Education 6590

Virtual Learning Environments: Using Online Course Management Systems to Implement Constructivism in Learning at the Secondary Level

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Abstract

In today's educational system, ideas concerning course design, teacher and student roles, methods of delivery, and evaluation are being changed. The acceptance of the Internet as an educational tool has altered the traditional environment of the classroom. For many teachers, conventional delivery methods have been replaced with an online alternative, one which cannot proceed in the same manner as the dynamic within the classroom. In technology courses as well as courses which use technology, constructivism has been touted as the learning theory that will extract the knowledge of the learners through sharing and working together to build the knowledge base of the learner. In Newfoundland, courses that use technology in their delivery have shifted from a drill and practice, didactic, traditional, or teacher-directed approaches to more student-centered approaches such as constructivism. This shift to constructivist theory has been aided by the use of course management systems within virtual learning environments.

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The educational environment is in constant dynamic change. New theories of teaching and learning are always emerging, some much slower to take root than others. The very essence of life-long learning dictates new perspectives be pursued and developed over time. In education, one such perspective that is emerging in the face of the growing intrusion of technology in education is constructivism. Constructivism encourages and compels us to radically and sometimes controversially challenge the definitions and very nature of knowledge (Gruender, 1996, p. 21). This is particularly fitting with regard to the exponential growth of technology within education at all levels – from primary to post-secondary. During the past decade alone, technology has made its way into education with aplomb. The number of technology based courses, and the integration of technology into more traditional core courses is evident in both theory and practice. A cursory review of any educational documents and directives from the governing and organizing bodies such as Departments of Education and the Atlantic Provinces Educational Foundation bears witness to the presence and perpetuation of technology in education. What continues to be most controversial throughout is the nature of this integration and inclusion.

In the secondary educational system, virtual learning environments have garnered a place in the delivery method of teachers. This method of presenting curriculum has penetrated many subject areas. The virtual learning environment of choice for most teachers is the web site, where teachers present materials on line for the students to use in their studies (Heimpel, 2000, p. 119-120). While this method is satisfactory, the use of the Internet becomes, at best, a clearing house of materials for the student to download or print and complete. Once complete, these materials are handed in to the teacher in some form, whether it is electronic or conventional paper. While learning is occurring, the use of technology as a learning tool becomes suspect.

Whereas technology helped the student in learning about a topic because they were able to use the Internet to receive the material, did technology help that particular student learn? Within a virtual learning environment, through the use of the course management system, the learner has a heightened responsibility for their learning and the materials that are available, simply because the curriculum being learned is located within the course management system. Also, if the tools that are present within a course management system are used, then the student and the process of learning become integrated through the melding of technology and learning. It is through the interaction of the student with the course management system that learning occurs.

This paper will attempt to show that as a learning tool, the use of online virtual learning environments to deliver the high school curriculum prescribed by the educational authority are better utilized within the constructivist methods of course management systems. Employing the curriculum on the Internet as an extension of the traditional classroom can be a worthwhile venture for both student and teacher as long as the curriculum and the medium are utilized by the student to learn, and not to retrieve. This research paper will examine the description of a virtual learning environment and how this environment is conducive to constructivist theory and learning. As well, the research will examine how effective course management systems are used within the framework of the secondary curriculum, both as an extension of the classroom itself and as the primary means of curriculum delivery. Finally, an examination of various course management system options that are available to educators to deliver superior online courses will follow.

What is Constructivism?

Virtual learning environments that use course management systems as their chief delivery method usually aspire to be rooted in constructivist theory. Constructivism can be best described as a philosophical position that views learners as creators of knowledge. As such, the learner is not a passive recipient of knowledge, but rather an active participant in defining knowledge. Constructivism is a teacher-facilitated process that places students at the center of active learning, rather than in a passive role. The theory suggests that students actually invent their own ideas. They assimilate new information and modify their understanding. In the process, their ideas gain in complexity and power (Ferguson, 2001, p. 46, Gullo, 1999, ¶ 3). Learning is constructed by assembling meaning from pieces of reality. Constructivism contends that you can never talk about what is learned in isolation of how it is learned (Hanley, 1994, ¶ 5). As creators of knowledge, students hold a larger share of the educational outcome. Thus, the argument can be made that students become more active participants in the total educational experience, holding their attention because the outcomes are directly tied to their efforts. Constructivism is child-centered; it "proposes that learning environments should support multiple perspectives or interpretations of reality, knowledge construction, context-rich, experience-based activities" (Jonassen, 1991, p. 28). Constructivism focuses on knowledge construction, not knowledge reproduction.

There are numerous scholarly writings on the role of constructivism in technology education. In the spirit of what has been disclosed above regarding constructivism, the authors and contributors of *Plugging In* use the term “engaged learning.” Clearly this article supports the constructivist paradigm.

> There's a dynamic shift occurring in this country as we move from traditional definitions of learning and course design to models of engaged learning that involve more student interaction, more connections among schools, more collaboration among teachers and students, more involvement of teachers as facilitators, and more emphasis on technology as a tool for learning. It is in this context that our framework operates; it is this type of engaged learning that technology must support to be effective. (Jones, Valdez, Nowakowski and Rasmussen, 1995, p. 2).

Plugging In provides a model with which we can make some observations of the effectiveness of technology education from the constructivist perspective. *Plugging In* identifies eight specific variables to assess whether engaged learning is taking place: vision of learning, tasks, assessment, instructional model, learning context, grouping, teacher roles, and student roles. Similarly, *Plugging In* cites six variables to gauge whether or not high technology performance is occurring: access, operability, organization, engagability, ease of use, and functionality. Rather than prescribing a definitive course of action and pedagogy that is often apparent in the positivist approach, these variables promote thought about the possibilities of action and pedagogy, and they allow for flexibility (Jones, Valdez, Nowakowski, Rasmussen, 1995, p. 14).

Dr. Elizabeth Murphy has developed an extensive constructivist checklist in response to the popularity of the constructivist paradigm. Here, Murphy provides some insights into how "…constructivist concepts might be operationalized in an instructional setting" (Murphy, 1997, Constructivist checklist section, ¶ 3). She draws upon the likes of von Glasserfield, Ernest, Joanassen, Wilson & Cole, Honebien and many others who all exhibit the same spirit of constructivism in the big picture, although individually there are subtle differences. As Ernest (1995) points out, "there are as many varieties of constructivism as there are researchers" (Murphy, 1997, Learning theory section, ¶ 3). In short, a variety of models are in existence.

Donna Ferguson advocates using constructivist theory in the classroom to give students the tools to develop and prosper in the technological age. She argues that technology should be used across the curriculum so students can prosper from its use.

> The task of the educational system should be to embrace the future and empower children to learn with the tools available to them. Trying to think up clever ways to use computers in a traditional classroom setting will not do the job. If we assign technology to a secondary role, which does not fully utilize its potential strengths, we are failing to use it to its fullest potential (Ferguson, 2001, p.53).

Ferguson also notes that the constructivist theorists, namely Jonassen (1991), Wilson & Cole (1991), Ernest (1995), and Honebein (1996) have observed that educators and cognitive psychologists have applied constructivism to the development of learning environments. In studying these applications, Ferguson notes that a constructivist learning environment should create real-world environments in which learning is relevant and focus on solving real-world problems. The instructors should guide and learners should be in control. Instructional goals should be negotiated with students and evaluation should be a self-analysis tool. Also, constructivist learning environments must provide tools which help learners interpret multiple perspectives and insure that learning is internally controlled and mediated by the learner. They must also provide multiple representations of reality and focus on knowledge construction, not reproduction (Ferguson, 2001, p. 50 - 51).

As a social constructionist, Martin Dougiamas provides us with the tenets of constructivist pedagogy that are to be adhered to from a design perspective. He argues that students come to class with an established world-view, formed by years of prior experience and learning. Even as it evolves, a student's world-view filters all

experiences and affects their interpretation of observations. In order for students to change their world-view, their ideas must be challenged and redesigned. This requires an effort to change these ideas from both the teacher and the student. Students learn from interactions between each other as well as the teacher. Since students learn better by doing, allowing and creating opportunities for all to have a voice promotes the construction of new ideas (Dougiamas, 1998, Conclusions section, ¶ 4).

Coleman, Perry and Schwen (1997) believe that the constructivist paradigm lead researchers to the conclusion that effective instruction cannot follow generalized principles. They feel that the world is too complex to reduce to a cause and effect relationship. They contend that effective instruction results from the application of a sophisticated construction in a specific context, within which everyone involved in the learning process will contribute their unique understandings and values (Coleman, Perry and Schwen, p. 280).

Finally, Roger Crawford gives us rules to encourage pupils to develop their cognitive and metacognitive strategies within a constructivist environment. Within a constructivist environment, it is OK to make mistakes, because it is through making mistakes that the correct answer emerges. Collaborative learning is positively encouraged, as ideas that emerge from a group are discussed and well formulated. Peer support is as valuable and as legitimate, if not more so, that teacher support. Students are empowered through taking control of the technology, thus the locus of control moves away from the teacher and to the student, who through this empowerment takes on a more responsive role to learning, both as an individual and as part of a group (Crawford, 1999, Towards a new pedagogy section, ¶ 4).

Learning and Constructivist Theory

In education, especially in online learning, constructivist theory has become the principal philosophy (Palloff and Pratt, 1999, p. 17). In the context of constructivism, there are two theories that relate to learning that are widely accepted (Kanuka and Anderson, 1998, Constructivist learning theory section, ¶ 2). They are critical constructivism and social constructivism. Critical constructivism views constructivism within a social and cultural environment. This theory combines the social, the radical, and the cognitive dimensions of constructivism. Essentially, knowledge results from the interaction of the student with the environment that they find themselves in and the contradictions that occur in the perception of the student through such interactions. Critical constructivism is a social epistemology that addresses the socio-cultural context of knowledge construction (Dougiamas, 1998, Critical Constructivism section, ¶ 3).

Social constructivism, or social constructionism, on which many of the theories and designs of virtual learning environments and distance learning are based, is more concerned with how knowledge is acquired through the interaction of people in a particular environment. Within this environment students bring their ideas and knowledge and share this knowledge with the group (Kanuka and Anderson, 1998, Constructivist learning theory section, ¶ 4). According to Vygotsky, the socio-cultural context of learning has an influence on thinking and the creation of meaning (Bonk and Cunningham, 1998, p. 32). The opportunity to interact with other learners in sharing, constructing and negotiating meaning leads to knowledge construction.

What is a Virtual Learning Environment?

Virtual learning environments represent an entirely new form of educational technology. A virtual learning environment (VLE) is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process. This environment resides online, dependant on the technology of the Internet to be able to exist. The principal components of virtual learning environments are:

- mapping of the curriculum into course topics that can be assessed and recorded;
- tracking of student activity and achievement within the curriculum presented online;
- support of online learning, including access to learning resources, assessment and guidance;
- online tutor support;
- peer group support;
- general communications, including email, group discussion and web access;
- links to other systems, both in-house and externally;

(Everett, 2002, What does a VLE do section, ¶ 1; Morrisson, 2003, p. 178).

A virtual learning environment may support similar forms of learning to a 'real' one but it is not a physical space like a classroom or lecture theatre, and learners may work closely together while not being active at the same time. Another characteristic of virtual learning environments that brings uniqueness to the development and design of course materials and discussion via online resources is the presence of asynchronous learning. If virtual learning environments physically separate both teacher and students in both time and space, then learning is asynchronous; learning occurs in different places at different times. In comparison, learning is said to be synchronous if learning occurs in the same time and place, usually a physical classroom setting within a school (Picciano, 2001, p. 70-71).

What is a Course Management System?

A course management system, or courseware, is defined as a software package that provides support for managing student access to courses, monitoring student activity, administering and scoring student progress and performance tests, storing student records, managing access to student and course records, and reporting on student and course activity. A CMS allows active teacher management of classroom participation, provide information on student learning progress, serve as a basis for student feedback, allow real time adjustments to instructional presentations, and allow the teacher to focus on the instructional needs of specific students. Course management systems allow the teacher to implement various video, audio, graphics, text, and programs without regard to their data format which enables teachers to electronically present instructional materials from different source formats in automated classrooms. As well, a CMS provides computer mediated support for course development and revision, either through built-in functions within the software of the CMS, or through integration with other curriculum development tools (Spearman, 2000, p. 2-3).

Course management systems have become a common tool in the implementation of virtual learning environments. Within a CMS, the tools to create quality online instructional materials within the parameters of the approved course syllabus are at the teacher's fingertips. Usually, this is done by making choices at the beginning of course setup by answering questions, or adding materials in previously created zones in the CMS setup. This is indicative of course management system software such as WebCT, Blackboard and Moodle. Many features have been integrated into the advanced CMS. These platforms provide synchronous and asynchronous tools for both teacher and student. These include features such as e-mail, threaded

discussions, chatrooms, whiteboards, video conferencing, online testing and evaluation, bulletin boards and teleconferencing (Moore, Winograd, and Lange, 2001, p. 7.4 – 7.6; Morrison, 2003, p. 179). Course management systems allow teachers to capture class activities, enabling access to course content beyond the timeframe of the course. A CMS expands opportunities for students to contribute to the course through the use of asynchronous communication tools. It encourages students to contribute to the course because it is readily accessible and amenable to all schedules. A CMS encourages active learning through the use of just-in-time learning resources and online, threaded discussions. It facilitates more efficient modeling and scaffolding activities using student samples and expert intervention. Course management systems facilitate peer review and collaboration on group projects. It also promotes learning through multiple forms of interaction distributed across space, time, and various media (Dabbagh, 2002, ¶ 2).

The Need for Virtual Learning Environments

> The thrust of current research is no longer on comparing computer based learning with other media or with the teacher, but in determining what specific computer environments can best enhance student learning and in determining which instructional approaches used in conjunction with the computer are most effective (Thomson, Simonson and Hargreave, 1996, p. 41).

The Internet has become such an integral part of North American society. It has become the medium of choice for many, especially the youth of today (Owston, 1997, p.109). Internet access and use has steadily grown since the development of Internet access for personal use. In 1999, Canada connected all interested schools and libraries to the Internet. From this endeavor, nine out of every ten students in Canada had access to the Internet for educational purposes. In fact, 96% of children aged 15 to 18 have some form of access to the Internet (Clark, 2004, p. 2).

Statistics have shown that an estimated 7.9 million Canadian households had at least one member who used the Internet regularly in 2003, either from home, work, school, a public library or another location (Statistics Canada, 2004, ¶ 2). In a study prepared for Industry Canada, 66% of parents stated that the greatest benefit from their child's use of the Internet was the educational advantages afforded to their children because of their decision to install the Internet at their home. In 2002, 82% of parents who responded to a Statistics Canada survey stated that their school aged children used the Internet. Of those, school was the most common place for the children to use the Internet, while home was second (Clark, 2004, p. 2).

With this level of access to the Internet, it would seem that a migration to education on the Internet would be an easy journey for teenage students. However, Huffaker (2003) reports that such is not the case. He notes that students state a widening gap between how the Internet is used for educational purposes and how they use the Internet under teacher direction. They are beginning to find their own direction in using the Internet for educational purposes, creating a curriculum derived from personal interests and self-discovery, which could point to a gap in communication between teacher and student (Huffaker, 2003, ¶ 2, 3).

Thus, a new approach is needed in teaching children, using the Internet as a tool for understanding. In order to effectively integrate the Internet along with the more traditional classroom teaching approach, teachers should implement virtual learning environments using a course management system of their choice to engage students in concrete, constructive learning. The new global economy demands students who can think critically, have excellent problem-solving skills, is skilled at written communication, and can work collaboratively in a group environment (Owston, 1997, p. 111). If the Internet is to be used effectively in education, it

must be approached from a student centered focus, where learning is the main goal in using the Internet. The use of a virtual learning environment where students create a learning environment in which they share knowledge, contribute to knowledge and take control of their learning outcomes fosters situated learning and promotes multiple perspectives among students and teacher (Tam, 2000, Constructivism and instructional design section, ¶ 15 - 17). As well, VLE's provide the opportunity for leadership and for students to take on roles to support their learning process (Palloff and Pratt, 2001, p. 109). Implementing a VLE will result in learners constructing the context of their learning using the tools and resources at their disposal (Kozma, 2000, p.11).

New technologies within virtual learning environments are forcing shifts in the roles of students and teachers. Within the technologically enhanced classroom, we see a pedagogical shift from teachers controlling the teaching to students controlling the learning (Johnston and Cooley, 2001, New instructional methods section, ¶ 1). A virtual learning environment can be used to supplement traditional instruction which will improve student achievement. VLE's are being used "to supplement in-classroom learning" (Lorenzetti, 2003, ¶ 2). When lectures or other resources are posted online, students can focus on comprehension and processing as opposed to "text-capture" (Fryer, 2002, Hybrid courses section, ¶ 2). Students hesitant to speak in class may be proactive in the threaded discussions of a VLE when the audience is removed (Fryer, 2002, Hybrid courses section, ¶ 3). This leads to a greater depth of learning and engagement for many students. Parents and students have expressed positive remarks concerning virtual learning and the benefits therein. In using virtual learning, parents and students express satisfaction in the enhanced independent learning, increased personal responsibility, better preparation for post secondary education and lifelong learning, fewer

distractions, equal opportunity to participate, quick feedback, and greater opportunity for parental involvement (SAEE, 2002, ¶ 8)

Scott Follows, a professor and director of the Acadia Centre for Virtual Learning Environments at Acadia University, has listed perceived benefits in using a virtual learning environment for post secondary student use. For the high school experience, virtual learning environments provide the student with context for the learning process to take place. The VLE can be used for further understanding of a concept, making the concept more concrete and tangible to the learner. Virtual learning environments allow the student to control the learning process. From the information that the student is exposed to, the student can select the presentation of information. The student can individualize the experience through participation in different aspects of the course in the online setting, such as e-mail, bulletin boards, or threaded discussion. A VLE has many aspects that are geared for different learning styles through the use of different file and presentation formats. Lastly, online learning is the preferred way to learn for many students. Students are comfortable with technology. They have the ability to process the information presented online because of the comfort that they feel with the medium (Follows, 1999, p. 3-4).

How Virtual Learning Environments Promote Constructivism

In 2000, the United States National Research Council completed a study on the ways in which people learn and how these findings can be brought to bear in the classroom. In this study, Bransford, Brown and Cockling (2000, p. 12) found that an essential element of learning was the control that students implemented in their learning in the recognition of understanding what is being taught and when they need more information. This was called active learning.

The ability to self-evaluate, self-assess and reflect understanding demands new approaches to creating classroom environments (Huffaker, 2003, The new science of learning section, ¶ 1).

In the National Research Council findings, three concepts were determined. First, it was recognized that students come to the classroom with ideas and opinions of the world. If the teacher does not recognize this, the students will not enter into new knowledge acquisition. Second, students develop knowledge through understanding facts and ideas. They organize this knowledge so that it can be retrieved easily and applied to a situation. Third, students must be able to identify learning goals and monitor their progress in achieving these goals. These statements have a direct affect on teachers in the design and construction of a learning environment (Huffaker, 2003, The new science of learning section, ¶ 3). In fact, these statements propagate the theory of constructivist learning as previously described.

Traditional instructional methods have difficulty in being applied to the emerging theories of learning. This is where technology in education becomes a vital cog in the educational experience of today. Jonassen, Peck and Wilson (1999, p. 118) argue that technology lays a critical role in a constructivist learning environment because it provides the means for "storing, organizing and reformulating the ideas that are contributed by each community member". In a virtual learning environment, constructivism is at play from the onset of the construction of the environment itself. Using the Internet as a delivery method of education can be designed by the teacher to be many things to the learners impacted by its use. It can be a resource to identify, evaluate and integrate a variety of information. It can be a medium of collaboration, conversation, discussion, exchange and a communication if ideas. It can be a platform for understanding and meaning. Finally, it can be a medium for participation in simulated experiences, apprenticeships and cognitive partnerships. It is assumed, then, that

virtual learning environments on the Internet would function best in a constructivist environment. The use of the Internet in any other way would defeat its purpose in the instructional process (Relan and Gellani, 1997, p.43).

The development of software applications focused on the creation of virtual learning environments provides the foundation for a complex, dynamic community. Such communities can be viewed in a broader sense reflecting their own unique and individual norms and values. The underlying theoretical perspectives are clearly creating both boundaries and structures for the communication and social interaction process. The theoretical perspective proposed by Resnick, Greeno, and Collins (1996) have been extended to incorporate the exploratory nature of many learning environments and also place greater emphasis on the collaborative nature of emerging Internet based learning environments. These environments have been extended to include the following perspectives: interactive, exploratory, individualized, and collaborative (Firdyiwek, 1999, p. 30).

Doolittle (1999) states that, through constructivism and the theory that emerges from a constructivist view of knowledge acquisition, there are eight recommendations for online learning that stem from constructivist pedagogy. First, learning should take place in authentic and real-world environments. In order for online education to adequately satisfy this, the online environment must provide complex, culturally relevant, ill-structured domains within which the user can operate and "live." Second, learning should involve social negotiation and mediation. The use of both asynchronous and synchronous online communications allows for social negotiation and mediation to occur across both time and distance. Third, content and skills should be made relevant to the learner. Online education is quite capable of providing relevance as long as the learner is able to self-select a relevant topic, process, or skill. Fourth, content and

skills should be understood within the framework of the learner's prior knowledge. In a synchronous environment mediated by an instructor, student's prior knowledge may be probed at the beginning of instruction and instruction may then be adjusted based on the feedback from the student. Fifth, students should be assessed formatively, perhaps with self check quizzes, serving to inform future learning experiences. Sixth, students should be encouraged to become self-regulatory, self-mediated, and self-aware. In most online education environments, self-regulation, self-mediation, and self-awareness are requirements for successfully engaging in that environment. Online education typically requires students to be more involved and more persistent relative to the educational environment. Seventh, teachers serve primarily as guides and facilitators of learning, not instructors. The self-regulatory and self-mediated nature of online education promotes the instructor taking the role of guide or coach. Finally, teachers should provide for and encourage multiple perspectives and representations of content. Online education has easy access to international and culturally diverse resources, including diverse populations. As Doolittle maintains, online education provides the resources necessary for students to construct knowledge (Doolittle, 1999, ¶ 1 - 12).

From a social constructivist view, virtual learning environments need to be collaborative ventures, where students share and construct knowledge through interaction and information exchange. Through this collaboration and feedback using the tools of the course management system, students work together to reach and understand learning outcomes, hereby formulating knowledge (Palloff and Pratt, 2001, p. 115).

There is no doubt that student learning can be enhanced through the use of virtual learning environments. Students using a VLE have more control over their learning, especially in the time learning takes places and the amount of contribution they offer. Virtual learning

environments support learners in constructing understanding in learning. Depending on the setup of the course, students may be in complete control of the topics and material learned. Students can work within the confines of the course management system at their own pace, not having to worry about other students or teachers because of the asynchronous nature of a virtual learning environment. Students in a virtual learning environment can use cooperative learning and peer collaboration using threaded discussion, chat rooms and e-mail. Those students with exceptionalities or disabilities can benefit from a virtual learning environment using a course management system to work as they see fit.

Teacher Options for Implementing Course Management Systems

Course management systems provide a complete set of tools for creating virtual learning environments that can be easily used by teacher and students. While CMS software makes developing a course easier, evaluating these software packages can be time consuming and difficult (Picciano, 2001, p. 169). Teachers who venture into course management systems quickly realize that there are two options available to them if they want to use a course management system platform as a virtual learning environment. In the world of CMS, there are two options; proprietary course management systems such as WebCT or Blackboard, or open source course management systems such as Moodle or Claroline.

Proprietary Course Management Systems

Proprietary course management systems come with the features that are necessary for the implementation of constructivism in the classroom. When purchased, the buyer is guaranteed that this software will meet the need that the buyer intends. If the buyer does their homework

and evaluates these software packages closely, they will meet their needs. However, the drawback with license software packages is the cost. Not only do you pay for the software, but you also pay for each student that uses the software, or you will pay by the number of courses you intend to offer using the software. As well, in the CMS software corporate world, competition is fierce. In an attempt to remain competitive, software products are routinely upgraded and enhanced every few months (Picciano, 2001, p. 161). These enhancements cost money. Many times, the software changes fix bugs in the previous release and are necessary to guarantee the success of the platform on the Internet and at the computer hardware level.

Open Source Course Management Systems

Open source is the opposite of proprietary software. Open source is available under the GNU General Public License, which means that they are free for all its users (free in the sense of freedom to use, not necessarily price). You can download a CMS via the Internet without charge, and their license will not discriminate against any person or group of persons or against fields of endeavor, neither restrict you from selling or giving away the software. You can charge consulting fees to install it, and you will have access to its development code. As well, support can be easily found online.

While it is free, it isn't an option for everyone. Without the proper expertise and resources, open source products can be an adventure gone wrong. Many times, schools will want to modify, develop further or improve its functionality. To do this, time and technical skills are needed. Secondly, schools may trade financial resources for human resources. Teachers may become upgraders of software, searching the Internet for patches and repairs. Then, these patches and updates have to be installed (Moore, 2003, p. 11 - 12).

The Use of Course Management Systems in a Newfoundland Context

In 1999, the Department of Education undertook an investigation into the delivery of education in Newfoundland and Labrador. The department, through the selection of a ministerial panel, recognized that many significant changes have occurred and are still occurring as a result of school reform in the 1960's and again in early 1990's. The panel presented recommendations on how education was being delivered in the classroom. One area of special interest that the panel undertook was distance learning. This was an area of focus in part due to the fact that the student population in rural areas continues to decline greater than in urban areas; "Enrolment decline is not evenly distributed throughout the province but is more pronounced in rural then in urban areas" (Government of Newfoundland and Labrador - Department of Education, 2000, p. 6). The panel also noted that, "technology must be embraced for a variety of reasons" (Government of Newfoundland and Labrador - Department of Education, 2000, p. 71). Technology can be utilized for much more purposeful reasons and it, "can be viewed as a liberating force capable of placing more resources in the hands of students than could ever be accomplished by conventional means" (Government of Newfoundland and Labrador - Department of Education, 2000, p. 71). Thus, a review of the methodologies employed by the traditional system of distance education was completed and several recommendations concerning new and innovative methodologies were made.

In their recommendations the panel described a system and method of delivery using Internet-Communications Technologies as the backbone. This led to the birth of the Centre for Distance Learning and Innovation (CDLI). This network provides students in rural Newfoundland and Labrador the opportunity to enroll in high school courses which they may not

have access to otherwise. Recommendation 61 states that "most communications be through an Internet-based system incorporating e-mail, conference forums, Internet fax and similar devices, with minimal reliance on synchronous communications, fixed schedules or other constraining elements (Government of Newfoundland and Labrador - department of Education, 2000, p. 73). CDLI uses a virtual learning environment, using WebCT as it course management system in the delivery of its courses.

Individual schools generally have not ventured into using a course management system to supplement the curriculum. Teachers who use the Internet for a virtual learning environment mainly use web pages, e-mail, and on occasion, chatroom software. However, Booth Memorial High School of St. John's, Newfoundland entered into the world of course management systems by implementing a CMS to supplement the classroom instruction (d'Entremont, 2004, p. 4). The school uses an open source software package called Moodle. Today, Moodle is being used at Booth Memorial to supplement the classroom discussion and delivery of curriculum on a wider basis. The teachers at Booth Memorial use Moodle to display the homework in their particular course for the week. They have adopted this system and have been using it well. The parents of the school's students have been informed of this site through newsletter, public radio airwaves and the main web site. The parents who have contacted the school have been positive in their comments. The experience of being able to log into a web site created by their child's teacher to find out what is happening in that class has improved parental involvement for some, and has increased home/school communication (d'Entremont, 2004, p. 4).

In implementing Moodle at Booth Memorial, there were issues concerning bandwidth, Internet naming structures, IP addressing and a platform on which to host the site. This proved to be quite a concern to the school boards information technology division, who did not want to

allow the school to have another web portal open at the school. As well, Moodle was to have been set up on a server using Linux, but this was refused because the district could not service a Linux platform. Thus, a compromise was made and Moodle was implemented on a machine using Windows NT and a program called Easy PHP. As for the open source software itself, Moodle was very easy to install; it took approximately twenty minutes to configure the site. Moodle.org, the web site devoted to the use of Moodle, is an excellent resource for information and troubleshooting problems in the delivery of the software to an online state. Once the program is unzipped and placed in the correct folder, setup requires the running of the admin feature and everything is built through the web interface. You can create a course site in ten minutes by following the prompts. Booth Memorial's current site is now on its third upgrade (d'Entremont, 2004, p. 5).

Moodle is an active and evolving product which evokes a social constructionist method of learning. Students can submit all their projects via Moodle. The time submitted can then be noted. Forums can be set to automatic subscribe, which provides a great way to send messages to enrolled students. Once the course is built you can hide or show sections so that students only see what you want them to see. All courses have the same look; therefore it is easy to navigate in any course for any teacher. Students only need to register once and can enroll in any number of courses. Moodle is packed with modules that implement the theory of constructivist learning. These are as follows:

Overall design:

Moodle promotes a social constructionist pedagogy; that is, it promotes collaboration activities and critical reflection within a group. It is suitable for 100% online classes as well as

supplementing face-to-face learning. Moodle installs a simple, lightweight, efficient, compatible, low-tech browser interface that is easy to use and intuitive to the student's needs. Moodle is easy to install on almost any platform that supports PHP, plus it requires only one database. The course listing shows descriptions for every course on the server, including accessibility to guests. Courses can be categorized and searched - one Moodle site can support thousands of courses. There is an emphasis on strong security throughout; forms are all checked, data validated, and cookies are encrypted. As well, text entry areas (resources, forum postings, journal entries etc.) can be edited using an embedded WYSIWYG HTML editor as long as the browser that is use can support it.

Course Management:

One of the reasons Moodle was chosen as the CMS for Booth Memorial was the course management features that are inherent within the program. Within a course created by a particular teacher, that person has full control over all settings for a course, including restricting other teachers from becoming members or creators of materials within that course. The course can be formatted to be delivered by topic, a weekly basis, or a discussion-focused social format. There is a flexible array of course activities, such as forums, journals, quizzes, resources, choices, surveys, assignments, chats, and workshops. Recent changes to the course since the last login can be displayed on the course home page. This helps give sense of community and awareness to what needs to be completed. Most text entry areas, such as resources, forum postings, and journal entries can be edited using the embedded WYSIWYG HTML editor. All grades for forums, journals, quizzes and assignments can be viewed on one page, and downloaded as a spreadsheet file. Every time a student or teacher logs on to the site, the user is tracked through the user logging and tracking administration feature. Activity reports for each student are

available with graphs and details about each module (last access, number of times read) as well as a detailed "story" of each student's involvement including postings and journal entries on one page. Moodle is integrated throughout with e-mail. Copies of forum posts and teacher feedback can be mailed in HTML or plain text. Teachers can define their own scales to be used for grading forums, assignments and journals. Finally courses can be packaged as a single zip file using the Backup function. These can be restored on any Moodle server and can be shared with other teachers using Moodle anywhere in the world.

Assignment module:

The assignment module is the area where students submit assignments via uploading to the teacher for grading. In the assignment module, assignments can be specified with a due date and a maximum grade. Students can upload their assignments (any file format) to the server where, when received, they are date-stamped. Late assignments are allowed, but the amount of lateness is shown clearly to the teacher. For each particular assignment, the whole class can be assessed with a grade and comments on one page in one form. Teacher feedback is appended to the assignment page for each student, and notification is mailed out. The teacher can choose to allow resubmission of assignments after grading. It is a very user friendly system for both teacher and student.

Chat module:

The chat module allows for smooth, synchronous text interaction. This module includes profile pictures in the chat window, so that the users can see a picture that represents the person who is chatting. Whether the picture is an actual image of the user or a glyph, this is directly up to the student and teacher. The chat module supports URLs, smilies, embedded HTML, and

images. All sessions are logged for later viewing, and these can also be made available to students.

Forum module:

The forum module is the place for asynchronous communication. There are different types of forums are available, such as teacher-only, course news, open-to-all, and one-thread-per-user. All postings have the author's photo attached, if one is available and uploaded by the user. Discussions can be viewed nested, flat or threaded, oldest or newest first. This is determined in the teacher setup. Individual forums can be subscribed to by each person so that copies are forwarded via email, or the teacher can force subscription for all. The teacher can choose not to allow replies to certain forums (i.e.; for an announcements-only forum). Discussion threads can be easily moved between forums by the teacher if necessary and attached images are shown inline. Users and teachers can rate the relevance or effectiveness of postings to the forum, if the teacher wishes to activate this feature. If forum ratings are being used, these can be restricted to a range of dates.

Journal module:

Journals are private between student and teacher. Each journal entry can be directed by an open question. For each particular journal entry, the whole class can be assessed on one page in one form. Teacher feedback is appended to the journal entry page, and notification is mailed out.

Quiz Module:

The quiz module is different from the assignment module in that students can do online quizzes for grading. Teachers can define a database of questions for re-use in different quizzes. The questions can be stored in categories for easy access, and these categories can be

"published" to make them accessible from any course on the site. Quizzes are automatically graded, and can be re-graded if questions are modified. The quiz can have a limited time window outside of which they are not available. At the teacher's option, quizzes can be attempted multiple times, and can show feedback and/or correct answers. Quiz questions and quiz answers can be shuffled (randomized) to reduce cheating. The questions allow HTML and images to be used. Questions in Moodle can be imported from external text files, but must be in a format that Moodle can understand. Quizzes can be attempted multiple times and attempts can be cumulative. The types of questions allowed in Moodle are multiple-choice questions supporting single or multiple answers, short answer questions (words or phrases), true-false questions, matching questions, random questions, numerical questions (with allowable ranges), and embedded-answer questions (cloze style) with answers within passages of text.

Resource Module:

The resource module is the module used by teachers to post homework for the course, This module supports display of any electronic content, such as Word, PowerPoint, Flash, Video, Sounds, and PDF files, just to name a few. It is very flexible in its usage and can be exploited in many ways. How it is used is only limited by the teacher. Files can be uploaded and managed on the server, or created on the fly using web forms (text or HTML) that are embedded in Moodle. External content on the web can be linked to or seamlessly included within the course interface. This allows a teacher to bring other online resources that exist on the Internet into the CMS for students to be able to access, while maintaining an attachment to the CMS and the users residing on the CMS.

Glossary Module:

The glossary module allows students and teachers to build a list of terms and definitions that reside online for all users to view. If a student does not understand a term that is resident to the course, that student can see if it in the glossary. If not, the student can look up the definition, and add it to the working glossary of the course. As well, not only will the term be in the glossary, the term will be hyperlinked throughout the course anytime the term is typed into a journal, forum or assignment.

Lesson Module:

The lesson module is used as a type of review mechanism for the topic or week that is finished. Each lesson is structured in such a way that the main tenets of the lesson are reviewed and a question is asked. The answer will determine if the student continues forward or tries again, because only a correct answer allows you to try another question. It is an excellent review mechanism for teachers and students.

Choice Module:

The choice module is used to allow student to choose between two items in a course. The teacher would set up a choice for students. Then, students log on the course, and select their choice. The choice is then shown to all students on the course main page (d'Entremont, 2004, p. 5 -13).

The Challenges of Implementing a Course Management System

With any new endeavor, there are challenges to see the fruits of hard work. Teachers who avail of course management systems for their students' use will encounter challenges along the way. There are technology skills that are needed. If the teacher does not have the requisite skills, then they will have to be acquired. Then this requires time and money. The teacher will have to develop a welcoming environment for all participants. This environment will need a

teacher who can encourage participation, establish required behavior, monitor progress and facilitate group progress (Garvey, 2002, Other considerations section, ¶ 3). Teachers will have to be willing participants in a virtual learning environment. This must be in concert with the curriculum workload that is undertaken by the teacher in the school year.

Greg Kearsley identifies two problems that contribute to the difficulty of implementation. First, he points to the increasing number of options and features that are making it difficult for instructors and course designers to determine which functions should be used for what aspects of the course. Second, users must not only deal with using new tools and how they are used within the course for the maximum effect and participation, but they must also adjust to the changing roles of student and teacher (Kearsley, 1998, Section 8, ¶ 2, 3).

Schools and governments who implement course management systems do so because they want to involve their students in the learning process. To do this, there are costs involved. There is the cost of technology, which includes the upkeep of servers, workstations, peripheral devices, removable media devices, and, if applicable, licensing costs. From a human resources standpoint, staff must know how to use the VLE. Training will be necessary for the VLE to be implemented and to run smoothly. As well, someone must have the time to be the technical resource person. Accessibility for students from home is a concern, especially if the VLE needs considerable bandwidth to run properly.

Conclusion

In the article by Tony Fetherston, *Pedagogical Challenges for the World Wide Web*, he states that, "Engagement is likely to be enhanced if there is a wide choice of learning paths

available to accommodate individual learners as they find their way through content presented" (Fetherston, 2001, Using the technical features for learning section, ¶ 4). Ideally change in education should improve the quality and equality of learning. Regardless of reasons, educators have been inundated with information as it pertains to their specific learning environment. Educators have been expected to integrate technology into their classrooms while retaining the essence of the curriculum.

In order to use technology in the classroom more effectively, Gullo (1999) states that already acquired technological skills should not be practiced on the computer. The student must find the learning to be meaningful and relevant. For different social roles to develop using technology (negotiator, mediator, leader, etc.), two to three students working on a computer toward common goals is ideal. Classroom activities using technology should be designed with open-ended goals, so that two or three students can be mentally engaged on the computer at the same time. As well, teachers should value incidental learning as a very important by product of planned activities (Gullo, 1999, ¶ 4).

Technology is changing our view of the way we work. Contemporary students, who are more technologically savvy than those of the past, demand pedagogical change. Society demands a pedagogical change by asking for a technologically empowered citizen. Educators at all levels have to examine the instructional environment, shifts resulting from technology, phases of technology integration, and models of instructional practices along a continuum. The idea that technology is not important within the walls of the secondary school is asinine. Recommendations by the Department of Education in Newfoundland and Labrador to remove technology as a graduation requirement for high school students shows the apparent lack of foresight which resides within those who make the decisions for curriculum, especially if the

only need for this decision is to save money. If anything, our society should place a premium on technology skills acquired at the secondary level.

It has been the premise here that virtual learning environments and course management systems are in keeping with the spirit of constructivism; that is, the learners – teachers and students alike – are active participants of knowledge formation and not merely the recipients of knowledge. It is as important for educators to operate in a constructivist frame of mind within their own camp as it is for them to facilitate the same active participation from students within their courses. Educators will continue to face enormous challenges in integrating and embracing a constructivist teaching/learning environment and the integration of the effective and equitable use of technology. Challenges such as funding, time, and training are evident, and the first decision must be the universal acceptance within education of the constructivist approach.

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