

E -LEARNING IN K-12 CLASSES IN SCHOOL DISTRICT DIGITAL INTRANETS

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As rural communities and schools decline in size educational policy makers often question their viability. In the Canadian province of Newfoundland and Labrador and in other areas of the world, new educational structures based on digital networking, using the Internet, are being developed for the delivery of education to rural schools (Stevens, 1999). In Newfoundland and Labrador school district No. 8, (The Vista School District), there are 5165 students enrolled in 18 schools. The schools range in size from 650 students down to 40 students. In eight schools in this district there were senior students who wished to study "Advanced Placement" (AP) courses in four subjects: Biology, Chemistry, Mathematics and Physics. (Advanced Placement courses enable students in their final year of High School throughout North America to begin undergraduate degrees if these courses are passed at grade levels specified by the university of their choice). The challenge that this presented for the eight small rural schools in the Vista School District was to provide University-level instruction for small numbers of students.

Teaching and Learning in a School-District Digital Intranet

Although AP courses are a well-established feature of senior secondary education in the United States and Canada, it is unusual for students to be able to enroll for instruction at this level in small schools in remote communities. In fact it is rare to find high school students in small and remote communities anywhere in the world who are provided with instruction in university-level studies. The electronic linking of eight sites (or schools) within the Vista School district to collaborate in the teaching of AP Biology, Chemistry, Mathematics and Physics created a series of open classes in this part of rural Newfoundland and Labrador. This new electronic structure became known as the Vista School District Digital Intranet. The School Board responsible for administering this district selected the lead teachers to teach each subject. The four AP teachers came from different schools in the district and were, in fact, the people who developed the AP courses for Internet delivery. Each of the four teachers had a tele-presence in each of the participating schools for that part of the school day during which classes were electronically connected, or on-line.

From the eight schools that together comprised the Vista School District Digital Intranet, 55 students initially enrolled in AP Biology, Chemistry, Mathematics and Physics courses. By participating in classes in real (synchronous) time using audio, video and electronic whiteboards over the Internet, combined with a measure of independent (asynchronous) learning, senior students were able to both interact with one another on-line as well as work off-line in their own community schools. From time to time social occasions were organized so that students could get to know their on-line AP teachers and the other students in their virtual classes personally.

A question facing teachers and school administrators in the initial stage of the Vista School District Digital Intranet was whether students who were not used to being unsupervised could cope with their new freedom and accept increased responsibility for their learning. At the conclusion of the school year the students were unanimous that, to be successful in an on-line AP course, it was necessary to be able to learn independently, to be able to cope with a high volume

of work and to be willing to ask teachers and other learners questions as they arose (Stevens et al, 1999).

The development of this new, electronic educational structure in rural Newfoundland was an attempt to use information and communication technologies to provide students with extended educational and vocational opportunities. Many students who were participants in the virtual classes learnt about the potential of information and communication technologies while completing their AP courses. Furthermore, many students learnt to integrate on-site and on-line instruction in their daily school lives.

Challenges to Traditional School Organization

There are three features of the changing educational environment that influence the ways in which we both provide and access education at the present time in rural communities:

The inter-connectedness of schools

At a time when the economies of many countries are becoming inter-dependent, so individual schools as well as school systems are able to link with one another. Global economic changes of the last decade have shown that national economic systems cannot survive by sealing themselves off from one another, and neither can national school systems. Many schools today, particularly those in rural areas of countries like New Zealand (Stevens, 2000), Finland (Tella, 1995; Stevens, Kynaslahti and Salminen, 1996), Iceland (Stefansdottir, 1993, Stevens, 2002) and Canada (Healey and Stevens, 2002; Stevens 2001) are changing by interfacing with one another electronically with profound effects on how they provide education for young people and their families.

The electronic basis of contemporary education.

The question that many schools face today is not whether to develop electronic infrastructures to use new telecommunications technologies in classes, but how new web-based technologies are to be effectively used for improving teaching and learning.

Appropriate technologies for classrooms

Most of the computers that are used in schools were designed for businesses or researchers. There have been few attempts to design computers specifically for classroom use and teachers and students in schools have had to adapt hardware that has been designed for other purposes. With the changes that are taking place in education, the mass provision of appropriate technologies for schools – flexible, durable and inexpensive - will become increasingly urgent.

Pedagogy of E-Learning

Students in the Vista School District Digital Intranet were frequently subject to scrutiny by their peers as they responded through chat-rooms, audio and video with their AP on-line teachers. The Digital Intranet provided students with access to multiple sites simultaneously as well as the opportunity to work independently of a teacher for part of the day. The need to prepare for classes before going on-line became increasingly apparent to both teachers and students if the open, synchronous, science classes were to succeed. The advent of the Digital Intranet had implications for students who had to interact with teachers and their peers in a variety of new ways. The teaching of each of the four AP Science subjects in the Vista Digital Intranet took place within

classes that were open between participating sites. Many students experienced difficulty expressing themselves and, in particular, asking questions in open electronic classes when they did not know their peers from other small communities. However, as the students became more comfortable with one another, particularly after the first social occasion, inhibitions such as asking questions on-line were overcome.

For those students in the first Digital Intranet in Newfoundland and Labrador a new learning opportunity was provided. They were able to study advanced science subjects, at University level, as members of virtual classes without leaving their small, remote communities.

Professional Development Issues for Teachers

The development of new ways of providing education in rural Newfoundland and Labrador by bringing schools into collaborative relationships has generated four challenges for teachers:

Challenge One: What is an appropriate location for teleteachers - in schools or between schools?

Teachers are appointed *to* schools, but in Newfoundland and Labrador, a growing number of them are actually teaching *between* schools. Teleteachers electronically enter and leave a growing number of schools (sites) across rural Newfoundland and Labrador in the course of a school day. Is it now appropriate to recognize the emergence of a new educational professional - the lead teacher with subject expertise and responsibility across a network of schools? A relevant development for educational policy-makers to consider is the emergence of charter teachers in Scotland.

Challenge Two: Where should control be located in electronic teaching and learning structures?

Principals in rural Newfoundland and Labrador increasingly have teachers who appear electronically in their schools and who also disappear electronically. Where is control appropriately located when schools link electronically to share resources?

Challenge Three: What is appropriate pedagogy for integrating on-site and on-line learning?

Rural educators have made considerable advances in bringing on-line instruction to their senior classes and currently there are developments to extend this to other areas within schools in Newfoundland and Labrador. The pedagogical challenge facing educators, curriculum developers and administrators at present is the integration of on-site instruction with on-line learning to blend physical and virtual education.

Challenge Four: What is the future of the small school in Canada – physical or virtual?

How far can educational networking be extended? At present most networks are at the school district level. Is it possible to move beyond the structure of school district intranets to personal intranets?

Conclusion

Schools in rural Newfoundland and Labrador are increasingly integrating with one another both academically and administratively. As classrooms are extended in terms of time, space, organization and capacity, teachers are challenged to develop pedagogy for telelearning to

facilitate the integration of physical and virtual instruction. There are educational, sociological, technological and political implications in the changes that are taking place in rural Canadian education and many questions to be answered. Perhaps the largest question facing the Canadian development team is to what extent are these developments appropriate for other parts of the world, including Spanish-speaking communities?

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