A Discussion of Technology Initiatives set forth by the Prince Edward Island Department of Education

A paper submitted to Dr. G. Hache

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Introduction

In Canadian society most citizens have had many teachers throughout the years, thus making education a highly visible profession. With such exposure, Canadians have created their own attitudes of what teaching is. Even among educators that attitude can be formulated on the belief that "teaching is basically common sense" or that its execution is "more of an art than a science." These attitudes are deceptive and deny teaching its true nature; which is one of a multi-disciplinary, multi-structural practice that requires its professionals to plan and manage their knowledge, their resources, their focus, in the realm of a task-oriented environment whose task execution is done in an accurate and timely manner.

Unlike the world of business, the education profession is often overlooked when conjuring images of a highly task-oriented profession, as the one described above. In such a work environment, technology has been implemented as a means of task execution since the dawning of the Industrial Revolution. Over the past decades, computer technology has been integrated into business organizations as ***the*** means to complete tasks. This dependency is so profound and to such a degree that the very essence of many professions has been permanently altered. What was once accepted as the "job description" has now been updated, and what was once a competitive advantage is now the expected. Thus exemplifying once again that "society shapes technology as much as technology shapes society." (Pool, 1999)

Technology's breadth has not left education untouched. Due to the task oriented nature of teaching and the usefulness of technology in task completion, the expectation on the education system has changed at all levels, not only for educators themselves but for their preparation of future generations. Technology is firmly entrenched in the culture of education. As a

consequence, a broad spectrum of educators the world over have dedicated their resources to the issues and the trends that have arisen from the introduction of educational computing into the learning experience. This spectrum includes; learning theorists, scholars, teachers, administrators, educational hardware and software companies, and trainers. In Canada's public education system, the influences of all these parties must be assessed, critiqued, filtered and sorted before reaching the classroom. A large part of the process of linking students to the greater education community and creating expectations from teachers is facilitated by a province's Department of Education. In fact it is the provincial initiatives carried out by a department which often have the most significant impact on a child in the classroom in both curriculum and technology exposure.

Provincial Initiatives in Technology

Many arguments can be made, and research can be cited, to justify the use of technology in the classroom and through all the debate and discussion educators try to remain focussed in the idea that "The real purpose of technology in education is education." (Anderson, 1996, p.9) Education departments attempt to maintain a focus by developing visions, plans and goals to define how they see technology being used in the education experience. "The strategic use of technology starts with a vision about the schoolwide learning goals and standards necessary to prepare today's students for tomorrow's world." (McNabb, Valdez, Nowakowski, & Hawkes, 1999, p. 7)

Within the Prince Edward Island Department of Education's philosophy of education the organization lists enabling students to understand the applications of technology in society as one of its goals. In a rapidly changing society, the Department sees schools as having a particular role to play in preparing individuals to deal with the future and with change. With technology explicitly mentioned in its philosophy of education, how does the Department see itself meeting societal

technological expectations?

One means to address this question is for education departments to create a technology plan to induce an active role in technology planning. “The purpose of technology planning is not just to produce a document, but to produce continuous action that creates and maintains a technology-rich educational environment.” (Anderson, 1996, p.9) However the PEI Department of Education does not seem to have a technology plan to address the issues they highlight in their own philosophy. In their need to keep pace with societal expectations, provincial departments often scramble when dealing with technology and often lack a clear plan as to how they will reach their own objectives. The subject of this paper is not technology planning per se, however as teachers on PEI the authors could not locate a technology plan to give us insight as to the various technology initiatives our province has recently undertaken. Since the topic of this paper is provincial technology initiatives and the issues and trends that have arisen, the authors will not be relying on a technology plan but instead on personal experience gained through curriculum development and carrying out daily duties. In presenting provincial initiatives that support the ongoing trend of having computers integrated into all aspects of the classroom we will examine the implications on curriculum, teacher tasks, and professional development.

Initiatives in Curriculum Development

With research that indicates that technology can enhance student achievement, many schools and districts feel they’ve derived the solution to some of their educational challenges. There is strong evidence that integrating technology into the curriculum will promote higher-order thinking skills, student engagement, and facilitate a more inquiry-based teaching and learning style. “Using technology to engage students in learning introduces a new dynamic into the

relationship between teachers and students. Instruction becomes more individualized. In the best uses of technology, the teacher's role changes from delivering traditional chalk-talk-textbook instruction to coaching, monitoring, and verifying student achievement of learning goals." (McNabb, 1999, p.47) In this paper, we will focus on the use of Vex robotics and Pasco probeware in supporting high school science curricula.

Initiatives in Teacher Tasks

The aspects of teacher tasks that encompass the teaching profession can be separated into many groups. For the purpose of this paper, teacher tasks linked to provincial technology initiatives will include attendance and records using Students Achieve.

Initiatives in Professional Development

Technology is changing how classroom lessons are being prepared and how teachers plan to meet curriculum outcomes while meeting the wide range of learning styles of their students. However, what is required to maintain this new teaching style is a new style of professional development (PD). The traditional approach to PD is one where teachers sit and listen to experts discuss best-practices or new insights into student learning styles. These sessions tend to be one-time-only workshops that have little success in teachers retaining the information, let alone integrating it into their classrooms. If this style of PD has little success with "traditional" topics, it will even less success with the ever-changing world of technology. For PD to succeed, "a well-planned, ongoing professional development program that is tied to the school's curriculum goals, designed with built-in evaluation, and sustained by adequate financial and staff support is essential if teachers are to use technology appropriately to promote learning for all students in the classroom." (Rodriguez, 2000) By recognizing technology, departments now must rethink the

way they approach and deliver professional development. In this paper a provincial initiative will be examined as to how departments are addressing this PD challenge in supporting communities of practice and creating knowledge management systems using Atutor.

Initiatives in Curriculum Development

Background

This section of the paper will explore two new provincial initiatives that integrate new technology for curricula delivery. These new trends are the introduction of data logging equipment into the high school science curricula and the development of a new applied science high school course centred on robotics technology.

For the past two years, Three Oaks Senior High (TOSH) has been participating in a design-based research study with the University of Prince Edward Island. TOSH acted as a pilot school for the integration of data-logging technology into the high school science (Sci 421, Physics, Biology, Chemistry) curricula. Early pilot results seem to indicate that these devices have improved critical thinking, student engagement and inquiry-based thinking. As a result of this emerging trend, the Department of Education has procured data logging equipment for each of the ten high schools within Prince Edward Island. Science teachers at Three Oaks continue to lead in developing new experiments and activities that allow students to use the Pasco GLX Xplorer (http://www.pasco.com) data-logging equipment (see Figures 1.1 and 1.2) in creating and exploring authentic learning experiences.

In September 2008, the P.E.I. Department of Education formed a committee to author and develop a curriculum for a new science course to be offered in February 2009. Applied Science

701A is a physical science course that develops student scientific and technological knowledge and skills through the use of technology and robotics design and construction. The course is a balance of theory, design and experimental activities that uses the process of inquiry, problem solving and decision making. The focal technology used in this course is the VEX (http://www.vexrobotics.com) robotics design system (see Figure 1.3).

Figure 1.1 Pasco GLX Xplorer

Figure 1.2 Pasco Motion Sensor

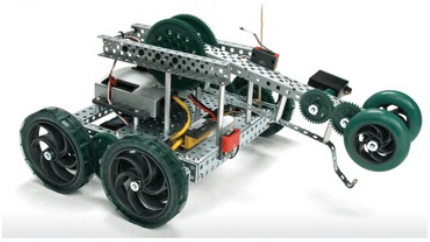

Figure 1.3 VEX Robotics Design System

Intended Users

Since these provincial initiatives relate to the integration of new technologies for curriculum delivery, the main intended users are the students. Outlined below are general curriculum outcomes and learning objectives pertaining to high school science courses and details on how the new provincial initiatives will affect their delivery.

Grade 10 and 11 Applied Science 701A

This course has 4 modules containing project based units that have students working in teams to: learn science and engineering concepts, visualize and create a digital prototype using computer

software, assemble a working robot, and conduct in-class challenges which require an engineering notebook and class presentations. Much of the work completed in this course is team based. Students will be using the VEX robotics technology as the basis for their design and build projects.

Grade 10 Science 421

The provincial initiative of introducing data loggers in high school science courses begins in grade 10 with students being introduced to the Pasco GLX Xplorer (see Figure 1.1). This handheld device is a stand-alone data logger that can capture, analyse, store and print data without being connected to a computer. The GLX motion sensor (see Figure 1.2) will allow students to determine the position, velocity and/or acceleration of any object that is moving in front of the sensor. The graphing feature of the GLX will allow students to have a real-time visual representation of the motion of the object.

Grade 11 Physics 521

The provincial curriculum guide states that the focus and context of the grade 11 course is as follows: The aim is for students to develop scientific literacy through the processes of inquiry, problem solving and decision making. To develop scientific literacy, students require diverse learning experiences that provide opportunities to explore, analyse, evaluate, synthesize, appreciate, and understand the interrelationships among science, technology, society, and the environment.

The purpose of integrating the GLX into the grade 11 curriculum is to encourage students to begin to use technology for comprehension, application and analysis. By engaging students in higher levels of Bloom's Taxonomy they will be able to build on their prior knowledge to have a

more meaningful understanding of the underlying physics concept. Using a variety of probes and sensors, students will collect data and then use this data for analysis, comparison and contrast, demonstration, questioning, deduction and examination.

Grade 12 Physics 621

The provincial curriculum guide states that the focus and context of the grade 12 course is as follows: Students should relate their study of mechanics to everyday occurrences. They should come to understand that the engineered world in which we live is built on the principals of classical physics. Activities and investigations of everyday events that are generated by class discussion should be encouraged. Students should have many opportunities to express their understanding of physics concepts, both verbally and in writing.

The purpose of integrating the GLX into the grade 12 physics curriculum is again to promote and encourage higher-order activities. Students will be engaged in critical thinking processes that will explore the highest levels of Bloom's Taxonomy; evaluation and synthesis. Students will be able to articulate their mastery of the concept by predicting outcomes and developing means to test their hypothesis. Many of the concepts in the grade 12 curriculum are extensions of the grade 11 curriculum. Therefore, through the implementation of this major technology intervention, students will be able to put together familiar concepts in a new or different way in order to determine its worth or value. The Province envisions this process taking place in the form of a major project where students will use data logging technology to design and carry out an experiment that they have created from scratch to prove/disprove a physics concept.

Positive or Negative Issues in Stipulating Technological Initiatives in Curriculum

As with many new technological trends, one of the prohibitive factors is cost. High schools on

P.E.I. vary in size, budget, and available resources. To create a level playing field, the Province has procured the same amount of Pasco and Vex hardware for each of the ten high schools, regardless of their size. Of course, each individual school may supplement the hardware provided by the Province but each school will have the same starting materials. However, there has been no provincial protocol regarding training, parts, maintenance or replacement of hardware or software components. This lack of continued service may lead to future equipment failure and disuse. Furthermore, adequate funding must be provided by the Province for Professional Development, in-services, and opportunities for teachers to share best-practices. The success of these provincial curricular initiatives depend on continued support and not simply a one-time infusion of technology into the classroom.

Since the introduction of the Pasco data-loggers and VEX robotics systems, student engagement in these courses has, on a whole, increased. Students at Three Oaks, and other Island high schools, have been participating in confidential on-line surveys before and after using the new data-logging equipment. The purpose of the survey is to help teachers assess the ways these technologies affect learning and attitudes in both boys and girls. One main question raised is can data logging integration help reduce potential gender gaps? Some initial findings seem to indicate that female students are more anxious and uncomfortable when first introduced to this new hardware. However, survey results seem to indicate that student attitude and familiarity seem to increase with exposure. Further research and exploration of this type of teaching device may help create a more level playing field for all students within our classroom.

Initiatives in Teacher Tasks

Background

"Prince Edward Island schools have new computer software to monitor student progress, keep parents informed and improve student achievement."(News Release,2006) StudentsAchieve is "an online collaboration system for students, parents, teachers, and administrators that allows K-12 students to maximize their learning." (Students Achieve, 2002) Educators can "provide real time communication between all educational stakeholders, enabling collaboration ...through an internet-enabled database driven software application." (Product Overview, 2002) The idea is to provide the right information to the people that need it in order to improve the educational experience for all stakeholders. "The relevant classroom data includes upcoming homework, test scores, attendance and daily behavior. By flagging problem areas such as incomplete assignments, parents and students can quickly identify areas that require improvement and address them." (Involvement, 2002)

"We (The PEI Department of Education) have initiatives in place at the school level that are dramatically improving communication with parents." (PEI Assembly, 2008) "Over the next three years, the program will be phased in at all (PEI)schools, beginning with high schools." (News Release,2006) "All schools will soon have access to the full suite of StudentsAchieve products, following the signing of a $200,000 agreement this week (October 18, 2006) by the Department of Education and StudentsAchieve, a Canadian company based in Alberta." (News Release,2006) "The Home and School Federation encourages teachers to use the technology because it is extremely helpful to parents in supporting their children's learning," (News Release,2006)

Intended Users

Educators

Teachers are at the grass roots level of users when it comes to StudentsAchieve; they are responsible for the majority of communication and data input; such as attendance and grades. The online application allows teachers to maintain attendance and comment on student behavior using simple drop down menus (see Figures 1.4 and 1.5).

Figure 1.4 Student Attendance

Figure 1.5 Student Behavior

This information can also be uploaded into other school administration software such as Trevlac.(http://www.trevlac.com/) Teachers can customize or collaborate with each other to maintain consistency within course work, lesson delivery, and evaluation. "StudentsAchieve will bring more consistency to reporting and assessment practices across the jurisdiction." (Parkland, n.d.) StudentsAchieve has the ability to weight evaluation methods (see Figure 1.6) or individual assignments in order to stress areas deemed important for the subject area.

#			Folder Name	Type	Weight	Rel	Abs	Cntx	-
1	☐	✎	Tests	Lessons/Marks Folder	35	35.0%	35.00%	1.1	↓
2	☐	✎	Presentations	Lessons/Marks Folder	10	10.0%	10.00%	1.2	↑ ↓
3	☐	✎	Assignments	Lessons/Marks Folder	25	25.0%	25.00%	1.3	↑ ↓
4	☐	✎	Classmarks	Lessons/Marks Folder	5	5.0%	5.00%	1.4	↑ ↓
5	☐	✎	Year End – Project	Lessons/Marks Folder	10	10.0%	10.00%	1.5	↑ ↓
6	☐	✎	Final Exam	Lessons/Marks Folder	15	15.0%	15.00%	1.6	↑

Figure 1.6 Evaluation Weighting

Teachers can notify parents and students of future assignments by preparing their online

gradebook. By entering the assignment titles in the gradebook with due dates, StudentsAchieve provides a calendar of upcoming evaluations to each student and their parents. The software can also provide reports to inform teachers of areas of concern, such as 'students at risk' (see Figure 1.7) These features combined with the application's ability to send mass email allows teachers to communicate effectively with a simple mouse click.

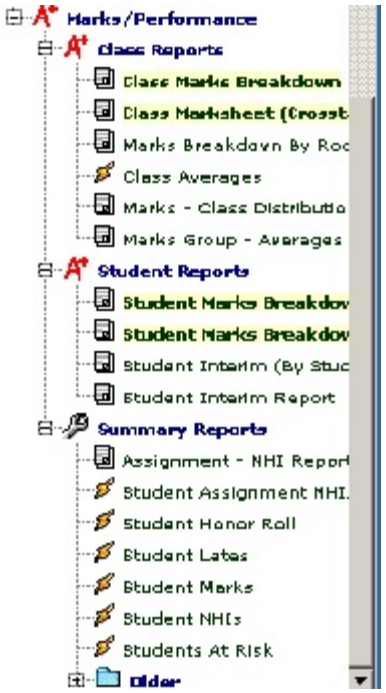

Figure 1.7 Reports

Parents/Students

"As technology creeps more and more into classrooms, keeping track of students' grades and homework by computer is just another tool for parents." (Alphonso, 2003) "They know their child's attendance records and they have open channels of communication with the child's teachers." (PEI Assembly, 2008) Parents can log on to StudentsAchieve and find the answer to the traditional suppertime question, 'How was school today?' which at the very least will open dialogues between parents and their children. The software is simple to use for parents and

students, and the information it provides is accessible on any computer with internet access which will help bridge the gap between school and home. “When parents come in for a parent teacher interview, they have much more knowledge about how their child is doing,” (Tomek, 2005) which is comforting for parents and teachers alike.

Positive or Negative Issues in Computerizing Teaching Tasks

Technology has changed parental interaction from periodic updates at parent teacher nights to the ability to update parents about attendance, behavior, and performance daily though the World Wide Web and software like StudentsAchieve.“By far, the most valuable and important time commitment in a course was the time actually spent in the classroom. That time was the most important determinant of student success and each unit of time in the class itself provided, among all the class related activities, the greatest improvement in student performance.” (Schiming, 2009) Now that parents can be updated automatically about their child’s attendance and follow-up on concerns it is expected that attendance will improve and with it so will student performance.

“Research over the last decade has consistently shown that all children achieve more highly when their parents talk to them about their experience of school and learning.” (Becta, 2008) In May, 2008 PEI Education Minister Gerard Greenan told the Legislative Assembly that “We all have much to gain when parents are involved in their children’s learning and school life. When a child feels that his parents are interested in his learning, he feels that learning is important. When a child sees her parents interacting with her teacher she is more confident about her learning. When the teacher feels the parents’support the teacher is more confident about helping the child reach

their full potential."(PEI Assembly, 2008)

It is the human factors that may be most concerning when a system like StudentsAchieve is introduced to a traditional institution like education. While parental involvement in education has many positive implications it is not without concerns when information technology makes it so consistently intrusive. "With parents constantly looking over their shoulders, it may be hard for young people to develop a sense of accountability. Instead, it shifts the onus of remembering schoolwork from the student to the parents, critics say." (Alphonso, 2003) Are the social implications that StudentsAchieve may be yet one more contribution to a generation of irresponsible and dependent young adults upon graduation?

Other concerns exist because "Sometimes a parent may perceive a child as underachieving, and access to each and every mark at any given time may only strengthen that perception." (Alphonso, 2003) The impact on the relationship between parent and child may actually close communications and add resentment. As well, parents that have the option of being involved in the daily educational life of their children and chose not to may give their children the perception that they are too busy or that their education is not important. The trend is definitely moving to almost real time progress reporting in education but "not all parents check the web log or have easy Internet access, the system will not replace regular progress reports." (Tomek, 2005) At least not in the near future.

Teachers are not without their own concerns. "Some teachers had reservations about instant access to grades. They were concerned that parents would expect scores to be available right after a test was taken, or if an error was made, the grade posted would be assumed to be final before it could be corrected." (Tomek, 2005) Teachers may also be concerned about the definitive

calculation of a passing or failing grade by a computer that calculates data based on subjective data so objectively. If a hard working student's grade is calculated on StudentsAchieve as a 49%, is it appropriate or professionally ethical to change the grade to a 50% after it has been accessed by the student or parent. What does this practice do to the integrity of the teaching profession, public education, and evaluation?

Initiatives in Professional Development

Background

With advances in education in both technology and curriculum changes professional development (PD) has become essential in providing educators the means to become informed with all that is new. Unfortunately cost and time constraints have impeded many educators from acquiring the necessary PD. To combat this situation, many departments are searching for alternative ways to provide educators in their employment access to both explicit and tacit knowledge apart from that of traditional professional development. One such way is to provide their teachers with access to online knowledge management systems.

The concept of Knowledge Management (KM) plays a pinnacle role in the educational environment at all levels which include, and not limited to, the classroom, school, district, and province. Although many aspects of knowledge management may appear distant to educators, the primary goal and pervasive theme of all components of knowledge management is essentially to have positive impact on student engagement and student learning, as well as professional development.

Susan A. Santo, in an article titled *Knowledge Management: An imperative for schools*

of education, describes what she terms the Information Technological Perspective (ITP) to knowledge management. ITP is ideal for explicit knowledge management in an educational environment. This perspective uses technology for knowledge generation, knowledge codification/capturing, and knowledge transfer. A variety of learning content management systems (LCMS) are increasingly available to facilitate collaboration. One such open source web-based LCMS software is Atutor.

In an initiative to provide its teachers with online professional development, the Prince Edward Island Department of Education has recently implemented Atutor. Teachers from across Prince Edward Island have accessability to this program, using it for both professional development provincially wide, or as a classroom teaching tool.

> "Atutor is an Open Source Web-based Learning Content Management System (LCMS) designed with accessibility and adaptability in mind. Administrators can install or update Atutor in minutes, develop custom themes to give Atutor a new look, and easily extend its functionality with feature modules. Educators can quickly assemble, package, and redistribute Web-based instructional content, easily import prepackaged content, and conduct their courses online. Students learn in an adaptive learning environment." (www.atutor.ca/atutor)

Intended Users

Since Atutor is an open source web-based learning content management system, it has a very versatile range of use within an educational community. School boards can use Atutor for professional development among educators of specific subjects, districts or even schools, without the worry of costly transportation expenses. Individual schools are also able to set up Atutor

modules to meet the needs of their specific school and teacher development. As well, individual educators wishing to share tacit and explicit knowledge can easily create their own Atutor module set up specifically to support their teaching area, inviting other educators teaching similar subjects to join in an online learning community.

Atutor can also be used by teachers to set up an online learning community within their individual classroom. Students can use this software to express ideas, work on projects, and chat in a teacher monitored chat forum. Teachers can use Atutor to set up online quizzes, upload readings and create assignments.

Positive or Negative Issues in Computerizing Professional Development

Atutor's security feature is one of Atutor's strongest attributes. Managers of specific modules have control of which participants use their particular module, and all participants are given a username and password. This feature ensures only those participants in which the module was designated have access to it, eliminating any unwanted outside parties from accessing the module.

Atutor offers a wide variety of benefits to professional development. Since Atutor is a web-based learning content management system, users can access it from anywhere that hosts a broadband server. Instead of accruing costs associated with traveling to different locations to acquire professional development, the user can access Atutor from the comfort of their own home, or classroom. Since educators can receive professional development from their home or classroom, time constraints become less of a factor. Instead of scheduling a time for PD which may not suite all involved, educators can access Atutor when it is convenient for them.

The chat forum feature in Atutor is an excellent way for educators to become personally involved in their PD. This feature allows educators to share ideas, express views, share best

practices or lesson which benefitted them in the past. The ability to pass on any prudent explicit and tacit knowledge changes the mundane, often stagnant professional development into a web-based learning community fostering the sharing of ideas and concepts. While normal PD. ends after the educator leaves the meeting, Atutor allows PD to be continuous and on-going.

Atutor provides a number of benefits within the classroom as well. As Jan Gahala writes in the paper *Promoting Technology Use in Schools* , "Evidence indicates that when used effectively, technology applications can support higher-order thinking by engaging students in authentic, complex tasks with collaborative learning contexts." (Gahala, 2001) Atutor can be used to re-enforce ideas or concepts introduced in the classroom, as well teacher facilitated chat forums can help engage the students and promote critical thinking and constructivist learning.

Although Atutor's capabilities hold numerous benefits toward both professional development and classroom use, its success is limited to the abilities of its users. Many educators may not be proficient with computers or are wary or unwilling to use technology to enhance professional development. Other educators may be unwilling to change the traditional setting of PD for a modern web-based one. Some educators have questioned Atutor as a web-based learning community for their courses, as those students who do not have the financial means to possess a computer or internet for home use may be left behind.

The Department of Education proposes that engaging educators in Atutor may improve organizational effectiveness, teaching, and ultimately student learning. "Professional learning communities operate under the assumption that the key to improved learning for students is continuous, job-embedded learning for educators."(DuFour, DuFour, Eaker, Many, 2006)

Conclusion

With the examples discussed in this paper it is obvious that technology has firmly entrenched itself in many ongoing initiatives set forth by the Prince Edward Island Department of Education. As technology becomes more and more pervasive in today's society, educators can rest assured that societal expectations on the education system will change at all levels. With this fact, it is certain that the technological issues and trends that face today's provincial Departments will not be the same as tomorrow's.

Appendix I

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