

Cybercells for Virtual Teaching and Learning

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INTRODUCTION

A cybercell is a face-to-face group whose members extend their discussion to include virtual visitors (Stevens & Stewart, 2005a). This recent addition to the lexicon of e-learning describes the integration of actual and virtual discussions, meetings, and classes and has particular application in Internet-based networks of schools (Stevens, 2005b). Cybercells provide teachers with opportunities to discuss their respective work with other teachers on-site and online, for students to similarly discuss their work with other students and for teachers to engage students in both actual and virtual environments.

BACKGROUND

A feature of education in the Canadian province of Newfoundland and Labrador is the proliferation of Internet-based networks of small schools in rural communities (Stevens, 2001, 2003). Within these networks virtual classes have been developed for teaching an expanding range of subjects at high school level. The development of Internet-based school networks, facilitating the creation of virtual classes, has implications for the professional education of teachers in this part of Canada who will, increasingly, be teaching both face-to-face and online, or virtually and actually. Cybercells provide a way of integrating e-learning and traditional face-to-face instruction.

The first step in the introduction of cybercells to pre-service high school teachers is the development of awareness of recent changes in school organization in the province, particularly in the majority of schools that are located beyond major centres of population. Most of these institutions are physically small but networked with other schools both academically and administratively. Teachers in this province are, accordingly, increasingly expected to provide instruction between sites as well as in traditional classrooms.

The second step in the creation of cybercells for pre-service high school teachers is an introduction to the potential of professional collaboration for effective integration of actual (face-to-face) and virtual instruction in classrooms. Traditionally teachers have been professionally prepared to teach in face-to-face classroom environments that have not been open to other classes. In opening traditional on-site classrooms to other classes for part of the school day, using the Internet, collaboration between teachers becomes essential. In Newfoundland and Labrador's networked school environment, on-site and virtual teachers are provided with a structure within which to manage collaboration. At the pre-service teacher level collaboration is taught through learning circles within which students are asked to reflect on and critique one another's recent intern experiences in schools.

A third step in the development of cybercells for the integration of virtual and actual teaching and learning, based on step one (collaborative teaching and learning structures) and step two (collaborative teaching and learning processes), is the building of shared realities within which mutual understanding can be negotiated.

TEACHING AND LEARNING IN NETWORKED VIRTUAL ENVIRONMENTS

Three stages can be identified in the development of teaching and learning in networked virtual environments that have particular application for the provision of education in sparsely-populated regions such as the Canadian province of Newfoundland and Labrador.

Stage One: Awareness of Collaborative Teaching and Learning Structures

The province of Newfoundland and Labrador is sparsely settled with a population of approximately 500,000

people, of whom less than 30,000 live in Labrador. In Newfoundland, the island portion of the province, almost all of the population lives in coastal settlements, including the capital, St. John's. Approximately two-thirds of schools in the province are located in rural communities. With continuing out-migration most small schools in Newfoundland and Labrador are decreasing in size and during the last decade many have closed and local students have had to travel to larger centres to continue their education. There was until recently a category of education in this part of Canada officially known as "small necessarily-existent schools," meaning they were too geographically isolated from all other schools to be closed. Since 1998 there has been consolidation of school boards in Newfoundland and Labrador from 10 to four reflecting the reduction in both the size and number of schools in the province. The changes that have taken place in the organization and administration of education in rural Newfoundland and Labrador have influenced classroom structures and processes. In 1998 the first digital intranet was established in which eight schools in the same rural district were academically and administratively integrated, through the local school board, so that teaching and learning could be shared between the dispersed rural sites. The eight participating schools had to coordinate senior classes in those areas of the curriculum that were taught across multiple sites. Some schools received instruction for senior classes from teachers located on other sites (schools) within the network. Collaboration between schools, teachers, and students in the initial teaching and learning network was essential. Classrooms that had previously been closed to one another began to open to classes located in other parts of the district network for both teaching and learning. The autonomy of teachers within their own classrooms as well as their isolation from other members of the profession was challenged by this initiative. Students struggled with the concept of discussing their work with peers they did not know who participated in shared lessons taught from other locations. The traditional closed, or autonomous, model of the school was challenged by an increasingly open teaching and learning environment.

Within the first digital intranet in the province four Advanced Placement (AP) Web-based courses in biology, chemistry, mathematics, and physics were developed for teaching on the Internet. Each of the four subject areas was organized by a development team. A lead science teacher in each discipline was paired with

recent graduates in biology, chemistry, mathematics, and physics who possessed advanced computer skills including Web page design, Java, and HTML. The lead teacher and the graduate assistant were advised from time to time by Faculty of Education specialists at Memorial University of Newfoundland in each curriculum area and, where possible, scientists from the Faculty of Science. The extent to which each Web-based course was developed by a team of four people varied. Most course development took place through interaction between lead teachers and the recent graduates. Although at times professors had different opinions as to the most appropriate approach to the design of the courses, this model enabled the four courses to be developed over a 16-week summer recess period in time for the 1998-1999 school year. All schools involved in the project had DirecPC satellite dishes installed to provide a high-speed down-link. In most rural communities in this part of Canada, digital telecommunications infrastructures do not enable schools to have a high-speed up-link to the Internet.

The initial digital intranet initiative challenged the notion that senior students in small schools have to leave home to complete their education at larger schools in urban areas. By participating in open classes in real (synchronous) time, combined with a measure of independent (asynchronous) learning, senior students were able to interact with one another through audio, video, and electronic whiteboards. From time to time they met for social occasions and to spend some time with their science teachers in person. The initial electronic linking of eight sites within a school district to collaborate in the teaching of AP biology, chemistry, mathematics, and physics initiated a series of open classes in rural Newfoundland. The creation of the first digital intranet was an attempt to use information and communication technologies to provide geographically-isolated students with extended educational and, indirectly, vocational opportunities. This has been part of a broader pan-Canadian initiative spanning the last decade to prepare people in Canada for the Information Age (Information Highway Advisory Council, 1997). The development of the first digital intranet within a single school district involved the introduction of an open teaching and learning structure to a closed one. Accordingly, adjustments had to be made in each participating site so that administratively and academically, AP classes could be taught. While technological and administrative changes supported this initiative,

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