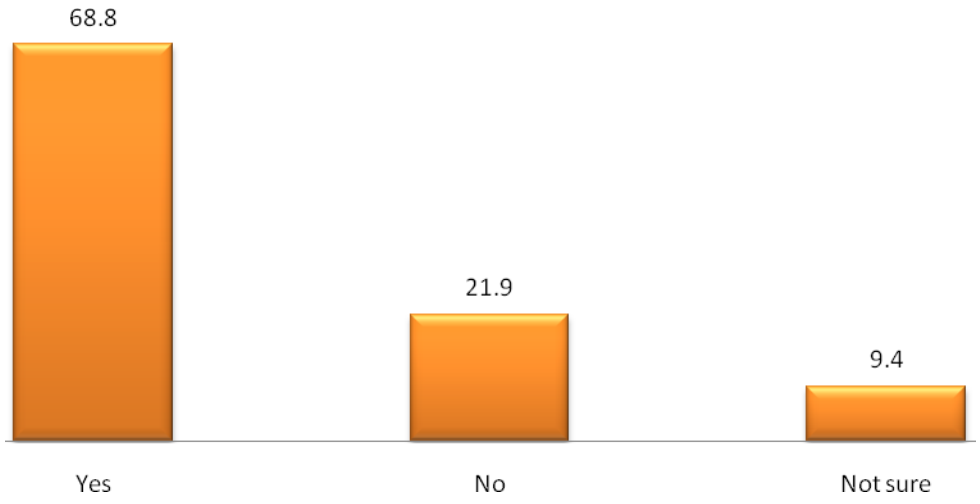
Survey question: Have you made changes to your teaching strategies as a result of access to new instructional technologies?



Ninety-one percent of teachers reported having made changes to their teaching strategies as a result of access to new instructional technologies.

Figure 7: Difficulty Accessing Content at School due to Filtering Methods (percentage)

Survey item: Have you had difficulty accessing online content due to firewalls or other filtering methods?



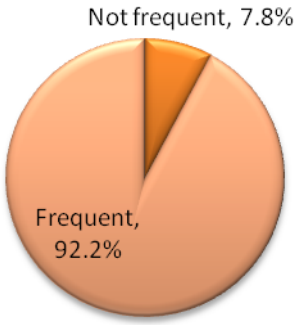
Almost 70% of teachers report experiencing difficulty in accessing online content due to firewalls or other filtering methods. Several school jurisdictions have restrictive firewall policies that blocked access to Web 2.0 applications, like YouTube. Some teachers expressed frustrations over firewalls that

prevented them from accessing instructional materials, or from accessing curriculum resources for human sexuality or religion lessons. In focus groups and interviews, teachers expressed that they would like fewer restrictions on their Internet use.

When asked about the frequency with which teachers used technology for instructional purposes, respondents were provided with a five-point scale from "not at all frequently" to "very frequently." The technique of combining the 'top two' and 'bottom three' responses was used to generate a visual depiction of the data (see figure 8).

Figure 8: Use of Technology for Instructional Purposes

Survey question: How often do you use technology for instructional purposes?



On the teacher survey, the use of technology for instructional purposes was defined in numerous ways. These included:

- As part of a teacher-led lesson:
- Individual student activities with technology;
- As part of a group activity in class;
- To find teaching resources;
- As part of a guided student activity in class;
- As part of inquiry-based learning activities;
- As part of a homework assignment;
- For student knowledge building;
- For student knowledge publishing (online dissemination); and
- For connecting with subject matter experts.

Almost 90% of teachers reported using instructional technology as part of a teacher-led lesson or to find teaching resources. **Teachers indicated that collaborative endeavors are rare**, such as connecting with outside subject matter experts (25.8% indicated they had done this) or the use of online publishing (22.7%).

Results from Classroom Observations and Student Focus Groups

Research suggests that student engagement in the learning process can be gauged in a variety of ways. These include the enjoyment/interest the student feels when pursuing academic work, their motivation for attempting to achieve good marks, the usefulness students perceive the material to have to their lives/future, and the amount of time students spend on task/quality of the on task time, to name but a few. Via the online survey, approximately 62% of students indicated that the use of educational technology increased their interest in the topics they were studying. In Math and Language Arts, over 50% of students reported they try to do their best because they want a good mark. However, only 28% or less reported they try to do their best because they enjoy what they are learning or enjoy class so much that they lose track of time. Similar results have been found in Science and Social Studies.

Preliminary data analysis indicates that students spend the majority of their time in class on low challenge, low-level thinking assignments and tasks, such as filling in worksheets, answering questions at the end of a chapter and recognizing rules. The majority of time in class is spent working alone or in listening to or watching the teacher present material to the entire class using technology. Approximately 28% of students in Math and Language Arts report feeling that the subject material is meaningful, while approximately 38% feel that Science and Social Studies have some relevance to them.

The data collected from both the classroom observation protocol and the student focus groups indicates that overall, students seem satisfied with technology integration in their classrooms. Students are generally enthusiastic about the use of educational technology in their classes. It is apparent from the classroom observations that students are more actively engaged when they are allowed to use the technology themselves, as opposed to watching the teacher use it. In some of the schools visited, students indicated that their interaction with technology was quite limited, and that they doubted it could actually increase their interest in academics or their motivation to complete school. Some students have reported that they have returned to school, after dropping out, due to the use of technology in the classroom. These particular students feel more interested in and involved with their education as a result of technology use. Overall, students report feeling more enthusiastic about those classes that use technology and express a desire for other classes not using technology to follow suit.

Finally, like the teachers, students expressed a desire for more technology (more personal use of devices such as laptops, more unrestricted, unlimited access and more time available) in the classroom. Students reported that technology has been an engaging addition to the classroom, in particular interactive whiteboards and many of the interactive programs and games that can be accessed through them.

Some sample student quotes:

"I'm more interested in the classes that use technology, because I can learn to do by doing."

"I dropped out of school because I just didn't learn the ways things were taught in school. I came back because now that they are using technology, I can learn better."

"I love using the laptop because it makes my work much easier – it's way easier to be creative and to express what I am trying to say. It's way more fun than just making a poster."

"The biggest benefit of technology is that it makes our learning faster, easier and more fun."

"I like the interactive whiteboard because it makes things more interesting."

"I like the technology because I can work on my own and figure things out in my own way."

Results from Interviews and Focus Groups with School Personnel

Teachers

Teachers have begun to embrace the new technologies in their classrooms. Using new devices like interactive whiteboards has enriched the experience of many teachers in this study who cited increased engagement in both themselves and their students. The most commonly reported challenge with new technologies in the classroom was adequate professional development time and prioritization of lesson plan creation.

Generally, teachers in the various jurisdictions appeared to be satisfied with technology integration in their classes but felt that more professional development, specific to the use of new technologies, was essential. Many teachers felt that the use of technology has transformed the class, increasing both attendance and engagement, but that they had not yet learned to use the technology nor to plan lessons accordingly. Teachers were generally enthusiastic about the new types of learning provided for their students, and commented that the use of technology encourages at-risk students to stay in school.

Many teachers reported an increase in student interest and interactivity with the lesson material when technology was used in the classroom. Teachers are generally enthusiastic about recent technology

projects and have indicated they have seen increased levels of student engagement. Teachers report that students pay more attention and complete more of the work in class if it is done using interactive technology.

Teachers feel that additional professional development would be beneficial. Many teachers feel they have inadequate skill levels to work with the various technological tools, whether computers, interactive whiteboards or software. Teachers also have concerns about technical support and having adequate time for preparing for technology- rich instruction. They have also expressed a desire to know how to integrate the technological tools – how to create lessons /projects in their subject area that use technology in a substantive manner.

Teachers indicated that it is very important for students to have individual access to laptops, as it was generally felt that students like to work on computers and are more productive when working on a computer, as opposed to pencil and paper. However, less than 20% of teachers surveyed agree that students have adequate access. Also, teachers expressed that it was somewhat to very difficult to schedule ad hoc (outside a lab setting – laptops, mobile computer stations) computing resources for their classes. There is also a concern over adequate access to instructional technology, with only 58% of teachers feeling they have adequate access. There is a perceived lack of equipment, lack of available time and blocked access (either through availability or filtering methods) to materials and resources.

Generally, teachers have embraced technology, but indicate that this is only the first stage in a technology implementation process. It was generally felt that the provision of technological resources/tools was the first step, that adequate teacher training with the resources was a necessary concurrent step, while the integration of the tools into both the curriculum and the lessons was a final step. Teachers would like to see more resources allocated for students, such as personal laptops for each student as well as unlimited access to online materials, more professional development time, more time allocated for pedagogical and curriculum development, and an overall commitment to implementing and using technology in all classes.

Jurisdiction Administrators

Jurisdiction administrators generally felt that it was essential for technology to be integrated into the classroom, as most students seem to prefer to learn in this way, and it may be a means of ensuring they stay interested in and complete school. Professional development, teacher training, and sharing of resources were viewed as crucial to making the integration of educational technology a success. Furthermore, it was stated that administration, both at the jurisdiction and school level, have to be firmly behind the decision and offer unstinting support, or the initiative will fail.

School-based Administration

Generally, principals and vice-principals felt that technology has to be integrated evenly across the curriculum/subjects for it to be effective in keeping kids in school and, correctly or incorrectly, many observed that teachers' skill levels are a significant constraint hampering a comprehensive integration. Staff turnover was also listed as an impediment to integration. Administrators felt there had been a pedagogy shift that not everyone had yet caught up with and that the need for leadership that was supportive of the technology initiative was paramount.

Project Team Leads

Project team leads were generally very enthusiastic about the projects underway in their schools. They felt that technology attracts the students to the classrooms, as evidenced by a rise in attendance in those classes in which educational technology was used. Meaningful professional development and consistent technology support has to become a priority for continued success, as some teachers still report feeling overwhelmed by having to integrate technology into their classroom. Team leads felt that only as more time is devoted to technology integration will teachers be able to come to grips with the demands of implementing technology, and that everyone has to be on board for implementation to be successful – parents, teachers, students and administrators alike.

Technical Teams/Advisors

Generally, technical team members/advisors felt that students do not have adequate access to technology and teachers do not have adequate training in the technology for implementation to be successful. It was felt that a digital citizenship course is necessary for teachers to effectively manage their students when they are using technology and that since teachers' skill level varies, a great deal of hands on training has been required. Ongoing training related to the implementation of technology is essential, because students expect to use technology in the classroom.

Some sample school personnel quotes:

"The emphasis is now on students guiding their own learning, problem solving, and thinking critically."

"I see students learning and doing as they would in the real world. I see them using technology in knowledge acquisition, knowledge application and right through their final analysis and evaluation."

"We've gone from struggling to get students to use the computers to struggling to get students off the computers."

"The relationship between the teacher and the student is becoming more one of equals. It is a partnership where they are learning together."

"We're committed to providing as much valid content to students as we can, in their preferred learning style."

"Teachers need to work with students to help them find the information, not just give it to them."

"Students notice when a teacher is actively involved in bettering themselves and their teaching."

"A classroom isn't something that happens just within four walls. We live in the 21st century and borders and physical location are not factors that have to confine learning."

Conclusion/Emerging Trends

Though it is too early to make any firm conclusions based on this preliminary data, there are some emerging trends. One is that although technology is increasingly being used in classrooms, generally speaking, it is still not being used consistently to its fullest potential to facilitate intellectual investment by students.

While teachers seem to recognize the potential that technology has for the learning environment, there are still a number of barriers that restrict effective and appropriate technology utilization. These include school vision, competing priorities, access, and training/professional development being the biggest. Schools and jurisdictions that have formal or stated expectations of technology integration seem to be more likely to actually see technology used in the classroom. Teachers repeatedly expressed a desire to receive guidance, from their leaders, in prioritizing the tasks and obligations required in a successful technological implementation. Access to computers and various technological innovations is frequently blocked due to filtering methods or materials are in such short supply that there are simply not enough to provide for each student (i.e., laptops). Further, teachers feel they could benefit from additional professional development in the use of technological tools and resources.

As these barriers are removed, and administrators and teachers gain more experience with appropriate technology use, it is possible that integration (a goal of a number of the jurisdictions) will become a more seamless component of instruction. The participating schools in the jurisdictions are, however, not there yet.

Recommendations

1. Students should be provided with opportunities to engage more and to become more active participants in their own learning processes. Students have indicated that they feel under challenged and that they could do more learning with technology. Provide opportunities for students to engage in more self-directed learning. An important part of this, however, is to ensure that the transition from teacher-directed to student-directed learning is scaffolded in a manner that allows for an increasing amount of self-direction as students develop greater capacity for it.
2. Teachers should be encouraged to create pedagogically appropriate, curriculum focused lessons/projects that demonstrate both the effective use and the integration of technology. Most teachers indicated they are using technology; however, most are still not using it to its fullest capacity. Support and training should be provided to help them to bridge the gap between simply having the technology to using it effectively and appropriately. This is crucial in order to realize the true impact of technology in the classroom.
3. A focus should be placed on leadership and creating a shared vision in the school that includes technology integration. Without the ongoing support of principals, vice-principals and superintendents, integration is not likely to occur. With each level of leadership lending its active support to the initiative, it has a much higher likelihood of success.
4. Make sure that teachers are supported, competent and comfortable with technology integration. Having the technology is not enough; ongoing training, support and resources are also required.
5. Continue to advocate for meaningful and appropriate integration of technology into learning and into every classroom.
6. Recognize and reward innovative teachers and schools who experiment and use the technology in meaningful and appropriate ways. To create change, experimentation, and not just success, should be rewarded.