

**The ABEL Project**  
**Final Research and Evaluation Report**

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## Executive Summary

*Introduction.* The Advanced Broadband Enabled Learning Project (ABEL) sought to break new ground in Canada by applying leading edge technologies in the service of a comprehensive and innovative new approach to inter-jurisdictional teacher professional development. It was designed to facilitate the transformation of teaching by establishing a sustainable collaborative learning model for distributed educational delivery and teacher growth that incorporated the use of broadband technologies. The project provided teachers in selected schools in Alberta and Ontario with access to videoconferencing hardware, a range of software applications, the technical and pedagogical support needed to use these applications, access to Canada's high speed data network CA\*Net 4, and commitments from their school boards to facilitate participation in the project. ABEL's goal was to provide teachers with opportunities for continuous self-directed professional learning on the job in partnership with colleagues in the project, and to move teaching toward being more learner-centred, collaborative, and inquiry-based. Project development started in early 2002, with the teacher professional development component being in full operation by fall 2002. Both public and private partners, including York University and the University of Alberta and a number of software and resource providers, as well as thirty-two teachers from six secondary schools (three in Edmonton and three in the Greater Toronto Area) participated in the project.

In the professional growth program, teachers participated in a combination of large group videoconference events that focused on key themes (e.g., the use of ABEL tools, inquiry learning, effective videoconference techniques, and small group subject area-specific videoconferences in which they brainstormed, planned learning events, and sought out colleagues with whom they could develop cross-class and inter-provincial student learning projects. The development of learning events and projects was facilitated by post-secondary advisers and learning leaders associated with ABEL, who supported teachers in incorporating inquiry learning approaches into their initiatives. The projects were implemented in the classroom, and could incorporate one or more of a number of elements, including class to class videoconferencing sessions, the use of streaming media from repositories, student creation of web pages, PowerPoint presentations or other digital artifacts, and videoconferences with leading experts or participants in significant events. Projects ranged in extent from bringing in a guest speaker as an enrichment activity to having students work over several weeks on inquiry-oriented projects which incorporated videoconferencing events to support collaboration with another class. Both students and teachers made use of the ABEL Community web site, which provided discussion forums, chat, a calendar of ABEL events, and a portal to the suite of ABEL software tools and online resources.

The research team employed participant interviews, surveys, observations, and learning project case studies to examine how teachers grew professionally as a result of engaging in project activities and events. The study also investigated the changes in practice that occurred over the duration of the project, how students benefited from ABEL learning projects, and institutional impacts. These findings, together with data on the obstacles and

challenges ABEL encountered, served as the basis for developing an understanding of the conditions needed to sustain the momentum for change generated by the project.

*Teacher professional growth.* All of the teachers who actively participated in the project experienced significant professional growth, although the nature and extent of that growth varied. Development occurred in two main areas: level of technology skill, and changes in pedagogical orientation and practice. With respect to the former, even those teachers who already possessed considerable information and communication technology (ICT) skills found themselves developing new abilities in the use of broadband for streaming media and videoconferencing, and expanding their knowledge to incorporate unfamiliar resources and unique software tools that were part of the ABEL Project. Teachers with less ICT background found involvement with ABEL greatly expanded their capabilities and comfort with a range of ICT applications from discussion forums to PowerPoint and the WebCT course authoring tool. Over the course of the project, teachers explored and utilized many of these new tools, technologies, and resources in their ABEL projects, and then began incorporating the use of some of them into their set of common teaching practices. Their work demonstrated their growing capacity to effectively infuse ICT into their teaching.

Most teachers found their experiences in ABEL projects also led to an expansion of their pedagogical repertoire to include more collaborative and student-centred instructional approaches. In the words of one teacher, her ABEL project “enabled [me] to see there are other ways students can learn and become more involved personally in learning.” Many teachers reported undergoing changes in their perspectives on what constitutes good teaching, and were beginning to grapple with the concepts and rationales of inquiry learning and in certain cases to start implementing many aspects of inquiry pedagogy in their ABEL projects. For several teachers their exposure to inquiry learning models and techniques was a professional awakening that heightened their enthusiasm for teaching; for example, one English teacher revised her entire grade 11 course to incorporate inquiry learning and found the results very rewarding. There was a small minority of teachers for whom inquiry pedagogy had little appeal, however, as it was seen as impeding the full coverage of a broad set of curriculum expectations that had to be met.

Teachers cited a number of factors that promoted their professional growth in the project. For the vast majority, the most important was the affordances it provided for collaboration with colleagues, through both the large-group and especially the smaller subject-oriented teacher videoconferences that were held intermittently throughout the year, the two face to face Summer Institutes held for three days each year, and opportunities to work with partners from other schools to collaboratively develop their learning projects. Teachers greatly valued the learning they gained collaborating with colleagues both formally and informally, and a strong sense of community developed amongst participants that cut across school and provincial jurisdictions.

A central element of the ABEL model as implemented that facilitated teacher growth was the practice of grounding professional development in the classroom. This was achieved by providing ongoing support to teachers as they collaborated together in the creation of innovative curriculum projects. To foster this development, ABEL provided hardware

and software resources, pedagogical support, and (most significantly) regularly scheduled release time which afforded teachers the time needed to inquire and brainstorm, learn the technology, and plan and develop student learning projects.

The projects developed by teachers varied in the degree to which they incorporated the key elements of inquiry pedagogy (e.g., student agency, authentic contexts and audiences, and collaborative knowledge building). Most made use of videoconferencing to allow students to interact with participants in significant events or experts normally not accessible, and/or to give students themselves a chance to dialog with remote peers around project issues. It was employed to support interaction for a range of curricular purposes, including facilitating interschool math problem solving activities, critiquing of student art by artists, and conducting interclass mock trials. Students relied heavily on ICT for their project research, communication, and presentation, and were usually allowed to select what ICT tools and resources they wished to use for their work. Student project development might incorporate one or more of a wide range of digital products and media, extending from PowerPoint presentations to web page authoring and digital video production.

*Student outcomes.* In most ABEL learning projects, students displayed higher levels of engagement than was typical in other classroom contexts. Videoconferencing proved to have a notable, even dramatic impact on most students' engagement levels in ABEL projects, and not just during the videoconferencing event itself. Students reported finding videoconferences interesting and exciting; they enjoyed opportunities to see and talk to students from other schools and regions, and to discover differing regional views on topics and issues being studied (such as energy use and conservation). They were also highly attentive when experts or participants in significant events participated in a videoconference. But the novelty of the medium, which no doubt contributed to student excitement, also had a tendency to limit meaningful dialog, as most students appeared quite inhibited about speaking "on camera"—a reaction that would likely diminish given greater exposure to the experience.

Curriculum-embedded projects that incorporated videoconferencing were seen in most cases as having significantly better outcomes than traditional projects. Students conducted more thorough research, spent more time developing reports and presentations, collaborated with peers more effectively, and were often more self-initiating and self-directive in their work. In a few classes where major inquiry projects were undertaken teachers noted improvements in grades for exams that covered project topics. Teachers also saw students benefiting from the widened purview that videoconferencing with others in a distant region of the country made possible. Exposure to different regional cultures and perspectives was seen as broadening students' awareness and appreciation of Canada and their place in it.

Students were able to produce digital presentations and artifacts for their projects that incorporated a greater range of media and were more elaborately designed than Bristol-board projects, and their work commonly demonstrated a high level of mastery of ICT tools. The projects' conceptual content was often more developed and extensive than what teachers were used to seeing (but by no means was this always the case).

*Institutional roles and jurisdictional issues.* Several faculty from the York University Faculty of Education participated in the project, introducing and guiding preservice candidates in the use of ABEL tools and resources. It was also their intention to work with the practicum placement staff to ensure that some of their students would be placed with ABEL teachers for their field experiences, but with a few exceptions these placements did not occur. The faculty group also developed an Inquiry Learning website with broadband resources for supporting inquiry pedagogy in the ABEL community. The University of Alberta Faculty of Education offered a Masters-level online course on broadband-enhanced learning for the participants which six teachers completed, and found to be both interesting and of practical value. Seneca also offered courses in ICT and education to ABEL teachers but no teacher completed any course. One Seneca faculty member became an integral part of the mathematics teacher group, acting as a mentor to both teachers and students. Staff from the Galileo Network in Alberta were also involved with the math teacher group, and supported several other teachers in their use of Galileo's IO course development environment as well as presenting to ABEL teachers on inquiry learning principles in two teacher videoconferences. Artists from the Banff Centre for the Arts acted as resources and mentors in one major arts project and their Director of Continuing Education was an active member of the ABEL Learning team.

The ABEL leadership played a critical role in negotiating and facilitating cooperation between the institutions and jurisdictions involved in the project. Without the efforts of the full-time management team working together with the learning lead team institutional inertia would have doubtless prevailed and the ABEL endeavour floundered. These dedicated individuals also provided support to teachers seeking ways to overcome the two inter-jurisdictional issues that were of primary significance in the project. The first of these was a consequence of the differing provincial curriculum expectations and requirements in Alberta and Ontario which sometimes made collaboration between teachers teaching the same subject in a given grade difficult, either because the teachers had no units in common or specific curriculum expectations to build joint projects around, or because the common curriculum was covered at different points in the year in each class. The second arose from the inter-jurisdictional differences in school schedules and annual calendars, together with the two hour time difference between provinces and the lack of a regular release time for the 11 teachers participating from the Toronto school. These differences made scheduling videoconferences very challenging; many teachers in Toronto could not attend teacher videoconferences as they often occurred in school hours, and bringing students together for a conference sometimes meant pulling them out of scheduled classes or having them stay after school. Teachers demonstrated considerable ingenuity in working around these difficulties, and were able to successfully implement a number of curriculum-embedded interprovincial projects. Nonetheless these obstacles did prevent several teachers from finding partner classes for their ABEL projects.

*Moving ABEL forward.* Maintaining the momentum for transformation in teaching and learning that has developed in the ABEL community will be a major challenge, particularly in the light of the substantial reduction in financial resources that the initiative now faces. Several problematic elements of the ABEL experience to date will

need to be addressed to sustain and deepen ABEL's impact on teaching and learning. The first concerns the technical reliability, quality, and ease of use of the broadband technology, particularly that associated with videoconferencing. Teachers cited the poor reliability of the videoconferencing as the major weakness in the project. Conference connections could often take ten or fifteen minutes to establish, or occasionally not be established at all; audio and/or video connectivity would be dropped and have to be reestablished; and sound quality was sometimes so poor as to make understanding remote speakers (especially students) difficult. These problems would frustrate teachers and make students lose interest in the events, reducing their educational value significantly on many occasions. Teachers also requested a videoconferencing system that would be easier to set up, use, and take down so it could be employed more quickly and flexibly; something akin to the ease of working a VCR.

Increasing collaborative opportunities for teachers by raising the number of participating teachers and, where possible, negotiating better synchronization of course and release time schedules across schools and districts is the second step that needs to be taken. Easing timetabling issues would allow teachers to pursue the development of truly collaborative interclass inquiry projects in which students work in small cross-class groups on a sustained basis, something that has not occurred to date in the project.

Efforts need to continue to further advance teacher pedagogy by means of collaborative coaching and mentoring practices. If teachers lose their release time they will only be willing to devote the extra time needed to sustain ABEL projects in class if they see students benefiting substantially from this work, and that will only happen when advanced pedagogies of inquiry and student-directed learning are employed. For as with any other new technology, the novelty of videoconferencing will wear off and its utility will then very much depend on the quality of teaching activities in which its use is embedded.

Having extra time available to pursue ABEL work was critical to the participating teachers. Most of the teachers with release time indicated that there was no way they could have achieved what they had without it, and many thought that if it was lost the pace and extent of their project work would drop off. Every effort should be made to maintain ABEL development time, especially for teachers new to the ABEL project. For in contrast to more conventional approaches to professional development, the open-ended, teacher-driven, and job-embedded nature of the ABEL model necessitates considerable self-initiated exploring, learning, and experimenting on the part of participants if teaching is to be transformed. In addition, effort should be made to retain and maintain ABEL tools as well as the online ABEL Community.

*Conclusion.* The ABEL project was largely successful in demonstrating the value of its collaborative professional development model. A true learning community was created, in which teachers after some initial hesitation assumed agency in their own professional growth, collaborated and supported each other in developing new technical and pedagogical knowledge and exploring new teaching practices, and frequently incorporated key elements of inquiry learning in their ABEL teaching projects. If the

issues outlined above are successfully addressed, ABEL's capacity to help teachers transform their practice can be both sustained and strengthened.



## Table of Contents

<b>Executive Summary .....</b>	<b>3</b>
<b>1. Introduction to the ABEL Project.....</b>	<b>11</b>
1.1. The Challenges of Changing Educational Practice with ICT .....	11
1.2. Project Overview .....	13
1.3. Project Events and Activities .....	16
<b>2. Overview of Research and Evaluation Methodology .....</b>	<b>19</b>
<b>3. Teacher Professional Growth .....</b>	<b>21</b>
3.1. Teachers’ Perspectives on Growth.....	21
3.2. Collaboration.....	26
3.2.1. Collaborative Processes, Tools and Resources.....	28
3.3. Other Processes and Resources.....	33
3.4. Impediments to Growth .....	35
3.5. Growth Demonstrated Through Leadership Activities.....	38
<b>4. Changes in Teacher Practice .....</b>	<b>40</b>
4.1. Classroom Practice.....	40
4.2. Teachers’ Pedagogical Orientations .....	41
4.3. Challenges and Obstacles .....	44
4.4. Plans.....	46
<b>5. Student Outcomes .....</b>	<b>47</b>
5.1. The Effects of Videoconferencing.....	47
5.2. The Use Of Discussion Forums And Synchronous “Chat” .....	51
5.3. Other Student ICT Use.....	51
5.4. Inquiry Learning .....	53

<b>6. The Contributions of Higher Education to ABEL.....</b>	<b>55</b>
6.1. York University .....	55
6.2. University of Alberta .....	58
6.3. Seneca College.....	58
6.4. Galileo Educational Network.....	60
6.5. Banff Centre for the Arts .....	61
<b>7. Institutional issues and impacts.....</b>	<b>62</b>
7.1. School Level .....	62
7.2. Beyond the School .....	63
7.3. Inter-jurisdictional.....	63
<b>8. Moving ABEL Forward .....</b>	<b>66</b>
8.1. Technological Issues.....	66
8.2. Collaboration and Community Building.....	67
8.3. Advancing the Pedagogy .....	69
8.4. Time for Exploring, Learning, and Planning.....	70
8.5. Summing Up.....	72
<b>9. References.....</b>	<b>73</b>
<b>10. Appendix A.....</b>	<b>74</b>
<b>11. Appendix B.....</b>	<b>75</b>
<b>12. Appendix C.....</b>	<b>76</b>
<b>13. Appendix D.....</b>	<b>80</b>
<b>14. Appendix E.....</b>	<b>88</b>
<b>15. Appendix F.....</b>	<b>93</b>

# **1. Introduction to the ABEL Project**

Two years ago York University together with a variety of public and private sector organizations entered into an agreement with Canada's advanced Internet development organization, CANARIE, to create and financially support the Advanced Broadband Enabled Learning Project. Known as ABEL, the project sought to model the transformation of public education in Canada by providing teachers in selected schools in Alberta and Ontario with access to a range of software applications, the technical, and pedagogical support to use these applications, access to Canada's high speed research network CA\*Net 4, and commitments from their school boards to facilitate participation in the project. The transformation that project leaders envisioned was to move classrooms toward being more learner-centred, collaborative, and inquiry-based, and to provide teachers with opportunities for continuous professional learning on the job in partnership with colleagues in the project. ABEL's approach to professional development was designed to employ the practices it aimed to foster in teachers, by moving away from the traditional prescriptive paradigm to one that provided teachers with the time, support, resources, and tools needed for collaborative professional inquiry and experimentation in their practice, enabling teachers to initiate and direct their own growth. The leaders' ambitions were lofty. Not only did project leaders have to reach a consensus among participants with differing agendas and expectations of the project, but they had to overcome past teacher and student practices, technical hurdles, resistance to this new approach to professional development, and inter-institutional and jurisdictional barriers—all within two years before the CANARIE funding ceased.

This report documents the experiences of participants in ABEL. It describes the professional growth of project teachers, changes in teacher practice that occurred as a result of the project, the impact of ABEL on student learning and engagement and participating institutions, and efforts made by participants to ensure the project remained viable. Additionally, it provides recommendations about how the project can increase its likelihood of becoming self-sustaining.

## **1.1. The Challenges of Changing Educational Practice with ICT**

Beyond the specific challenges just cited that ABEL faced, the literature on educational reform underscores the general difficulty of significantly changing educational practice, a reality that ABEL also had to tackle. Michael Fullan, who has extensively studied and written about educational change, estimates that an elementary school can be turned around from a poor performing school to a good or better one within three years, a high school can be reformed in six years, and a school district in about eight years (Fullan, 2001). Even at that, he adds, the number of examples of schools and school districts that have been transformed is discouragingly small given the intense efforts that have been devoted to educational reform over the last several decades. Moreover, the transformation in these schools is often fragile, so much so that if one individual leaves the change may flounder. Reform efforts that have focused specifically on using information and communications technology (ICT) by and large have fared no better in producing

fundamental changes in teaching and learning, nor have they shown the productivity gains often promised by their leaders (Cuban, 2001).

The heart of this dilemma appears to be the lack of support for teachers (Fullan, 2001). Teachers, acting both as individuals and collectively with their colleagues, are absolutely vital in sustaining reform as school change clearly stands or falls depending on what teachers choose to do in the classroom (Elmore, Peterson, & McCarthy, 1996; Fullan, 2001; Owston, 2003). The challenge is exceedingly difficult, however, because teachers tend to “gravitate” toward approaches that are congruent with their past practices, focus on surface manifestations of reforms (*e.g.*, discrete activities or materials) rather than on deeper pedagogical principles, and tend to graft new approaches on top of existing practices without altering past routines or norms (Coburn, 2003). Collegiality, open communication in the school, trust, support, and high job satisfaction and morale among teachers are vital. Schools that focus on team learning foster a culture that values these attributes (Senge, 2000). A major part of team learning is teacher professional development—but not the traditional notion of professional development that permeates most schools, where one-shot workshops and outside authorities “deliver” professional development to teachers, as this kind of professional development offers very limited growth opportunities for teachers. Rather professional development that is long-term, school-based, collaborative, focuses on students’ learning, and linked to curricula tends to be most effective (Hiebert, Gallimore, & Stigler, 2002). Added to this, ICT specific professional development should involve teacher hands-on technology use, a variety of learning experiences, ongoing technical assistance and support, and learning curriculum-specific software applications (NCREL, 2002).

While there is a very limited amount of research available on broadband use to date, what evidence there is suggests that the potential of broadband as a technology to enrich education is considerable (Wideman, 2003). By enabling real-time, multimodal, and interactive connections between groups of learners (and teachers), broadband offers a powerful new medium that when integrated into the appropriate pedagogy can help teachers foster learning that is both more collaborative—as students are afforded the ability to work together with others—and more authentic, extending beyond the artificial boundaries of the classroom. But these outcomes are only likely when a number of preconditions are met. These include the development of a “virtual teacher community” with a strong and ongoing commitment to exploring new forms of teaching, and which provides a collaborative networking space in which teacher to teacher connections—the basis for project-building—can be fostered and sustained. Reliable and high quality videoconferencing signal transmission is also critical to success. Other important requirements include a strong technical and administrative support structure, extended professional development opportunities, teacher time for project development, and sufficient financial resources to support project implementation. Therefore, if these factors are attended to, the potential of a project such as ABEL succeeding is increased.

To increase the likelihood that new practices introduced to schools through ABEL are continued beyond the formal end of the project, attention also has to be directed at the factors cited in the literature as contributing to the sustainability of innovations. Fullan (2001) posits that four characteristics of change are relevant: *need*, which deals with the

fit between the innovation and district or school needs; *clarity* of the goals and means of achieving them; *complexity*, which concerns the extent and difficulty of the change for those implementing it; and *quality and practicality*, which is about how good the innovation is and how attainable it is. On the other hand, Rogers (1995) suggests that there are five factors related to the nature of innovations and their rate of adoption: *relative advantage*, the degree to which an innovation is perceived as better than the idea it supersedes; *compatibility*, the extent to which it is consistent with existing values, experiences, and needs of adopters; *complexity*, how difficult it is to use and understand; *trialability*, the degree to which it can be experimented with on a limited basis; and *observability*, the degree to which the results of the innovation are visible to others. Despite their extensive writings on the change process and the similarities between their analyses of the nature of innovations, neither Fullan nor Rogers cite each other's work. Fullan's *complexity* and *need* are similar to Rogers' concepts of *complexity* and *compatibility* respectively, however they diverge in their views on the remaining factors. Owston (2003) in an international study of innovative pedagogical practices using ICT found support for Fullan's *need* and *practicality*, and for three of Rogers' (1995) five factors: *compatibility*, *relative advantage*, and *observability*. Moreover, Owston emphasizes that teachers must see that students are benefiting from an innovation because, without this, they are not as likely to devote further time and effort to developing the innovation.

With this understanding of the centrality of teachers in school reform, the challenges of employing broadband technology, and the factors affecting sustainability, the project leaders embarked on designing and implementing ABEL beginning in August 2002 with an introductory ABEL Summer Institute for participants. The project was formally launched in classrooms at the beginning of the 2002-2003 school, and it continued through into the 2003-2004 school year. Again there was an ABEL Summer Institute in August 2003, which is reported on in *Professional transformation: The ABEL 2003 Summer Institute* (Morbey & Owston, 2003). This final ABEL report covers the period from August 2002 to March 31, 2004.

## 1.2. Project Overview

The ABEL project developers formally stated its mission as to:

- establish an interactive collaborative learning model for educational delivery and teacher development scalable to the national level and transferable to other educational entities, government and industry;
- support cost-effective dissemination of leading-edge instructional design and educational expertise; and
- develop the basis for sustainable inter-jurisdictional and inter-institutional collaboration in supporting professional development of teachers.

Overall some 300 individuals participated in ABEL, drawn from York University, the University of Alberta, Edmonton Public Schools, the York Region District School Board,

the Toronto District School Board, and Seneca College of Applied Arts and Technology, as well as from numerous other public and private partners (see Appendix A for a listing of these other partners). Included in this group six secondary schools, three in Edmonton, two in York Region north of Toronto, and one in Toronto. Area. There were thirty-two teachers who participated; eleven from Toronto, seven from York Region, and fifteen from Edmonton.

ABEL is made up of four components, which taken together, comprise what project leaders refer to as the ABEL model. The first of these components is the *learning platform*, which makes available to project participants via CA\*Net 4 and the public internet a range of learning resources and tools for classroom use. Available tools included:

- Internet-based video conferencing hardware and software;
- WebCT (<http://www.webct.com>), the widely-used course management system;
- Intelligence Online (IO) (<http://www.myio.org/>), an online learning application that guides teachers through the process of creating and implementing inquiry-based learning projects;
- Barrier Free Education, a web-based tool particularly suitable for the hearing and visually impaired that allows for the enhancement of multimedia artifacts with synchronized text and audio; and
- Community Zero (<http://www.communityzero.com>), a web-based discussion and file sharing tool. The project's website, called The ABEL Community (<http://abelearn.ca>), was built around this tool. (A graph showing the use of this tool over the course of the project can be found in Appendix B.)

Resources provided to project teachers were:

- Heritage Minutes (<http://www.histori.ca/minutes>), a collection of dramatic 60-second "mini-movies" about significant events from Canada's past;
- CineRoute ([http://cmm.onf.ca/E/index\\_cineroute.epl](http://cmm.onf.ca/E/index_cineroute.epl)), a collection of over 10,000 original English and French films from the national Film Board of Canada available for streaming on the Web;
- Insite (<http://www.magiclantern.ca>), a resource database of nearly 10,000 video learning objects aimed at the k-12 curriculum;
- Histor!ca (<http://www.histori.ca/default.do>), a Canadian history education resource site with a collaborative on-line learning program (Weblinks) that links high school students in Canada with their peers around the world to discuss relevant issues;
- E-STAT (<http://estat.statcan.ca>), an interactive database of Canadian socio-economic statistical information;
- TV Ontario's Curriculum Resource Bank (CRB), a library of streamed video content that is linked to the Ontario curriculum expectations; and

- the Ontario Ministry of Education’s Learning Object Repository (LOR), that provides teachers with a data bank of re-useable digital learning objects and activities which are tagged to the provincial curriculum expectations.

ABEL’s second component is a *professional growth program*. The program was intended to be participant driven in its design, job-embedded, to encourage teacher reflection, and provide a mentoring element. In the growth program, teachers assumed responsibility for collaboratively developing innovative curriculum projects incorporating broadband technologies. They participated in a combination of large group videoconference events that focus on key themes (e.g., use of ABEL tools, inquiry learning, effective videoconference techniques) and small group subject area-specific videoconferences to brainstorm, plan learning events, or coordinate curriculum. A key feature is that university faculty from the York University Faculty of Education collaborated with classroom teachers and student teachers who are placed in ABEL classrooms for their practicum experience. For teachers seeking formal accreditation, an online graduate degree credit course tailored for ABEL teachers was offered by the University of Alberta Faculty of Education. Clusters of ABEL professional activities were developed for Ontario teachers so that they could receive credit toward the Ontario College of Teachers Professional Learning Program requirement, however during the second year of the project the College terminated this aspect of their accreditation program.

Third is an *implementation strategy* that focused attention on managing change, motivating people to become change agents, and creating an environment that supports risk taking. ABEL’s goal is to create an empowering culture that allows teachers to take responsibility for their own learning and professional growth. A key strategy to accomplish this was to overcome the major structural impediments to widespread and significant use of new technologies in education including:

1. inter-institutional barriers and inter-provincial barriers (e.g., collaborative delivery of teacher education, provincial curricula);
2. pedagogical barriers (e.g., the lack of educational models that provide guidance on structuring learning activities for broadband environments);
3. professional barriers (e.g., differing professional development cultures and professional isolation of teachers); and
4. technological challenges (e.g., access to high bandwidth networks and related technologies).

An integral part of the implementation strategy was the ABEL project management team that consists of a full time project manager and assistant, a learning lead and Ontario co-lead, a technical lead, and research co-leads, who together coordinate the four ABEL components and share responsibility for planning and supporting project activities. The leads also had responsibility for preparing quarterly progress reports for submission to CANARIE. Overseeing the project was a board of directors that consisted of the leads and representatives from the major stakeholders involved in the project.

The final component is a *research and formative evaluative strategy* that sought to inform and shape the project as it evolved. A research team led by researchers from York

University, with assistance from the University of Alberta, has been an integral part of ABEL since its inception and is charged with this responsibility. The team has employed a variety of research methods throughout the project, such as detailed classroom case studies, teacher surveys, document analyses collection, interviews with key informants, and student focus group interviews and surveys. (This methodology is described in a subsequent section.) Two formal reports have been produced by the team to date: a 2002-2003 interim report and a report on the summer 2003 ABEL professional development institute. In addition to the formal feedback, project leaders encouraged feedback and comments from participants whenever a project event or activity occurred to aid in planning future events.

What follows is an overview of the different activities, tools and resources that were integral to the ABEL project.

### 1.3. Project Events and Activities

Throughout the two years of ABEL, a wide variety of broadband videoconference events or sessions took place. The frequency of occurrence of the various categories of events that occurred is given in Figure 1 below.

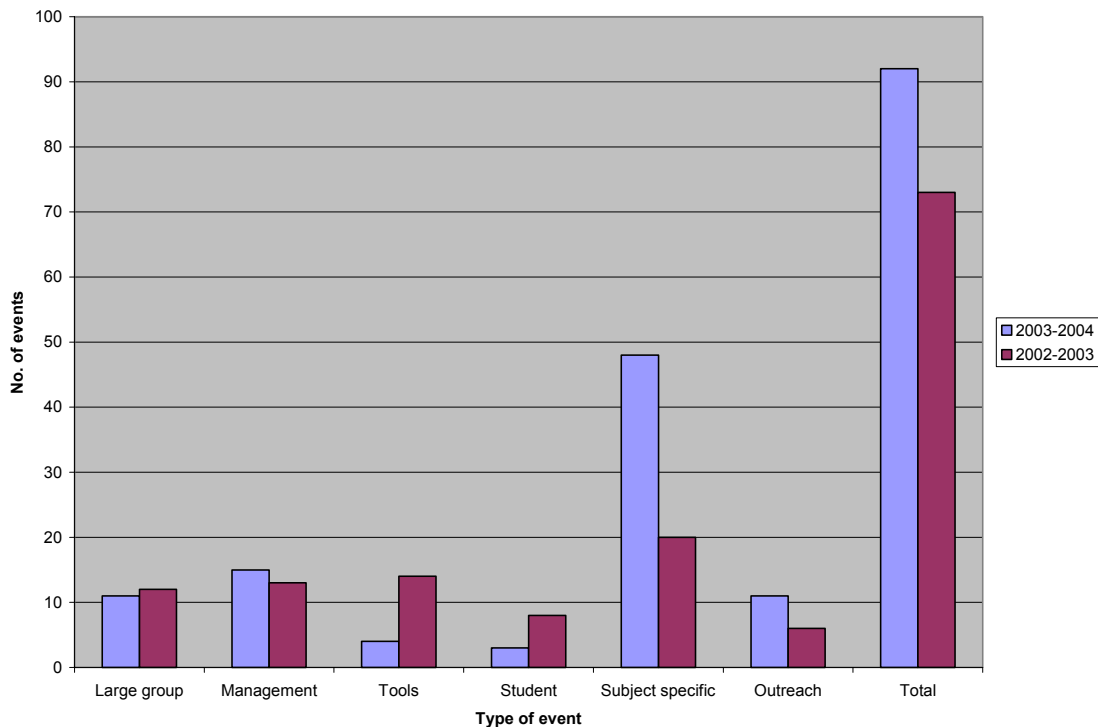


Figure 1: Frequency of Broadband Events per Year<sup>1</sup>

<sup>1</sup> Note that for the 2002-2003 school year the period is for 10 months, while for the 2003-2004 it is for 7 months.



The types of events shown in the figure are explained below, and examples of each are given where relevant.

*Large group sessions* involved most of the teachers and project leaders. These were typically held monthly for professional development purposes and to deal with project announcements and administrative issues. For example, in one session, there was a discussion about inquiry learning led by representatives from the Galileo Educational Network (an Alberta teacher professional development organization). Teachers then shared critiques of various projects they had researched beforehand with the whole group. During the second year of the project these sessions were split into two groups for two reasons: (1) to ensure more opportunity for participants to discuss and interact; and (2) to provide a more reliable videoconferencing environment. Appendix C provides a table of major teacher large-group and subject-specific sessions over the 2002-03 school year and the first seven months of the 2003-04 year.

*Management sessions* involved meetings of project leaders and/or the board of directors for project planning and reporting. These were held regularly throughout the project.

- *ABEL tools* sessions were devoted to learning new tools or resources such as WebCT or IO, or on how to use videoconferencing effectively. The sessions also provided an opportunity for teachers to discuss issues with members of the technical team, and they gave the private sector partners the chance to meet with individuals and individual sites for training and feedback.
- *Student events*. This category was when students in one school met with other students in another via videoconference to share activities and ideas. For example, one Ontario high school teacher had his students share mathematics ideas with students at an Alberta school. And students in physics classes shared ideas and information and developed plans for collaborative projects over the broadband network using ABEL tools.
- *Subject-specific sessions* focused on one of the four main curriculum areas of ABEL—science, mathematics, social studies, and arts/multimedia. This category includes two types of events: sessions where subject area teachers met to discuss and plan projects, and student learning events. In the former, teachers supported each other to implement new pedagogical approaches and to use new technologies. Teachers worked together over the broadband network to collaboratively develop web-based resources, learn the ABEL tools, and brainstorm the solutions to the challenges of using technology in the classroom. In the latter, students working on projects under the guidance of their teachers in two or more schools would videoconference to discuss issues and findings, debate topics, present artifacts, or make presentations. Examples include mock trials in which students in different classes took on the various roles associated with a court case (judge, jury, prosecution team, etc.) to better understand topical issues and their relationship to the legal process, and an event hosted at the Ontario Science Centre in which science students present at the Centre demonstrated and explained DNA fingerprinting protocols to students in Alberta using authentic

DNA lab equipment. In a third example, the History Festival Project, high school students at one school created comedy skits, a play, and readings on the web for students in other ABEL schools to watch and review. Each school reviewed the student performances and made critical suggestions for improvement on either the history or the performance itself via videoconference. The site that is voted the most helpful at the end of the term won the “*Peoples Choice Award*.” More detailed examples of student subject-specific learning events and their outcomes can be found in the three project case study summaries presented in Appendix D of this report. Appendix E provides a table of student subject-specific sessions that took place over the 2002-03 school year and the first seven months of the 2003-04 year.

- *Outreach sessions* used videoconferencing to link classrooms to experts with a variety of backgrounds who were not formally associated with ABEL. For example, a professional singer-songwriter performed for students at two schools. This one-man performance brought shanties, ballads, anthems, work-songs, satirical verse, spirituals, marches, rap, and protest songs into the high school classes, providing a unique view of issues, events, and personalities looked at in the Canadian Studies history curriculum. Other examples include linking to international events, dialoging with peace activists, and working with other CANARIE funded projects (e.g., Music Grid), and post secondary institutions. (These events are also listed in the tables in Appendix E).

Of particular note in the above graph is the more than doubling of the subject-specific events between the first and second years, largely because teachers found subject specific events more fruitful and a better use of their time than the large group sessions. Outreach sessions doubled too as teachers sought to bring insights and knowledge from experts beyond the classroom to their students and foster meaningful dialogs. Also of note is the significant drop in ABEL tool events as teachers became familiar with them, and the decrease in student events. The drop in student events occurred because during the second year student sharing was more integrated in subject-specific events rather happening as an isolated activity.

In addition to the videoconferencing events, teachers employed ABEL tools and resources in their classrooms for projects. These reportedly took place often, although we do not have specific counts or details of all of them because of their decentralized nature. Examples of these included: high school mathematics students preparing multimedia presentations on course topics with the use of websites and PowerPoint; a teacher developing an inquiry-based Greek History unit that included PowerPoint slides on local Toronto architecture which has been influenced by the Greeks; a mathematics class having students explore the use of Statistics Canada’s database to develop projects for other ABEL mathematics classes; students using the streamed video applications to build interactive projects; and students viewing the curriculum-linked educational video available in Insite and the Curriculum Resource Bank. Many of these projects are listed in Appendix F

## 2. Overview of Research and Evaluation Methodology

The research team's research agenda was flexible and responsive to the evolving design of the project and changing needs for information. We focused on five main research and evaluation questions that are described below.

1. *How did project teachers grow professionally as a result of engaging in project activities and events?* There was an expectation by project developers that teachers would benefit considerably by taking part in professional activities in collaboration with their colleagues. Additionally, the fact that most of the project's activities were directly connected to the curriculum that teachers were teaching was also seen as increasing the opportunities for teacher professional growth.
2. *What changes in teacher practice occurred over the duration of the project?* Most teachers began the project with limited skills in integrating technology into their teaching. Therefore, there was an expectation that through experimentation, reflecting on their work, and sharing ideas and strategies with their colleagues, teachers would develop new teaching practices that focused more on student-centred inquiry learning.
3. *In what ways do students benefit in terms of their learning and engagement when teachers engage in innovative practices?* The ultimate goal of improving professional practice is to enhance student learning; however, the connection between these two factors cannot be considered a given. Therefore, we sought evidence of improvements in student learning and engagement that occurred as a result of the new practices employing broadband technologies that teachers developed.
4. *What is the impact of ABEL on participating institutions?* One of ABEL's goals was to foster institutional learning, build capacity within participating institutions, and increase inter-institutional collaboration. Hence we gathered evidence of the kinds of changes that happened to the public sector partners that were centrally involved in the project.
5. *What have ABEL participants done, and what else might be done, to ensure the sustainability of the project? What are the conditions that will foster ongoing success?* A long term goal of ABEL is that the new practices learned by the project teachers become institutionalized. Consequently, we examined key factors related to the ABEL model such as, their technical issues with videoconferencing, teacher release time, logistics, inter-institutional challenges, funding, support, perceived issues with tools and resources, and limitations and strengths of ABEL professional development model relative to sustainability.

The research team employed a combination of qualitative and quantitative data collection techniques over the two years of the project. These included: formal interviews of the project leads at the end of the first and second years; interviews with teachers and administration of surveys to students at the completion of a subset of projects; interviews with Faculty of Education and partnering instructors, principals, and teachers periodically throughout the project; participation in large group videoconference sessions; examination of teacher learning logs posted at the ABEL Community website (<http://abelearn.ca>); student focus groups; and analysis of classroom and formal project documents. All interviews were audio taped and transcribed for analysis. Several projects were identified each year by the researchers, the project manager and learning leads of being worthy of greater attention because of the exemplary use teachers were thought to be making of ABEL tools and resources. These projects became case studies for the research. Members of the research team visited the sites regularly to observe students and teachers as they carried out their projects. When these cases involved more than one site, we endeavoured to have a researcher at each site simultaneously during videoconference events.

Responses to all surveys were tabulated, and transcripts of interviews were analyzed using Atlas.ti qualitative analysis software. The main research questions were used as higher level codes in the analysis, and these codes were further broken into sub codes that emerged from a careful reading of the data. When the coding was completed, all text passages having the same code were grouped together. These coded passages were then re-read and drawn upon extensively when writing this report.

### 3. Teacher Professional Growth

In general, teacher professional growth attained within ABEL seems to fall into three distinguishable yet overlapping categories: learning, leadership, and collaborative pedagogy. *Learning* includes the acquisition of technological skills, the augmentation of pedagogical perspectives and practices, and the development of new ideas about the application of technology to pedagogy. *Leadership* refers to an increase in type and number of activities undertaken by ABEL participants to disseminate their ideas and knowledge to others, both inside and outside the project. And *collaborative pedagogy* relates to an expansion in the ABEL teachers' interest and skills in engaging with colleagues to share and expand ideas, and to plan and implement joint activities, in ways that further develop their pedagogical and technological repertoires. While it can be generally understood as one component of professional learning, collaborative pedagogy in the ABEL context merits special discussion due to its perceived significance to the teachers.

Collaboration also describes one of the three general kinds of process whereby teachers' professional growth was attained: *interactive and group processes*. It includes both formal and informal activities, from large- and small-group videoconferences, to planning and discussions carried out via email, to casual conversations in school hallways. Other kinds of process employed for professional growth, though to a lesser extent, were *individual activities*, often related to skills acquisition and the use of ABEL tools and resources, and *formalized learning* in the form of accredited courses offered by [institutions] and available through ABEL.

This section begins by exploring teachers' reflections about their growth in several areas: greater skill, comfort and understanding in relation to new technologies; changed pedagogical perspectives; new attitudes toward innovation and pedagogical risk-taking; and their perceptions of themselves as leaders and agents for educational change. Next it examines the roles played by the processes and the tools used to attain this growth, offering a discussion of both their strengths and their drawbacks. Finally it reviews some of the ways in which this growth has been demonstrated through leadership in innovation and dissemination.

#### 3.1. Teachers' Perspectives on Growth

Teachers came to the ABEL project with vastly different levels of experience and acquaintance with ICT. ABEL facilitated further skill acquisition even for teachers who already possessed considerable ICT skills: for instance Bill, describing a video of students performing an experiment, which he produced and then uploaded for viewing over broadband, commented, "I thought I was a 'techie' before...but now I'm [really] a techie...I can more readily think outside the box." But even more striking are the strides made by teachers with relatively little experience, as exemplified by Ray, another Edmonton teacher, who described his progress thus: "I was afraid of copying and pasting

from one document to another ... and now ... I'm not afraid... I [even] quite like the videoconferencing.”

Growth, however, means more than skills acquisition. Teachers' interview responses to queries regarding whether ABEL has contributed to their professional learning overall ranged from Mark's categorical reply—“Absolutely”—to his fellow history teacher Marlene's descriptive summary of its effects on her as an individual: “It definitely made me stretch in my teaching. A different way of thinking ... is good for the brain and good for one's teaching.... It made me think more metaphysically, on a larger scale, and then ask myself how can I make this exciting for the students.” And Donna reflected on how the project “enabled [her] to see that there are other ways in which students can learn and become involved more personally in learning.”

Connections between technological skills acquired and their usefulness in teaching were also made by teachers of different subjects at different schools. A case in point is Edmonton science teacher George's detailed enumeration of benefits, which included

[E]xpertise with the technology and ... comfort with hooking up and establishing a point to point or a multi point video conference, [as well as] expertise with the tools [so that]now I would feel much more comfortable trying to set up a WebCT course or [using] IO to develop a project....

Similarly, Alice, who teaches mathematics in Toronto, elaborated on the ways in which ABEL provided “not just the technical tools available but also ... enough information to make [her] curious about inquiry learning and how it could be used and presented.”

Both George's and Alice's statements go beyond the mere description of activities or useful resources to suggest something complex and significant about their growth through ABEL: a developing capacity to determine the pedagogical purposes to which these tools, skills, and knowledge might be put. And they were far from alone; indeed, much of the learning accomplished by teachers throughout ABEL incorporated content and processes that linked the use of technology with its application to practice.

Other teachers spoke of their ABEL learning as having led to changes in their pedagogical perspectives, include Joseph, who related how the project encouraged him to “think about different learning styles, modes of presentation [and] delivery of subject matter.” Joseph's Middlefield Collegiate colleague Stan had something similar to say about ABEL's impact on his pedagogical philosophy:

After four years of teaching, I'm getting comfortable with my teaching style.... What [ABEL] did was make me reevaluate how I taught, and it made me think about the ideas of inquiry based learning—are you talking at [the students] or are you making them learn on their own?

The concepts around inquiry-based learning (IBL) concepts were common to many of the teachers' commentaries on their ABEL learning. For some, like Alice, IBL had been an abstraction with which they were acquainted but to which they had never given a great

deal of consideration. For others such as George, who believed “that the most effective teaching is when kids are more directly involved [in] hands-on and IBL and where the teacher is more a resource than the sole supplier of information,” and who described himself as “trying to develop an inquiry-based student project,” ABEL facilitated the process of incorporating this approach. And for those like science teachers Stan, Trevor and Bill, for whom IBL was at least somewhat established as a part of their pedagogical repertoire, ABEL helped to expand the previously existing potential of this pedagogical framework. Bill reflected that ABEL technology, used in conjunction with tools outside of ABEL, had allowed him to “break my teaching out of an old traditional mould.” Said Trevor, “I was always very inquiry-based to begin with, [but ABEL] gave me another tool.”

The recognition by teachers of IBL as a possibility did not result in an uncritical wholesale adoption of it. The ABEL context allowed it to receive the kind of scrutiny on which reflective teachers always insist, and this scrutiny inspired varied responses. Edmonton science teacher John, for example, questioned what he saw as ABEL’s strong emphasis on constructivist and inquiry based-learning, contrasting it with his earlier exposure to students who had failed to learn successfully in such a framework. His colleague Anthony, who taught Social Studies, responded similarly to what he perceived as a certain amount of dogmatism regarding inquiry-based pedagogy by pointing out: “Well it’s one way, but on a day to day basis the reality is, we do all sorts of ways of [teaching and] learning, and...[inquiry learning] isn’t necessarily ... true for everyone.” The importance of critically assessing new approaches, and the role of ABEL in this assessment, was discussed by a Toronto teacher, Mack, who teaches courses in history and world issues. He stressed the fact that “over [his] career there will be lots of new stuff to play with, and some of it is useful and some is not. And just because it’s new...it doesn’t mean that we should do it.”

The above perceptions illustrate one of the ways in which growth in ABEL did not always follow a predictable path. Rather than imposing a single prescribed approach to integrating technology into classroom practice, it offered teachers the opportunity to inquire into issues of technology and pedagogy, and the relations between them, in ways that suited their personal interests and learning styles, as well as the needs of their students. Interestingly, this came as something of a surprise to some teachers. Colleen, a Toronto teacher whose teaching subjects are English and media studies, recalled how her initially negative view of ABEL was transformed into enthusiasm:

Before I went into ABEL I was quite skeptical because my experience with using technology in the classroom has always been that the technology drives the curriculum. ...But then...when I saw what Alice was doing with the math and what Marlene was doing with her history course I got excited because for the first time I [was] seeing that this is the way it should be—a curriculum should be the driving force and the technology should only be the support.

And some teachers went even further. Social studies teacher Roger reflected on how, through ABEL, he has come to conceptualize school “as a community of leaders and a community of learners at the same time. I see students as leaders in a different way.” He

went on to acknowledge a personal shift, “from feeling almost forced to include more technology, or more new methods ... to welcoming [ABEL] as a new way of developing better as a teacher and developing better classroom approaches.”

Some of this development, in relation to inquiry learning and more generally, was for many of the ABEL teachers manifested in an increased willingness to take risks. Colleen, for example, recognized risk-taking as an important component of her newfound enthusiasm for integrating technology into her teaching, while her Ursula Franklin colleague Sheila similarly acknowledged the role of ABEL learning in her more general sense of feeling “comfortable with taking risks and trying to explore and learn something that I don't already know.” Roger reckoned that improvements to both his and others’ teaching, and to the quality of projects as ABEL progressed, were attributable to “risk-taking and ... the fact that [people were no longer] afraid of committing ... to projects.” Virginia explained how taking risks in relation to the Arts and Multimedia Project videoconferencing was beneficial to both her and her colleague Sheila:

I never really pictured this as a final big videoconference. I allowed myself as a teacher to make mistakes, I allowed the students to make mistakes. Sheila and I spent the morning trying to upload everything the day of [the conference], because we couldn't figure it out for the two days [prior, but] I feel that even though that caused stress it was still a really good learning experience. Yeah, we made a lot of mistakes, but I think now I'd walk into it with more confidence. But perhaps it was the York region history teacher, Mark, who best articulated how the encouragement of risk-taking was built into ABEL:

Within the ABEL project there is an expectation that you'll try something and if it fails, that's okay. And I don't see that in the provincial curriculum, the assessment of teachers and so on. They say go ahead and take risks, but don't you dare fail. But ABEL says go ahead and take the risk, to see how it works. If it works, great. If it doesn't, what have we learned from it?

Mark went on to say that this risk-taking has “affirmed a lot of the things [he] was already doing, given [him] pause to think about other neat things.”

The willingness to take chances in a technological context both contributes to and results from an increasing level of comfort and confidence with the technology itself, and with its use. Teachers made numerous statements about what they had learned, and about their satisfaction with the skills they had acquired. Typical of such statements is Paula's enumeration of her achievements:

[In addition to using] PowerPoint, I have a website for my classes, and I communicate with the parents through email. And I communicate with the students. I post my homework and my deadlines and my announcements on the website, and the students communicate with me through email. ... This is all something I started after I started with ABEL.



Paula, a York region teacher, went on to discuss her comfort with videoconferencing in particular, describing how her new learning in this area was supported by help she received from others: “I am comfortable. . . . I can't tell you that I am 100 percent comfortable doing [videoconferencing] on my own, but I am getting better all the time, and I'm usually not alone.”

While this should perhaps not be surprising in a project whose aims included the acquisition of technology skills and the increased confidence in their use, it is significant that it applied equally to both novice ICT users and those whose comfort level with technology was already high prior to their joining ABEL. Indeed, so nearly universal was the view that ABEL had increased teacher comfort with ICT use that the few individuals who held different perceptions stand out. Significantly, these include several teachers who felt their confidence would have benefited had they been able to attend the first Summer Institute, at which training sessions were held, and one, Esther, who admitted, “Part of [the reason] was because I wasn't that interested so I didn't want to . . . venture into putting energy towards [it].”

As noted, however, these teachers were in the minority. Of the majority who felt that they had in fact attained increased skills and comfort, Catherine's statements are representative. “I wouldn't have considered myself to be uncomfortable in the past, but I did realize that there was so much I didn't know compared to what I know now.” Stan too had “always felt fairly comfortable with computers,” but acknowledged his growth thus:

This has actually made me that much more comfortable. I never imagined that I'd be doing video editing on the computer [or] trying to develop websites, because I was always comfortable, I was always good at using stuff that was already developed. But I'm actually into playing with stuff on my own, and I know as far as other programs go, like Markbook programs, that I knew how to use but didn't really use on a daily basis, they're all my thing now.

Dara, an Edmonton mathematics teacher, spoke of her ABEL learning as “invigorating and rejuvenating” and described her confidence with technology as having gone “through the roof.” She felt she had acquired a kind of “maturity” with respect to ICT use: “There isn't too much that I think now could be tossed at me that I wouldn't be able to deal with or, or expect,” she said.

Dara is one of those to whom this newfound or improved confidence in their ICT skills gave a sense of themselves as innovators and leaders, both technologically and in terms of their practice. In Dara's case this was quite unexpected: “I think in the school and, and even the math group, I was kind of surprised I stepped up to get things moving.” Leslie too has had a role in inspiring other teachers: “I feel that I . . . have taken on a technological project and I represent the layman. . . . People in the school tell me that they wish that they had signed up.” Paula likewise reported that her role in the school had changed: “All of a sudden people are talking to me as if I am an expert.”

Some ABEL teachers have demonstrated their innovation and leadership in activities such as presentations to parent groups, school board trustees, and at conferences: these

will be discussed in detail below. What is worth noting here is that implicit in each of these examples of ABEL's role as a facilitator of leadership skills and practices is mentorship. Mentoring practices include both in-school and online assistance of colleagues and also the kinds of outreach to teachers and other members of the education community that include the dissemination of pedagogical perspectives and possibilities for changes in practice as well as skills. Clearly, the ABEL teacher is often particularly well placed to mentor his or her peers by assisting them with technical skills, such as the operation of videoconferencing equipment or the use of a particular piece of software for lesson or unit planning (each of which is discussed below).

Participation in ABEL has, on one hand, increased teachers' confidence, skills, and comfort with risk-taking, while at the same time it has helped in most cases to transform both their teaching philosophies generally and the particular kinds of projects they undertake. And it has facilitated a shift to teaching practices that embrace and embody collaboration and interaction. One teacher succinctly summed up the difference in outcome between traditional models of professional development and the ABEL growth model. In typical one-day workshops, she noted, "we get all excited, and then go back to the real world...and all those ideas are lost," whereas the ongoing and collaborative nature of ABEL professional development has "translated into something practical." The next section takes a deeper look at the nature of that collaboration and its impacts.

### **3.2. Collaboration**

The distinction between collaboration as a planning practice and as a teaching practice or philosophy is subtle but important. Teachers might, for example, collaborate for the planning of lessons, units, or even entire programs that would then be taught individually. This kind of collaboration is distinct, however, from the actual practice of collaborative teaching—a practice grounded in the belief that teaching and learning benefit from interaction between teachers, students, and other adults both within and beyond an individual classroom. The importance of collaboration in ABEL as a means for growth will be examined in the following section; for the moment it is useful to consider briefly ABEL teachers' views of collaborative pedagogy, and the kinds of collaborative teaching practice, that ABEL has made possible.

The Arts and Multimedia Project, the Ontario Science Centre DNA Fingerprinting Project, mock trials relating to the real-life and the fictional, the Embryology and Drugs presentation and the MC<sup>2</sup> Mathematics Project are but a few examples of collaborative projects undertaken during the course of ABEL. Each of these involved varying levels of interaction, through videoconferencing and other media, between teachers and students as well as other individuals: for example, the mock trial settings had students presenting "cases" to a real-life judge during a videoconference, the multimedia project saw music, video and visual art students present their work to other students and professional artists, and in MC<sup>2</sup> participants worked at solving problems with their peers in another province (see Appendix .D for the MC<sup>2</sup> case study summary).

Each of these projects was inspired by a combination of ABEL-provided technologies and teachers' ideas. And while the projects had their share of difficulties—technical, logistical and otherwise, which will be discussed below—the general consensus was that they were beneficial in numerous ways (see chapter 5, *Student Outcomes*). Evidence for this consensus lies in the fact that teachers who participated in them are, for the most part, keen to pursue them further: the math teacher Dara stated that she “would really like to continue with MC<sup>2</sup> [because] the format really [benefits] the students. Roger, who teaches social studies in Edmonton, expressed a desire to pursue projects with colleagues and their classes in other provinces because of the benefits he perceives in “allowing students to take control of their own learning [by developing] as a community, ...bringing questions up and finding the answers to those questions lot more readily. And world issues and geography teacher Esther concurred: “We [teachers] are working more collaboratively with other people and encouraging the students to do so as well.”

Some of the ABEL teachers have begun to think about the possibilities for specific future implementations which, although they are not quite in place as yet, bode well for the future of collaborative teaching. An example of an anticipated future project at the conceptual stage at the time of the interviews is a cross-curricular collaboration involving Bill, Steven and Ray and their respective students in a unit about HIV/AIDS, in which:

Social studies would talk about the social impacts of AIDS, biology would deal with all the science behind AIDS and the immune system, and the math department would work on...all the numbers and trends... (quote from Bill)

Vera, a Toronto art and media teacher who has been involved in the Arts and Multimedia Project (see Appendix D for the project case study summary) also looked forward to further collaborative projects, although she foresaw challenges ahead. She summed up her view, saying:

I think that we've probably created a bit of a community between the teachers...I think it's something to have the facility for doing that [project work] collaboratively [although] it's really difficult to create some kind of assignment that will be more than just the sum of solitary creations.

Vera plans to work with Sara Diamond of the Banff Centre on a project that will engage her “Computers in Art” class with Sara in a project using the ABEL Community. Also teaching in the Arts is Virginia, whose participation in ABEL has inspired her to work with a non-ABEL drama teacher in her school to “involve different sites doing improvisational games together and responding to each other live.” Virginia went on to explain her idea: “I think there's some really interesting [possibilities] from a drama but also from an art, and from a performance art point of view... a new art form [that uses] the media as a piece of art.”

As noted above it is obviously difficult to completely separate the concept of collaboration as a pedagogy from its use as a process. These examples give a sense, however, of some of the specific ways in which collaborative teaching and learning practices have been and continue to be employed through ABEL.

Collaboration was generally viewed by the majority of teachers as the single most useful component of the ABEL model both for professional development and project planning. For example, Trevor, a York Region science teacher who participated with his students in the videoconference with an astronaut, enthused:

It helped me just talking to the teachers in the other places, seeing their ideas, matching ideas with them or just talking about ideas... Collaboration with other teachers was a good way to grow and foster new ideas. I never would have thought of bringing an astronaut in but we were able to do it, [which] expand[ed] my thinking about how to bring things to students.

John (P47) cited the “fine connections with some colleagues at remote sites” as simply the single most valuable component of ABEL.

The next section begins with a consideration of collaboration as a *process* by which these practices came about, and the specific tools that were used in that process.

### **3.2.1. Collaborative Processes, Tools and Resources**

Specific collaborative processes teachers perceived as most useful included the small-group, often subject-specific videoconferences. These were preferred by almost everyone over the earlier, larger teacher videoconferences, which were found by many to be both too general, impractical, and too time-consuming to be helpful.

Alice, for example, contrasted large group discussions which she viewed as “a waste of time” with smaller sessions in which she and her peers could focus on questions of particular interest to them. Trevor concurred: for him,

It’s much better when you have the small focus like a science videoconference where you are just talking with your colleagues about what needs to be done...But when there were four, five or six different sites, and all different disciplines, I found it useless.

Colleen found that in small groups she participated more: “For the large group I didn’t have a say...and sometimes certain things weren’t relevant...but when it started being more focused I... I benefited...because I was encouraged to participate and my opinion was valued.”

The topics covered and formats used for the large groups sessions shifted over the course of the project. John recalled “a high level of frustration early on in the project—just the sense that some of the... videoconferences were almost make-work type projects,” and contrasted this with what he saw as greater productivity later in the project, a change he attributed directly to the response of project leaders to suggestions made by participants. Indeed, this kind of responsiveness to the needs of teachers was a hallmark of the ABEL project, to the degree that it can be considered a form of collaboration all on its own. Teachers were nearly unanimous in praising the willingness, even eagerness, of the management and learning leads to receive and respond quickly and appropriately to

feedback provided via online surveys or more informal means. As John noted, it was the teachers' collective expressions of dissatisfaction with the initial series of large group teacher videoconferences that led the ABEL management to reinvent the format by instituting small subject-oriented conferences, more practically-oriented tool training sessions, and later splitting the less-frequent whole group sessions into two separate sections, with schools participating in the one that better fitted their schedules. This new structure and focus for formal teacher-group videoconferencing proved much more fruitful, and provided the initial collaborative impetus for the great increase in project implementation after the fall and early winter of the 2002-2003 school year.

With few exceptions teachers also lauded the responsiveness and competence of the technical support personnel. Donna, echoing other comments, called the technical support "amazing." Virginia recounted how, when she and her colleague Sheila were having difficulty uploading videos onto a website in preparation for a videoconference, "Sheila contacted York, and there was just a nice dialogue going back and forth all day until we got everything set up the way we needed it." Donna also described how her colleagues Roger and Terry had helped her "set things up [for a videoconference, and] even ... wrote it all out step by step so that [she didn't] feel uncomfortable at all." Support of this kind from colleagues was common, and found to be invaluable. Virginia spoke of "a lot of support from other teachers at the other sites we are communicating with, specifically J. Percy Page. We just e-mailed them and said we were having some trouble and they took us through all the steps."

Videoconferencing was an area in which many teachers had little or no experience prior to joining ABEL; a great deal had to be learned concerning how to connect and operate the equipment, how and where to place microphones and screens, and ways in which to organize conferences to maintain flow among participants. These skills were learned primarily through practice and experimentation: the videoconferences held by teachers for collaborative planning purposes allowed them to take risks with format as well as to learn conference etiquette, for their own use and in preparation for later conferencing activities involving students. In addition, some technological issues arising in earlier videoconferences with students were reflected on, discussed, and resolved in time for later ones. Significant here is the interconnection between technical and pedagogical issues. A comment from John summarizes this complex process, and reflects the same "smaller-is-better" view that held for teacher video sessions:

We found out that having two big groups [of students] doesn't really work very well. [It] doesn't allow enough participation, and it provides for too much background noise and crowding... Also the [videoconference] technology is not really as challenging if it's point to point [between two schools]. Point-to-point sessions almost always work, and there are fewer issues related to making the connection. And so partly we wanted to avoid the problems you can sometimes have with a multi-point session. And partly we only wanted to have one class at each end so that we could more effectively get the kids to participate.

Other more general concerns raised about using videoconferencing technology for collaboration related to reliability, availability of equipment and ease of setup (see

discussion below). The fact that some schools did not have a dedicated videoconferencing “cart” also meant that teachers either had to become proficient in setting up the equipment, or, where either time or confidence was lacking, rely on students or other teachers to do so. While relying on students was not necessarily seen as a disadvantage—teachers were often relieved to leave this kind of work to experienced students—there were concerns about sustainability in this regard: Vera asked rhetorically, “These [students] are going to graduate, and then what are we going to do?”

Of course videoconferencing, though an important tool for collaboration, was far from being the only one. The following summary is worth quoting at length for the sense it gives of the variety of tools that might be used in a single planning process:

We decided to do this at the [ABEL] Summer Institute. The idea was to involve two teachers and their classes in Ontario with Terry and myself here in Alberta. We began to collaborate...through the discussion area [in the ABEL site] and with e-mail. We eventually decided [to] make it a WebCT course, so we had a couple of planning meetings on line where [we four] decided on what the various elements would be.... Then [we each] took responsibility for working on different parts of the web page. There was one meeting where we had chat going, we were video conferencing, and on another computer we had the website up. And ... we were making changes to the WebCT program while we were video conferencing. [We did this until] we established the project. And then we continued to [communicate throughout] the project. [There were] two video conferences involving the students. (George)

E-mail—for the ABEL teachers a relatively low-tech tool—was used extensively at all the participating schools, even by those who, as Sheila observed, “are in the same school but never see each other.” The ABEL Community, the ABEL website, contained virtual bulletin boards for posting ideas, information about projects and events, and invitations to participate in activities, as well as tools for discussion both synchronous and asynchronous. Other resources and toolsets linked to and available through ABEL included IO, WebCT, Tutor Buddy (later Insite), the National Film Board (NFB) film repository, Histor!ca, E-Stat, Barrier Free tools, Learning Object Repository, and the Ontario Curriculum Resource Bank. For many reasons these received varying levels of interest from and use by teachers, as the following brief overview summarizes.

Daunting to a few, to whom it appeared somewhat crowded and time-consuming to explore, The ABEL Community was nevertheless found useful by most of the ABEL teachers. Many mentioned the bulletin board feature as a helpful way to keep updated on ABEL activities both near and far, and the chat software as a useful planning tool. Mack also found the chat feature helpful “during the videoconferences because there’s so much dialogue that could be happening in that space [and chat is] a nice way to not interrupt what’s going on but still bring concerns to the forefront.” A Toronto teacher found chat difficult to arrange with Alberta schools because of the time difference; however, her students did use it to communicate with each other. Lee opined that “using file transfers to post things there [so that] people could look at artwork that was done, and

assignments, and pictures of events” constituted a kind of internet based collaborative tool that allowed teachers to share practices and student work.

Though some teachers were unacquainted with the Curriculum Resource Bank, others had perused it. None had used it, however, either because they felt, like Stan, that “it was more fun sharing with people ... than downloading from a bank,” or because they found nothing there relevant to their subject areas. Similarly, only one of the teachers had found a useful link in the Learning Object Repository. Others said they thought the repository was potentially useful, but that it either contained little of immediate relevance, or required more time than there was available to incorporate it into an already full program. Several teachers were beginning creative experimentation with the Barrier Free tools, using them to add closed-captioning to videos, for example. Others were enthusiastic about them and considering their use. E-Stat had been used by some of the teachers both in planning and with their students; some mathematics teachers also had students use it on their own.

Though the Histor!ca site was found by some teachers to have technical problems, and by others to contain insufficiently challenging content, others praised it highly. Esther was particularly pleased with the way it allowed students to read and comment on work done by other students from around the world. And history and film/video teacher Virginia used it in a cross-disciplinary project with her students, who were assigned to create their own “Heritage Minutes” by making videos about defining moments in Canadian History for later contribution to Histor!ca:

[Some] use the website to do research on...our [local] community within the context of Canada...[Others] have decided to do...Toronto communities like Kensington Market and look at the history and turn it in to Heritage minutes. And [still] others are taking like larger topics like World War II and looking at heroes at World War II. It's a really diverse group of topics.

CineRoute, the National Film Board online catalogue and film repository, had been used by some of the teachers prior to ABEL; others had already accumulated film libraries of their own and felt this resource was somewhat redundant for their needs. For the rest, although some training in its use was provided, and teachers were enthusiastic about it, attempts to actually use it were often thwarted by ongoing connectivity issues that impeded its use both before and during classes. Additionally, the schools in York Region experienced some major technical problems in the fall of 2003 which blocked access privileges to the NFB resource.

Tutor Buddy/Insite received very mixed reviews. Edmonton social studies teacher Anthony was among those who viewed it favourably: he used it to engage his students in discussions about “the nature of communication ... how we are affected when we look at television, and how our media operate,” finding that had a “tremendous amount of potential, and when it was working it worked quite well.” Science teachers too tended to find its content in that subject at least somewhat useful, although John commented that “it seemed to require a lot of research up front” to find content that was challenging enough for his students. Criticisms from history teachers were that it had insufficient Canadian

content, while an ESL teacher found little that was relevant to her work and music teacher Terry found the content outdated. Many teachers reported that the interface and search engine provided “clunky access” that made its use difficult.

The ABEL teachers expressed tremendous interest in WebCT. Many had explored it and were eager to learn how to use it, but simply had not been able to find the time to do so. Similarly, those who had become proficient in its use found that they had no time to add it to the tools they were already using. Though some of the teachers involved in the project on democracy in Iraq used it, it received most activity around the Energy project (see project case summary in Appendix E). Terry related that it was easily accessed not only by the teachers but also by their students and the energy experts; it was engaged for planning, communication and displaying student work. Wendy, a York region science teacher, provided an overview of its use as a planning tool:

... Our hour on videoconferencing sometimes included a little PD for each other. ... One of us would show [the others] how to do it, ... live through the videoconferencing on WebCT. The designers would have their WebCT open, with the videoconference going and in the background chats ... such that when we say we want to include this element of the project ... someone was sitting at their computer on WebCT making the change in real time. Two seconds later the other teachers would say, “Okay, that looks good” because they could see the change right away. So again, there is that immediate feedback.

Wendy was less pleased, however, with student use of WebCT, particularly the lack of use of the chat feature. And this disappointment was echoed by Terry: “There were no [technical] problems, and [the students] had every opportunity. I was hoping that they would use it more because there were good contacts there.” Nevertheless, George pointed out, some student discussion did take place although not in real time. Overall, he found Web CT a “user-friendly” resource that “became a useful source of information and a means for dialogue.” While George was positive about the prospects for using WebCT in the future, others were less sure. For instance Stan, who had taken a workshop on its use, found it interesting but chose not to use it, because he “wanted something [he knew he would] have rights to use after the ABEL program end[ed]”. Bill had a similar concern.

Like WebCT, IO garnered a significant amount of positive interest and feedback from teachers. Marlene found it of great benefit in developing inquiry project ideas. And Toronto teacher Colleen spoke of the impact it had had on her teaching philosophy:

It [helped me] not only organize my lessons but it also in a way provided an opportunity for me to... re-evaluate my approach to teaching, my pedagogy. It made me take more risks in terms of ... inquiry-based learning. I even created my grade 11 course based around those ideas and I think it’s a lot richer this year.

Similarly, Roger called it a “major help that completely changed the way [I] looked at project learning.” Despite these benefits, however, some teachers, including both Paula and Trevor, found IO somewhat time-consuming to learn. And several Alberta teachers



found it lacked relevance to the provincial curriculum, largely because they saw it as being directed at the creation of open-ended inquiry projects.

### **3.3. Other Processes and Resources**

As is evident from the preceding discussion, what is perhaps most striking throughout the ABEL project is that collaborative activities, as well as the cooperative use of technological tools and resources, far outweighed the use of any other approaches to professional growth and development by participating teachers. But there was a substantial degree of enmeshment between the collaborative and the individual; teachers would collaborate during a videoconference, but when they left those sessions they took with them ideas that they would implement in individual classrooms through the filter of their individual beliefs, knowledge, and practices. Thus, despite the very apparent focus on collaboration, it is also the case that some professional growth and learning were achieved on a more individual basis. Consider comments by Stan, for example, who spoke of “playing with” the IO resource on his own, to try to determine whether he would be able to use it to cover the mandated curriculum, and Trevor, who likewise “played with” the Histor!ca website on his own to determine exactly how he might use it in future teaching, post-ABEL: these illustrate the kinds of individual exploration that teachers undertook throughout the project with the goal of understanding and evaluating the resources available to them.

In addition, various kinds of formalized learning opportunities were made available to the ABEL teachers. These included a Masters-level ABEL course at the University of Alberta, professional development courses for teachers offered by Seneca College in Toronto, and the two ABEL Summer Institutes, the first in King City, Ontario and the second in Banff, Alberta (in 2002 and 2003, respectively). While no teachers completed the Seneca courses and only six finished the masters’ course, a majority attended at least one of the two Summer Institutes. The latter were found by participating teachers to be particularly useful, for everything from the acquisition of new skills to deep philosophical discussions about what technology can mean for teaching and learning. Marlene articulated the view of many when she referred to the Institutes as a kind of “validation, a very positive experience—like advanced-level PD, [but] more intense.”

The Institutes embodied more of the kinds of collaborative elements that made the small-group videoconferences and collaborative tools so beneficial. While a few teachers found that the first of these, held in King City, Ontario in August 2002, tended to lead to a kind of information overload, most of those who attended the Institute relished the opportunity to engage in person with colleagues they had known online and through email. For Donna, “Going to Banff was a real turning point for me because I could actually put faces to the names I'd heard about or seen on-line, talk face to face with people and plan things.” Dara also valued both conferences as a set of reference points for collaboration. Recalling the second one she said: “Going to Banff and meeting everyone again was really nice because we knew what we had been able to accomplish in the one year and we were really looking forward to [see] where we could carry a group of students and where we could move with this.” In addition, they valued the tool learning activities at the

Institutes. Leslie recalled that she “didn’t have a grasp of Web CT until the Banff conference.”

It was at that same conference, in August of 2003, where significant strides were made in planning projects and events for the upcoming school year. Here is how Alison recalled the session that gave rise to the Arts and Multimedia project:

There was a group...with a representative from York University and a representative from the Banff Centre ... [and] art teachers and multimedia teachers. We were given an afternoon to talk about what type of project we could have. And it went from all of us looking at each other across a boardroom table to all of a sudden this idea of inspiration and transformation. ... We all came up with an idea of what we would do in our classes because we were all teaching various subjects... And we talked about how an artist in that area becomes inspired, [and ...] then we came up with specific plans.

Not only did the Institutes sow seeds for specific projects, but for some teachers they offered, as did the teacher videoconferences throughout the project, an opportunity to engage with others at a meta-level, exploring significant questions about the role of technology in teaching and learning. In Anthony’s reflection on what he found useful about ABEL as a whole, he emphasized his experience at the Banff Centre, and went on to reflect that that experience inspired him to think about “some of the implications [of technology in terms of] ethics and philosophy.” (For a detailed accounting of the 2003 Banff gathering, see Morbey & Owston’s *Professional transformation: The ABEL 2003 Summer Institute*.)

The other more structured professional development opportunities offered through ABEL, specifically the graduate course, was found useful by those who enrolled. Roger is one of those who spoke very highly of the ABEL graduate course. Calling it “a great experience in terms of professional growth,” he found that it engendered in him a strong sense of community and leadership, and allowed him to see schools as “a more universal thing.” This, he recalled, changed the way he thought about technology and education, both when he went to the Banff Institute and ever since. (The results of the graduate course evaluation are discussed in chapter 6, *Contributions of Higher Education*.)

But in general the formal offerings are most notable for their relative lack of take-up in comparison with those resources already discussed. Teachers gave several reasons for this, including uncertainty about whether credit could be given for courses taken out-of-province, and concerns on the part of Ontario teachers, in the context of an ongoing debate between teachers’ associations and the provincial government about mandated professional development, about whether involvement in such courses might go against their union’s wishes. The predominant reason given for this lack of involvement, however, was a shortage of time. Teachers simply felt that their always substantial workloads, already increased, however positively, by their involvement with ABEL, would not support more activity than they had already undertaken. In that vein, while teachers feel that they have undergone considerable growth throughout the ABEL project, to leave out their views on the program’s drawbacks would be to ignore a significant

piece of the picture. It is crucial to consider the teachers' perceptions of the major impediments to making greater advances through the ABEL program: time, access to technology, varying curricular demands and teaching assignments, and project sustainability.

### **3.4. Impediments to Growth**

The importance of having sufficient time to collaborate, implement, and reflect in a context such as ABEL is best illustrated by comparing the views of teachers about the release time that some of them have been given throughout the project. There are three categories of teachers in this regard: (1) teachers who had regular scheduled course release time (80 minutes per day for teachers in York Region, 80 minutes every second day or 1/7 time for teachers in Edmonton); (2) teachers who could request release time involving the use of substitute teachers, but on a very limited, irregular basis (Toronto teachers); and (3) those who had no release time at all (a few teachers who had come into the project after its budget had been set). Teachers in the first category found that, while the release time has covered only a portion of the ABEL work they have done, so that a significant amount of their own time was spent on it as well, they have been able to engage in learning that would stand them in good stead should the release time be lost. Typical comments came from Steven, who had just developed a web page for use in his teaching—"I'm learning new tools and technology...that I would have never have been able to do without the release time"—and Paula: "Without the release time I simply wouldn't have been able to do it."

For those without release time, or very limited access to it, however, learning has come somewhat more slowly; they have a strong sense that they could have done more with some scheduled release time. While it is true that they managed to participate in ABEL without significant release time, they also recognized the potential of the program for going beyond what they themselves were able to do. Mark, a Toronto teacher, is typical of this group: "I feel that I haven't given ABEL its fair due. I haven't had the time to devote what I think I could do, and it's an issue of time. There's been the frustration of ... not having the time to sit down and really pull something together." In addition, when asked how they foresaw continuing with their ABEL work, these teachers tended to be less optimistic, perhaps because their learning had not progressed to quite the same stage as those teachers who had been given time to pursue it. They frequently said that although they would continue to use some of the tools they had begun using in ABEL, and perhaps even repeat some of the activities they had tried, their work would be curtailed, and they could not imagine being able to develop or implement new projects. Sheila, a Toronto teacher, summed up this view succinctly: "Without release time I couldn't do it, and I wouldn't be willing to, because I know how much time was put into [it] even in addition to the release time."

A tension existed around the use of release time in the Toronto school, where teachers did not have a scheduled course release but could make use of an occasional substitute teacher. One Toronto teacher summarized this dilemma: "It's hard to leave your class and get that time because you are worrying about coverage and what you are going to do

for that period anyway and it becomes just the same amount of work.” Another pointed out “If you have to book [a substitute teacher], that becomes problematic in itself because it takes a lot of prep time to both prepare for and recover from a sub.” Bill, who did receive scheduled release time, also recognized this dilemma, and asserted that to attempt to continue and expand ABEL work without dedicated time would be “ridiculous. You couldn't expect a teacher to do it without regular release time, and I don't mean [substitute teachers].” When Vera, who with her colleagues had implemented the Arts/Multimedia project, was asked to consider how her ABEL participation might have been different with scheduled release time, simply asked, “Can you imagine what would have happened if we had had that?”

The topic of time would not be fully addressed without mention of the issue of time *differences*. Looking forward, it is not difficult to imagine the logistical issues that would arise in this regard for Ray, for example, who was eager to connect his class with a school in India, 12 hours ahead of Alberta. But even the fact that ABEL schools are located two time zones apart made for some scheduling difficulties, particularly for videoconferences involving students: scheduling these events during the middle of the Alberta school day meant that Ontario participants might have to stay after school.

Throughout ABEL, videoconferences and other events did in fact tend both to start late and to finish late, due to various technical and logistical hurdles. While technical quality varied across sites, such that some had very few problems, these hurdles, when experienced, sometimes had negative consequences for students (these are taken up in chapter 5, *Student Outcomes*). Many teachers spoke of technological obstacles to doing more and better work with ABEL. As discussed above, there was repeated difficulty accessing particular tools and resources. In addition, Mark described himself as “slowed down quite a bit” by a broken laptop that took many weeks to repair. In a scenario all too common, Joseph recalled how, in the middle of a presentation by a Holocaust survivor, the videoconference system had simply crashed, completely rendering it a non-event for one participating school. Downloading was a problem during the Arts/Multimedia videoconferences, and the moments when students were unable to hear comments from the Banff Centre artists about their work, or even to view the work itself on the screen, proved distracting and counterproductive. In discussing how he had come to the decision to use videoconferencing rarely, if ever, Bill had but one word to describe the situation he found himself in when, the night before an event, he was unable to connect with the other participating school: “Insanity.”

“Making connections” in ABEL could not only be technically problematic at times, however: differences in curriculum, classroom demographics and dynamics, and teaching assignments sometimes impeded collaboration. Mark was eloquent on the problems of collaboration when teachers had substantively different kinds of work to do at different points during the school year:

The drawback has been provincial curricula. For example, Alberta has departmental final exams. So you start to lose the Alberta teachers in the spring in grades 11 and 12, whereas in Ontario, in that second semester, [teachers have] had

the kids for a while, they're ready to rock and roll, but now they've lost their partners. It's an example of the high-stakes testing being the tail wagging the dog.

Catherine spoke of a different kind of disconnect, pointing out the difficulty of “agreeing to do a project as teachers before even knowing who the students will be.” She opined that “to link with a class that is similar academically is the big thing,” and that where there are significant differences students need “the opportunity to interact enough that the difference is a benefit to them.” Other teachers reported feeling isolated, and finding it difficult to collaborate, because there were few or no other teachers of the same subjects involved in the project, and the resources available did not seem to have content useful to them. And still others spoke of having planned, at the end of the first ABEL year, to collaborate with particular colleagues on specific projects only to find that teaching assignments were changed at the last minute and they were no longer teaching the same classes.

Two other difficulties, separate yet related, need to be mentioned. Though each of them was only articulated by one teacher, they both speak to the same larger questions concerning professional growth in a project of this kind. First, Anthony expressed a concern about the pressures of conforming to what he understood as underlying and somewhat uncritical assumptions regarding both the usefulness of technology in teaching and the ease of measuring that usefulness. His comment is worth quoting at some length:

From day one I think [there have been] pressures to keep [ABEL] going ... and sometimes the almost foregone conclusion that this will be better because we're doing it. And in some cases, certain things didn't work very well. And I think people were hesitant to say, ‘Well, that, that doesn't work at all....’ [Because] our whole structure [has] a political agenda and we work within it ... and we're constantly having to balance what we know is true and what we have to present as true. ... People want to see a certain thing, and it just gets frustrating sometimes.... We were asked [during] a presentation at the school board, do you think this will help learning? And I said, ‘Well, we don't think it will *hurt* learning.’

John too felt that that ABEL was driven by a particular assumption—that inquiry-based learning is the zenith of good teaching—and felt that this assumption was not reflected in its original goals, which he understood to be more directly related to the integration of technology in classroom practice. This perceived shift was problematic for John, even alienating: “I have left this project ... with lower self esteem than I had going in.... It's been emphasized so many times about constructivist approaches and inquiry-based learning [that] I sometimes feel I'm doing my kids a big disservice by not doing more of that in my classroom.”

All of the preceding difficulties affected teacher morale; and the morale of the participating teachers clearly has an impact on the potential sustainability of the kinds of work begun in a project like ABEL. Stan viewed the entire second year of the project as difficult because of technical and connectivity problems that kept arising, in particular videoconference quality that went from “perfectly crisp, to wobbly, to not working at

all.” Problems such as this, he found, have already contributed to a loss of morale on his part: “My motivation is lower than it was before, because [I] put my heart and soul into [preparing for an event], and then go in and turn the machine on, and it doesn’t work. ... It just hasn’t been as much fun.” Regarding the necessity of locating, moving, connecting, and relocating videoconference equipment every time it needed to be used, Vera anticipated further difficulties in terms of teacher burnout: “It’s pretty exhausting. For now, since it’s part of a pilot project, we’re all willing to put out the extra effort. But it’s not sustainable.”

Moreover, videoconferencing was not the only component of ABEL to receive such feedback. Bill pointed out that he was “leery” of spending too much time learning how to use WebCT, because although he would “love to use it again, without any guarantee of sustainability, that’s a lot of teacher time.” Asked about what would happen to his commitment to technology use if the ABEL resources were lost, he compared ABEL with an unfaithful lover, saying: “It’s like being dumped once. Should you go back to her if you know she’s just going to dump you again?” And Wendy worried about sustainability in terms of whether she would “still be able to collaborate with Terry and Jeff next year.” In that same vein, part of Stan’s discouragement came from his and John’s plan, developed the prior year, to have their classes scheduled so that, taking into account the Toronto/Edmonton time difference, they would be able to use videoconferencing to “jump into each other’s classrooms, because I’m a biochemist and he’s a biologist, and we could actually teach each other’s classes.” However, as Stan tells it, “John found out two days before school started, that he’s not even teaching the grade 12 biology. They switched the schedule, they switched everything.”

These obstacles and limitations within ABEL, while significant, do not negate the very real successes in professional growth that have been achieved. The next section overviews the ways in which professional growth has been and continues to be demonstrated through leadership activities that demonstrate innovation and disseminate learning.

### **3.5. Growth Demonstrated Through Leadership Activities**

Leadership activities engaged in by ABEL teachers, and anticipated for the near future, run the gamut from peer teaching, to in-school roles, to outreach with other teachers, to conference presentations, to pan-Canadian initiatives. They include both informal and formal undertakings, and involve not only the dissemination of ABEL ideas and practices but the use of skills acquired through ABEL in new settings. An example of the latter is Paula’s use of PowerPoint for presentations to colleagues—something she had not done prior to ABEL. Some ABEL teachers’ leadership manifested through their taking advantage of “teaching moments” with colleagues. Joseph found it somewhat “surprising” that although “of the ABEL people [he saw himself as] the least qualified, for the other teachers [he was] teaching them”: “They think I’m a techno-guy,” he said.

Sheila described how she assisted another (non-ABEL) teacher: “I knew how frustrated she was trying to learn the technologies and I had just been through that so it was

comforting for me to know that I [could] alleviate her frustration by just being there to show her.” Some leadership roles have already been formalized in individual schools. Anthony was the lead teacher for his ABEL project, responsible for “coordination and collaboration, getting staff involved, and making sure that the project was completed.”

In some cases leadership has carried over from the local school setting to a broader context: Colleen reported on how enthusiastic colleagues at other schools have become when she promoted ABEL to them. Similarly, Stan has presented his ABEL projects to several conferences, both at and away from his own school, including at a conference for the elementary school group that feeds into his school as well as a school board conference. And Esther was involved in making a presentation to her school board about ABEL; this was very well received and this, she believes, part of the reason why the project was extended to the end of the 2003-04 school year.

In the area of formal leadership and outreach, Ray spoke of a presentation he made, at an online symposium entitled “Engaging Multi-Modal Learners,” in which he talked about the use of technology at his school and its connection to ABEL.” Dara has done presentations regarding ABEL in a mathematics context to groups within her school district, “to provide them with an understanding of the impact that broadband can have in a classroom.” Several other teachers have made similar presentations.

Roger also saw himself and his colleagues as becoming leaders in the province when it comes to the implementation of Supernet (Alberta’s high speed provincial network), with the goal of “leading teachers down a brand new path.” For other teachers too, ABEL has suggested future leadership possibilities. Mark, who spoke of already having “gone out and conducted workshops, both pan-Canadian and at [his] own Board,” has been “putting [additional] proposals forward to the Board, based on the use of ABEL” and, in particular, the Histor!ca resource. And Colleen anticipated her future work thus: “I see myself in a leadership role ... where I’m going to continue to advocate for the use of technology because I’ve seen the benefits and I think...this is what the kids are going to be using.”

Clearly ABEL has helped to generate significant interest in, opportunities for, and initiatives directed at dissemination and outreach in relation to the development of ideas and practices that integrate ICT, teaching and learning. But perhaps the most important outcomes of all, in terms of learning, reflection, and innovation, are those changes that have been implemented in the area of classroom practice. These are taken up in the next chapter.

## 4. Changes in Teacher Practice

The impact of the ABEL experience on different teachers' pedagogical perspectives and practices varied considerably. Summative statements about ABEL-inspired changes in teacher practice range from Steven's sense that the project has broadened his practice "somewhat" without changing his pedagogy as a whole, to Roger's new "faith in the ability for students to take control of their learning," to Paula's sense that ABEL has changed her fundamentally as a person, from wanting "to know where [she is] going" to being "ready to try things [without] knowing what's going to be the result." Though these changes vary in degree and kind, it is clear that for virtually all of the participating teachers the project has had some effect on their practice. This chapter begins by offering an overview, first of specific changes implemented by ABEL teachers in lessons, units, and projects involving ABEL tools and resources, and second of the broader changes in pedagogical philosophy that underpin these particular implementations. It continues with a look at some of the challenges and obstacles faced in relation to these implementations, and concludes by enumerating anticipated implementations that have not, at the time of writing, translated into actual changes in the classroom but which reflect teachers' new ideas about practice.

### 4.1. Classroom Practice

Throughout the teacher interviews, discussion abounded about new classroom practices arising out of teachers' participation in ABEL, and many of these were confirmed in observations of ABEL teaching activities. The following examples illustrate these new practices and hint at their pedagogical grounding, itself often either changed or affirmed by ABEL, which will be reviewed later. The most obvious and widespread change made by many of the teachers pertains to increasing the integration of technology into classroom activity for research, communication, and presentation. As is the case for change more generally, the uses to which the technology is put vary both in kind and in degree. John has begun using Powerpoint in all his lessons that involve lectures: "every single day, every lecture." Catherine, for her part, uses various technologies "a little bit here and there.... It can be as simple as just emailing students about something, or having them email me. It's small, the change, but it's there."

This integration is seen as important for students for a variety of reasons: facilitating the expansion of their understandings; preparing them for the workplace; providing access to authentic experts in various fields; developing their skills at using different multimedia presentation formats; and increasing their motivation. For example, Susan has begun "to think of different ways of delivering the curriculum that use more technology" to help her students prepare for "different jobs ... especially in business where videoconferencing is being used a lot." Catherine would concur: for her, since technology "will be incorporated into life so much more ... having the opportunity to experience it in school [is] great preparation, especially if it's used effectively." Mark has sought to introduce students to non-traditional ways of demonstrating learning. Thus, in addition to doing a more usual assignment such as a test or essay, they "have to present [their learning] in a



different and unique way,” such as with skits, comedy, satire, visual art, interpretive dance, or music. In effect, he has asked his students to consider not only what these media represented in the Histor!cal periods being studied, but how they could be used to demonstrate students’ understanding about those times.

Technology in the form of ABEL-related tools and resources has been used to supplement established lesson plans, as well as for student research, review, and study. Reported Esther, “Certainly three or four times a week I’m using technology, whether as part of the ABEL project or for downloading other stuff.” She has inserted Insite videos and Heritage Minutes into her lessons; her students have also used Heritage Minutes, and other Histor!ca-based research, in their own projects. George has used WebCT, Tutor Buddy, and Insite: his students watched streaming video, used the internet extensively and accessed a WebCT-based course for research purposes. Leslie has had her students post and respond to the ABEL Community; as well, they have used the site for online surveys and polls on topics such as cloning, genetic foods, and privacy issues. Roger found that WebCT served as a “communicative interface” for his students, and that IO was a “huge help” in the planning of a project-based unit that “turned out really well” and changed his ideas about project-based learning.

One of the ways learning options have been extended is through the accessing of scientific experts, authors, and other guests that broadband technologies, particularly videoconferencing, make possible. Many of the teachers agreed that the opportunity for students to question and discuss leaders in various fields is invaluable, and that videoconferencing is an invaluable means for accomplishing it. Dara spoke of this resource as the part of her “repertoire” that best allowed her to consider and use experts as a resource far more readily than she could otherwise. And Donna emphasized the view, supported by numerous other teachers, that:

In the ABEL model teachers are not only creating knowledge but also learning from the experts...and so ABEL has transformed that traditional model—where students are sucking up the knowledge and the teacher is just spitting out whatever they've gotten from professional development activities or their—because [now] we're learning through discovery.

## **4.2. Teachers’ Pedagogical Orientations**

The specific classroom changes, enumerated above in relation to particular lessons, projects, and curriculum units, are manifestations of the kinds of pedagogical orientation and focus that ABEL has helped, in many cases, to evolve or to affirm: orientations teachers already hold or are developing, which relate to both their actual classroom practices and to their ideas about what good teaching and learning mean. Some of these shifts have been and continue to be in the direction of collaborative learning, inquiry- and project-based learning, learner autonomy, and critical thinking.

Videoconferencing is one dramatic example of a tool that can be used to facilitate both collaborative teaching and cooperative learning. For most of the ABEL teachers, and

most of their students, it was an entirely new undertaking, introducing students to peers across the country and to experts in various fields. On some occasions, for example in the Arts and Multimedia project, it allowed students to share their work and potentially to engage in constructive critique of the work of both their peers and the professional artists involved in the project. It was important for teachers too: as one of the more experienced videoconference users, one art teacher saw her use of this technology in the Arts and Multimedia project as having facilitated her seeing the “bigger picture” in terms of interaction and collaboration among teachers, students, and professional artists. Though at times these conferences had a lecture format, (in Mark’s words “a talking head [that] nattered on, and wasn’t the best educational[ly]),” at other times they had been a vehicle for encouraging students to work more collaboratively on problem-solving than is the case in the traditional classroom, and to support students in the use of inquiry methods.

Project-based and inquiry-based learning are additional pedagogical models both encouraged and affected by the ABEL project. ABEL allowed teachers to develop and change their classroom practices, as they saw fit, in relation to these pedagogies. Bill found that in general ABEL encouraged him to move further along in his commitment to a project-based pedagogy, even though this was disappointing for one student who objected to what she claimed was his demand that she “teach herself.” George found that developing expertise with WebCT has allowed him to integrate project-based learning into his teaching in new and more meaningful ways: “As a result of the [broadband] connection and communication within the project, I become more involved in project-based learning, and can see now [to] incorporate [it as] more and more a regular part of my teaching.”

While ABEL allowed development in these particular directions, what is perhaps more important is that it allowed teachers to experiment with these pedagogical models—as well as with new technologies—and to make decisions about their potential usefulness in their practice, with their students and their curricula: in effect, to conduct their own inquiry into inquiry learning. In some cases this inquiry has led to ambivalence about a particular model, as evinced by Anthony’s contention that inquiry learning might not be for everyone. For those already accustomed to inquiry methods, however, ABEL was a way to infuse technology into inquiry based study. For relative newcomers to inquiry-based learning, like Colleen, the first year of ABEL was a chance to experiment. The “phenomenal” results she had convinced Colleen that

It's definitely what learning is all about.... At first I was hesitant because it meant that I would have to give up that power, and trust in my students to find a way to learn for themselves. But once I started I realized that it was so beneficial for them because it gave them ownership of their learning.

This “experiment” inspired Colleen to redesign her entire grade 11 course based on the inquiry-learning model. For still other teachers, like Catherine, inquiry learning seemed like too great a change to try to implement in tandem with the increased use of technology: “We’re aware of it, but in the conversations the ideal situation is always presented, which isn’t the case for, you know, probably 99.9 percent of the teachers.” Nevertheless, she did notice changes in her thinking: “Many of my thoughts are towards

how to involve the students more... and [use an] an inquiry approach or a problem-solving approach.”

Extending their teaching and their students’ learning across disciplines was for some an important goal facilitated both by ABEL and by the process of students directing their own learning and choosing their own ways to present that learning. As previously discussed, history teacher Mark found that introducing the arts into his program made for beneficial cross-disciplinary experiences for his students, who brought performance and comedy to their First Nations studies unit. Video/film teacher Virginia, who also teaches history, has introduced her students to the Histor!ca resource, where they have viewed “Heritage Minutes” and began developing their own versions of these brief videos that present Histor!cal data obtained through research, using video equipment Virginia has in her classroom.

Teachers also found that ABEL-related resources and projects assisted them in their efforts to promote autonomy in their students’ learning, and to enhance student self-confidence and social skills. The value of autonomy was articulated by Roger, who asserted that “if students are taking responsibility for their own learning they really advance themselves and they become better learners [which in turn] makes their teachers better.” Dara would probably concur. She began her participation in ABEL with the goal of integrating multimedia in her classroom, and used IO to develop her M3 (My Multi-Media) Project. The opportunity to integrate technology not only helped her “see some of the students in a very different way” but also gave the students themselves “an outlet they did not [previously] have in the course,” and some “freedom” that helped them socially as well as academically (see chapter 5, *Student Outcomes*).

ABEL teachers found ways to support and extend critical thinking, and to engage in the kinds of meta-level discussions about technology and education that they believe are of crucial importance in the current educational milieu. Among these was Anthony, who commented that working with online learning has, for him,

Brought into sharper focus the real problems that arise when you put kids into the computer world. You have to do a lot more preparation to make sure that the information they're going to encounter is useful... They have to stay focused and use information rather than basically just shovel it.

Anthony talked about ABEL, particularly the Banff Summer Institute, as inspirational in helping both teachers and their students explore deeper issues of education and technology. Back in the classroom, he discussed with his students what he had experienced through videoconferencing, and engaged them in discussions to facilitate their thinking about “the nature of communication [and questions like] how are we affected when we look at television, or how do the media operate, how do you get your news sources.” These discussions have been, for Anthony and his students, “a way of looking at some of the more philosophical ideas about communication.”

The relationship between new technologies and teaching and learning is not uncontroversial. The ABEL teachers’ stories that tell of their own and their students’

engagement with the pedagogical challenges surrounding this relationship speak to their imitative, dedication, and willingness to take risks, and to a process of reflective practice that is enriching for all. This is not to say, however, that the larger questions of technology and education are the only challenges faced by those teachers in ABEL who are looking to change their practices.

### **4.3. Challenges and Obstacles**

As discussed in the section on teachers' professional growth, unreliable technology and insufficient time created challenges of various kinds, relating to the accessibility and functioning of ABEL tools and resources. While it would be redundant to enumerate all of those difficulties again, it is useful to recognize that certain of them had particular implications, actual and potential, for classroom use as such and for either the likelihood or the effectiveness of changes in practice.

Teachers' concerns about connectivity cannot be overemphasized. Most teachers cited the unreliability and intermittently poor quality of the audio and video as the major weakness of the entire ABEL project. Steven stated that being able to show streaming video in his class was "great when the net's working." However, the frequent connectivity problems he encountered in the second year of ABEL have brought him to the point where, he said, "I just don't rely on it any more. You always have to have a backup plan, and if you've already booked the backup VCR and the backup video, maybe I'll just stick with that." He reported feeling less positive and upbeat about the whole project as a consequence. Such comments need to be heeded, for they speak to the difficulty teachers have in attempting to implement change when it seems at times that they keep bumping into walls that impede their progress. Similarly, Esther recalled the "aggravation" she felt when the technology did not work: "I'd be showing [a video] as part of my class and it wouldn't buffer properly. It doesn't add to your comfort level when 35 people are watching you.... The flow of your lesson isn't there any more."

When Vera was asked whether her art students had developed the kind of collaborative community she had hoped for, and which it was felt videoconferencing had the potential to help facilitate, she replied, "I think that honestly the [videoconferencing] technology is still too primitive. Students are used to good-looking images, high-resolution, high-definition, and no time-lag. ...And that is a real barrier to build[ing] a connection."

Other issues related to learner accountability and the sharing of work. The former arose when students were working online: their projects had to be graded but their teachers could not be certain when these had not been done at school that they did in fact represent students' own work. The latter challenge came into play when Paula's plan to have her students use the ABEL Community to share their comparison and contrast essays with other students had to be shelved. This happened because the only other teacher whose class was willing to engage in this activity "didn't have the ABEL knowledge" and there was insufficient time for her to learn it. Clearly, these logistical challenges can limit the kinds of activities that teachers interested in collaborative work for their students might wish to undertake.

With respect to concerns relating to new or alternative pedagogical models, the question of meeting curriculum expectations reared its head as one of the teachers' main challenges. A few Edmonton teachers whose grade 12 students were facing provincially mandated diploma exams at the end of the year felt constrained by a need to use their class time to cover all relevant curriculum, and so chose not to implement projects that allowed students considerable initiative in choosing topics and directing their own learning. While Dara did engage some of her lower-year students in inquiry projects, she shared those concerns: "Part of the difficulty for me has been the fact that I'm [preparing students for] a Grade 12 diploma exam, and so I would really have to have something that fit perfectly because I really can't afford to try something and find it didn't work. I don't have a lot of flexibility time-wise." While ABEL saw significant strides made in terms of adapting technologies to meet curricular demands, some teachers were understandably concerned about finding the balance between using new technologies and alternative teaching and learning models on one hand, and fulfilling curricular mandates on the other: "This business of students constructing their own meaning is very interesting... But the province lays down our program [and] we have to teach [it]."

At times some of the teachers were challenged not only by the problem of finding this balance but of the related but arguably even deeper uncertainty of adopting new paradigms. Some found it relatively easy to balance these competing demands: Terry described his approach as telling the students he was "leaving it as open ended as we can—within the guidelines of the curriculum, anything you want to pursue, pursue it." But others, such as Dara, for whom experimenting with inquiry-based learning was initially "a big step," tended to be "more structured [and therefore worried that] just throwing it wide open to kids... was very foreign."

Sometimes obstacles to interaction and inquiry learning took the form of mismatched groups of students. Catherine noted that videoconferences were sometimes less than satisfactory because some groups of students "either didn't do their research or didn't care for discussing, so although students did bring up some very significant and thoughtful points there was no true discussion because no one responded, and the teachers had to carry it." (This is analyzed further in chapter 5, *Student Outcomes*.)

The ABEL teachers were capable of taking a philosophical view about the obstacles they encountered. Like those who used imperfect videoconferences as jumping-off points for discussion with their students about the nature of truth, and the complexities of communication, Dara spoke of how sometimes the barriers erected by technology, or more specifically by the challenges of technology, can be negotiated productively. When her students saw her lack of expertise at the beginning of ABEL, she recalled, "They saw me as very human, plain and simple. I cannot control everything. This is obvious—we're staring at a green screen. And ... it strengthens those [teacher/student] relationships." And for his part, Lee understood the limitations of videoconferencing as a good thing for students to be exposed to, because an acquaintance with the problems as well as the successes invites very important discussion, about "what technology can and cannot do."

#### 4.4. Plans

There is considerable evidence for the ABEL teachers' commitments to continue to explore and reflect on new technologies, even in the face of the numerous technical, logistical, curricular, and pedagogical challenges they face in so doing. This evidence rests in the many plans they discussed in the interviews. While these undertakings have not materialized at the time of writing, it is important to summarize them briefly, for they provide an indication of where these teachers are headed that supplements the foregoing discussion of how far they have come.

While a few teachers' uncertainties about the ongoing viability of ABEL made them reluctant to engage in major course unit development, fearing they might not have access to units after the project ended, others engaged in work that led to the creation of artifacts or unit plans that they fully intend to make use of next year. Steven described how he used an ABEL-acquired camera to "record what the kids were doing and save onto the computer [to use] as exemplars" with students in science labs the following year. Alice's math students created instructional videos about the use of graphing calculators that she plans on using with students in the future; the same holds true for the multimedia trigonometry tutorials produced by Dara's students.

ABEL teacher interviews are rich with teachers' future-oriented plans. Vera, asked whether she would give up following her somewhat disappointing videoconference experience, simply replied, "No." She then went on to articulate her intention to "link with Sara Diamond at the [Banff Centre] because [Sara] has this Code Zebra project that is a web-based kind of artwork," which Vera believes can inspire her students to "use these [technological] tools as an art form . . . and create art in the form of a website." Colleen was hoping to use videoconferencing to introduce her ESL students to Canadian writer Winston Choi and his writing on identity. And Marlene comments that "action-based learning and inquiry-based learning are areas that [she intends] to start investigating next September [2004]."

In the area of interdisciplinarity, math teacher Ray has been looking for ways to integrate mathematics with his other passion, peace studies: because of his work with ABEL, and in particular his colleague Steven, he has discovered a resource entitled "Peace, War and Mathematics" at York University that he intends to access. Mark acknowledges that current levels of technology will not support his idea, but nevertheless he "would love to see [his] students designing their own learning objects, creating their own Heritage Minutes"

The next chapter examines the impact of ABEL projects on students.

## 5. Student Outcomes

Fostering student engagement in learning, developing students' capacity for critical inquiry, and facilitating the growth of domain knowledge are central challenges facing high school educators. The ABEL program provided teachers with a broad set of tools and resources, both technological and pedagogical, for addressing these challenges. This section considers the impacts that the varying ways in which teachers chose to make use of these resources and capacities had on student engagement and learning.

### 5.1. The Effects of Videoconferencing

Videoconferencing proved to have a notable, even dramatic impact on most students' engagement levels that frequently extended to related ABEL project work. This was observed by researchers and reported by teachers for a wide variety of projects in which videoconferencing was used for differing purposes, ranging from interschool math problem solving activities, through the critiquing of student art by artists, to interclass mock trials and the delivery of talks by off-site experts<sup>2</sup>. During the videoconferences, rapt attention on the part of students was commonplace (provided the connection was maintained reliably and the audio and video quality did not degrade enough to interfere with easy comprehension). Off-task talk was minimal—at most times non-existent. One teacher noted how she was struck by her students' posture in the session: everyone was sitting upright and leaning forward to watch rather than slouching and shifting in their chairs as was more common. Attendance in one basic level class, for which there would typically be a number of absences, was “way up” on the days when a videoconference was scheduled. In a few instances students willingly participated in videoconferences after school hours or over their lunch period when these were the only times available. When student role-playing was part of an event, as in the mock trials, teachers noted that their students' participation was very authentic (“they believed in it, it became real to them” as one teacher put it).

When asked, nearly all the students who had engaged in videoconferences in which they interacted with remote peers indicated that they found seeing and talking to distant students very interesting. The reasons given varied, and depended to some degree on the project they were involved with—after a mock trial, for example, students indicated they were very interested in the arguments and what the verdict was going to be. Some reasons expressed for their high level of interest were more generic; there seemed to be a fascination with meeting and interacting with unknown peers who went to a different school, whether that school was in the same school board or several thousand kilometers away. Regardless of the particular focus of the interactions, they were generally seen as “fun” and “cool.”

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<sup>2</sup> A table of videoconference learning events in which students participated over the past two school years can be found in Appendix C.

Videoconferences in which students listened to and interrogated guest speakers such as renowned physicist Dr. Ursula Franklin were also reported as interesting by students, who valued the opportunity to hear from and question people they perceived to be authentic experts, whether they were lawyers, human rights activists, artists, or scientists. One teacher wryly commented that when she would provide her students with the exact same content in class it would not be treated as seriously because it was “just coming from a teacher.” Some of the experts would give highly polished presentations employing multimedia (an example would be University of Alberta Professor Bagnall’s presentation on embryology, which one student told his teacher was “the best thing that ever happened to me in school”), whereas others would participate in less formal, more interactive discourse with students, but both formats seemed to engage most students’ interest. Student engagement and excitement was regularly witnessed by research observers, and was remarked upon by faculty members and learning leads as being a common feature of videoconferences they had observed or participated in.

In most cases teachers saw students’ participation in a videoconferencing event as having a significant positive impact on the quality of learning that occurred and the work that students did in preparation for, during, and following the videoconference events (provided that event was meaningfully embedded in unit projects). For example, a science teacher in York Region had been taking groups of his students to the Ontario Science Centre (OSC) to undertake a DNA fingerprinting procedure for several years, but when he combined this with an on-site videoconference in which each of his students had to demonstrate a few steps of the procedure to a class of peers in Alberta, he found that the students learned the lab protocol and the reasons for it better and that the average mark on the lab assignment they completed after the OSC visit was much higher. (When he attempted the same project the following year but had a broadband connection failure at the OSC which prevented his students from presenting, the students were quite upset and badgered him to arrange another trip to the OSC so they could make their presentations to the Alberta students.) Another teacher indicated that students that participated in Dr. Bagnall’s presentation “learned much more from him than me.” Drawing upon examples taken from this presentation in their test, some students scored 30% higher on this test than on previous tests, and the overall class average was 8% higher despite some no-shows for the test.

A number of teachers remarked that in projects incorporating videoconferencing students conducted more thorough research, spent more time developing reports and presentations, collaborated with peers more effectively, and were often more self-initiating and self-directive in their work. An Alberta math teacher noted that her students participating in the MC<sup>2</sup> project were coming up with a range of “incredible methods” for solving math problems, which was a key goal for her—she did not want students to be solely focusing on finding the “right answer.” Another teacher found that those students who would typically be less actively involved in class work “kind of blossom” in a videoconferencing project, extending themselves beyond what they would normally do. Several teachers observed deeper-than-normal levels of student thinking and comprehension being stimulated by videoconferencing events, as evidenced in the questions and discussions held during and after videoconferences with outside experts. Teachers reported an eagerness on the part of some students to engage experts in



discussion, but several also commented on many students' apparent shyness and reluctance to speak "on-camera."

The opportunity for students to collaborate using videoconferencing with peer groups that differed in some way from themselves was also seen as providing significant educational benefit. A teacher of a grade 11 ESL English class whose students had participated in a mock trial with a conventional grade 9 English class remarked that allowing her students to engage the grade nines via videoconference provided them with a psychologically safe first step for venturing into the potentially risky world of native speaker interaction, and she observed that it had given her students a sense of achievement, as they were now doing the same work as a regular English class.

Teachers saw students benefiting from the widened purview that videoconferencing with others in a distant region of the country made possible. Exposure to different regional cultures and perspectives was seen as broadening students' awareness and appreciation of Canada and their place in it. An Ontario teacher whose students had participated in a mock trial with an Alberta class noted that her students found it made Alberta seem a "lot closer", and also made them more aware of the unified national law structure. Teachers involved in the Energy Project noted that students were seeing the regional differences in energy use and production and starting to consider the implications: "It's important to get students thinking beyond their corner of the world".

In several projects students were exposed to the work of remote peers or experts, and in turn presented their own work in some form to these groups. The nature of what was presented varied from works of art to arguments presented in mock trials. Students demonstrated very high levels of engagement when presenting their works, and were very interested to see the reactions of others, whether it be conveyed by a jury vote, for example, or by through comments on their creative work from professional artists. Teachers thought a key part of the educational value of these events lay in making the learning experience more authentic for students by engaging them with a 'real' audience. As one teacher whose students presented art for review observed, "they can see other people being influenced, and see their reactions reflected immediately in the videoconference". She saw this audience reaction as acting to legitimize students' efforts. To see the artists' smiles and hear their positive and reflective comments on student work was an exciting experience for her students. In another context, students working in groups to build presentations were overheard encouraging each other to do a better job in preparing for the event. One teacher involved in setting up the videoconferencing of the Innovative Thinkers series at Ursula Franklin Academy (UFA) remarked on the deeper educational value for teenagers of contacts with "the other": "[T]hey could connect and become more metacognitive because they think about what other people are thinking and think about how they are thinking

Viewing other students' work was also highly motivating. One of the teachers involved with the Arts and Multimedia project noted:

It really intrigues them to see what other kids across Canada are doing. There is a competitive spirit [that gets] engaged. They look at it and are impressed and want to do something equally impressive. They really do put more effort into it.

That competitive feeling, combined with a sense of pride in the “home team”, led students to make a greater effort than normal when presenting their work to other classes. One teacher noted that students feel more responsible and accountable because they feel they should present a “good face” to strangers. “We like to compete with other schools and do well” said another, and she saw this dynamic as motivating her students to carefully prepare for a mock trial. The net effect was to heighten student ownership of the experience and strengthen engagement.

Videoconference events, however, did not always have significant educational value. Students reported finding a few specific conferences “boring” or a “waste of time”, and these were characterized by higher levels of off-task behaviour and/or a lack of participation in discussions the teachers were trying to facilitate. Weak videoconference events fell into three categories: (i) conferences plagued by technical difficulties; (ii) those for which students were not properly prepared; and (iii) those in which the guest presenter(s) had not followed the “game plan” formulated by the teachers, left no time for discussion, or were otherwise not appropriate for the audience. Several conferences fell (at least to some degree) into the first category. In a handful of cases one of the sites participating could not establish an audio and/or video link into a point to point or multipoint conference at all. More commonly there would be significant delays in getting connected that meant either the conference was rushed or the late-joining party was dropped into the midst of an ongoing event. Technical glitches in video and (especially) audio transmission, which were far from rare, would if they continued beyond a few minutes disrupt student focus and lead to frustration and restlessness. Poor quality audio would usually also affect the level of interaction during the conference. A teacher whose students participated in a mock trial noted that a discussion planned for the event had been negatively impacted by the low audio quality that left her students straining to hear students at the other participating site.

A few times a group of students was not sufficiently prepared for a conference, and this would impede meaningful dialog with the other parties about the topic being addressed. If the advance scheduling of conferences was based on a student work timetable which then turned out to be too optimistic (and the session could not be rescheduled for a later date), students were placed in the position of discussing a topic they had not researched or thought about sufficiently for fruitful dialog to ensue. This circumstance arose in the Energy Project, when in a few participating classes a number of students had not been far enough along in their project development to offer informed opinions in dialogs with another class. The opposite could also happen when due to videoconference scheduling delays one of the classes participating had finished their study or project on the relevant unit weeks ago, and would as a result be less prepared and/or less engaged in the topic.

## **5.2. The Use Of Discussion Forums And Synchronous “Chat”**

Although they were not always used in projects, online discussion forums when employed proved in most cases to be a valuable tool for supporting student dialog and discussions. Their use was most consistent when mandated as a project requirement, and when participation was graded. Students indicated that they generally found it interesting reading other students’ views and often learned new things or got an understanding of others perspectives. In a few projects discussion threads emerged in which students would thoughtfully engage or interrogate each others’ perspectives, although these would rarely develop into an extended discourse. When outside experts were made available for consultation on problems or projects via the forums, only a minority of students made use of them as a resource.

Student chat sessions using tools built into the student ABEL web site or the WebCT authoring platform were sometimes scheduled in advance within specific learning projects for evenings or weekends by teachers or students, but they rarely led to any significant interaction—usually, students would report later that they could find no-one else on the chat when they tried to join it. No teacher reported being able to use this mode of interaction effectively as a means of furthering meaningful discussion, except when it was used as an adjunct to videoconferencing. In this capacity it was found to be very valuable, providing a back door for communication between different parties in the conference. Students could use it to ask questions of speakers without interrupting ongoing discourse. It had the additional advantage of providing those students who were shy about speaking in front of the camera a channel for anonymously submitting questions and ideas for discussion. (It also facilitated the smooth running of conferences by providing a means for teachers to inform each other about technical problems such as lost connections and failed downloads, and to unobtrusively manage the flow of events and change agendas on the fly.)

## **5.3. Other Student ICT Use**

In virtually all of the ABEL projects students undertook, they were either given the option of using or were told to use ICT-based resources and tools to research and develop their project artifacts, reports, and presentations. These uses varied from conducting online research to developing short digital video clips to creating PowerPoint presentations or Web pages embedding different media.

Many teachers commented on how the use of ICT raised students’ level of engagement to varying degrees. One teacher, for example, noted that students seemed more eager to complete their project assignments and made better presentations; another found that class attendance had gone up for project work periods, students had engaged in more supportive collaboration in their research and development activities, and presentation quality had increased. Certain students were observed to “take off” in their work, demonstrating levels of skill and creativity that shifted the teachers’ perceptions of these individuals. An ESL teacher found that a number of her students proved to be highly competent with technology and were able to produce presentations she termed “strong”:

“It provided them with a new medium of expression that they were more skilled with” than English. Being able to demonstrate competence in non-language areas with ICT significantly enhanced these students’ self –esteem.

Access to ICT tools was seen by another teacher as providing quieter students who were less likely to participate in traditional activities at a high level “another outlet” which “energized” them, and allowed them to express previously unseen attributes such as a sense of humour. The use of ICT in small group projects was seen as fostering greater growth in students’ collaborative and presentation skills.

A few teachers indicated that their reassessment of certain students on the basis of their ABEL project activities had broader implications. One teacher said “I see students in a new light when they show project results through technology... it changes the rapport in the class and how I approach certain students at times in a very positive way.”

Compared to more traditional Bristol-board project presentations, presentations completed for ABEL projects using PowerPoint, web authoring tools, or even Word were consistently reported as incorporating a greater variety of representational forms and media, such as photographs, diagrams, charts, animations, and video or sound clips. Many of these presentations employed complex and in some cases sophisticated design elements that reflected students’ desire to produce creative and attractive work that exploited the technology’s potential, and these required considerable skill with the tools to produce.

While most students readily adapted to working with ICT tools and resources, and in many instances appeared to engage their project at a higher level when doing so, for a small minority of pupils the use of technology was perceived either as a stressor they preferred to avoid, or as “boring”. In these instances no improvements in project work were noted. Nor was their always consistency in interest and depth of engagement across classes, even when students were involved in the same project. In the 2003-04 Energy Project, for example, Catherine indicated that her grade nine class showed no significant changes in interest, degree of collaboration, research level, or presentation quality, and student grades on the project were at an average level. Wendy’s grade 11 class, however, demonstrated greater levels of interest, and Wendy was “amazed with what some of them came back with in their completed projects”; nearly all students received a grade of A- or higher for their work. (This class difference is likely a consequence of the relatively advanced level of project expectations laid out in the project requirements and rubrics, which made the project highly challenging for most of the younger students.)

In a few cases, teachers were uncertain of the overall impact that ABEL projects had on student learning. One teacher pointed out that he had large classes which he only taught for a semester and as a consequence did not know his students that well, making it hard for him to judge if the ABEL project led to any significant change in the depth of their work. But even in cases where that judgment could not be made, there was an appreciation for the growth witnessed in student skill at using a range of ICT tools, which teachers considered an important part of preparing their charges for higher education and employment.

## 5.4. Inquiry Learning

There was considerable variance in the degree to which ABEL projects incorporated inquiry-based pedagogy. Most commonly students were given some freedom to choose their inquiry topics from a circumscribed domain (for example, a type of energy source to investigate) but because of the need to fill multiple roles in some projects, this degree of choice was not possible (for example, not everyone can be the prosecutor in a mock trial). The project scope, expectations, timelines, and rubrics were typically established with little or no student input. Collaborative work was normally encouraged or mandated; students were usually allowed to choose their collaborators and research sources, and were typically free to select what technologies to employ in the creation and delivery of their reports or presentations. Assessment was (with a few exceptions) conducted by the teacher, and was mainly summative. The issues investigated were usually ones with direct relevance to students' lives, or served to expand students' perspectives on the implications of Historical events or abstract fields of study (such as mathematics) to the "real world". Videoconferencing was often used to allow students to learn from and question authentic participants and experts in specific fields.

Students had varying responses to the more open-ended inquiry projects. In one case the projects produced were exceptional and the impact on student understanding powerful: Volunteer grade 12 students were asked to choose an area of mathematics that was difficult for them and develop a multimedia project that could be used by future grade 12 math students to learn about the area. Students worked individually or in small groups to design and implement their projects. The teacher observed that "you had a lot of instruction just going back and forth between the students and you could see that as their projects developed". The students appeared highly motivated by the opportunity to create a "legacy resource" for other students to use, and generated projects ranging from custom programming relating to quadratic equation solving to web sites and PowerPoint presentations incorporating animations to videos related to math Jeopardy. Nearly all the projects were in the area of trigonometry, and the class as a whole raised its average understanding in trigonometry almost a full point (on a four-point scale) over prior years. And in the provincially administered math final exam (22% of which dealt with trigonometry) the class exceeded the provincial average, which the teacher considered highly significant given that the student achievement at that school was normally "average to borderline"; she attributed "quite a bit" of this gain to ABEL project work.

An Edmonton teacher who had engaged his grade 12 Social Studies class in a major inquiry project in the fall semester of 2002 also saw an impact on students' diploma exam grades. Students had to design an ideal society, discussing "all the good and bad parts of the ideologies and economic systems they had encountered". When the exam was written in June, more than half of the students did better on multiple choice questions relating to the first semester than the second semester—unusual since students typically do better on the questions relating to the second semester work as it has been covered more recently.

An English teacher who had tried an inquiry project with one class in the 2002-03 school year as a result of her exposure to inquiry learning principles and practices in ABEL large

group sessions found the results “phenomenal”: “It was so beneficial to them, it gave them ownership of their learning, and they were the ones who directed where they go and what they do.” The experience had led her to undertake a redesigning of her entire grade 11 course according to inquiry learning principles. As a consequence, she saw these students learning more.

Some efforts to implement inquiry learning had more mixed outcomes. In the experience of one teacher who worked on an inquiry project in music with her students, “Not every kid loved it ... a lot of students found it too challenging and they hated that project and were happy to see it finished; but there were grade 10, 11, and 12s there, and the more mature students approached it differently.” Despite this student resistance, the teacher thought most of her students had gained from the project: “they really had to reflect and they learned a lot... because they had to try to connect and apply their ideas.” Most students, she indicated, did more work and learned more than they would have otherwise.

A few teachers found that those students who would normally do well in class were the ones who did well with inquiry learning; these were typically students who were more self-initiating and had more mature reasoning skills.

## **6. The Contributions of Higher Education to ABEL**

Three higher educational institutions participated in ABEL: York University, the University of Alberta, and Seneca College. Also participating was the Galileo Educational Network, a centre based at the University of Calgary supporting the adoption of inquiry learning practices, and the Banff Centre for the Arts, through their Director of Continuing Education, Sara Diamond. This chapter summarizes the role each played in the project and the impact on faculty and staff members of their involvement.

### **6.1. York University**

York provided management offices and videoconferencing facilities for the project, as well as the nucleus for and leadership of the technical team responsible for structuring and maintaining broadband network connectivity amongst the participating institutions. It also ensured access to the tools and resources that were part of the ABEL learning platform, provided technical support to all participants for videoconferencing, the ABEL web site, and some of the software tools and resources (others, like Galileo's Intelligence Online [IO] were hosted and supported by other ABEL partners). Five members of York's Faculty of Education were participants in the project's Learning Team, and were either given release time or compensated for their involvement. Their role was to provide pedagogical guidance and support in the use of the ABEL platform, specifically to student teachers (referred to as teacher candidates or TCs at York), some of whom were to be placed in ABEL schools for their practicum experiences, and when possible to assist teachers involved in the project. One faculty member, for example, was actively involved in the planning and implementation of the Arts and Multimedia project, carving out a role for teacher candidates to act as online mentors to students creating works of art. Faculty also brought (to varying degrees) elements of the ABEL initiative such as inquiry learning, videoconferencing, and the use of certain ABEL resources into their pre-service teaching.

The faculty group is currently developing an Inquiry Learning resource website for ABEL to assist teacher candidates and teachers in developing their understanding of how to engage students in inquiry learning. The site makes use of classroom teaching videos and commentary to illustrate the application of inquiry learning principles in different subject areas, and provides a channel for dialoging with faculty around inquiry learning and its application.

The role of teacher candidates in ABEL is not well-defined and depends mainly on host teachers and faculty members with whom they work and their opportunities to have access to ABEL tools and resources. Some of the ABEL faculty members tried to connect their TCs with ABEL, and a few were successful in placing them with teachers. Several faculty indicated that they had difficulty connecting their TCs to ABEL in York courses as there was no access in the Faculty of Education teaching locations to videoconferencing equipment. However, those TCs who did gain access to ABEL through the ABEL offices at York expressed a desire to become more involved with this

type of learning and wanted to be told if anything came along that they could be included in. These TCs, according to faculty, will seek out ways of incorporating the principles of ABEL into their planning. Lacking the ABEL broadband access, other TCs have attempted to do locally what ABEL was capable of doing nationally. One of the faculty reports that his TCs have commented that they learned about risk-taking and problem solving in ABEL when the project did not go as planned due to failures of videoconferencing technology in host teachers' classes.

Several teacher candidates have been involved in many of the videoconferences, sometimes as spectators, but occasionally as participants in dialogues and inquiries that were going on as well. According to one interviewee, these TCs communicate the advantages of using ABEL technologies quite effectively which makes them effective ABEL advocates when they get out into their schools. In the few instances where TCs did work with a host teacher who is involved in the project, the model seems to be effective. One faculty member had his TCs participating in videoconferencing and also in some of the ABEL curriculum development projects. He also made use of certain of his ABEL activities more broadly in his pre-service teaching. He comments,

The connection with ABEL then would be more tenuous but some of the ABEL initiatives I translate into the class. For example, we have done some videotaping and some experimenting with teachers' strategies, which is emerging out of my work with ABEL in the context of York University.

Another faculty member has applied ABEL's inquiry learning focus to his pre-service teaching, involving his TCs in videotaping inquiry activities. What it has done, he reports, is that it has moved the TCs beyond just doing an activity to consciously looking at the attributes that will be analyzed through the viewing of the evidence—the video:

It has forced them to step above just doing this activity to the level of engagement, where they are exploring, where they are analyzing data and inferring their conclusions from the data—and the difference between conclusion and opinion in a lot of these bigger issues because they know that the video will be looked at that way, so it has really forced them to step into a higher domain and order of thinking.

All of the faculty members interviewed thought that their ABEL experience had enhanced their own professional growth and opened up new possibilities for them. (However, the faculty lead in the first year of the project chose not to continue his participation in the second year as he felt the project had been too focused on the use of broadband technology and had not given enough attention to applying inquiry approaches to teaching.) One faculty member stated that ABEL enabled dialogue with colleagues which had led to a deeper level of thinking. He also mentioned how videoconferencing and other ABEL tools have made him think more profoundly about the future of effective classrooms and how they might look. In his view ABEL has fostered professional development by offering new cutting-edge technologies and by getting together people from diverse backgrounds and with common philosophical goals about education. For another faculty member, involvement has expanded his comfort level and enthusiasm for



the use of technology and working with people who know technology much better than he. He also found what he termed the “cross-curricular collegiality” he experienced led him to rethink how some of the commonalities of education are affected by the introduction of the new technology.

One faculty member noted that ABEL and its related technologies had thrown into greater relief the necessary interrelationship between theory and practice:

What ABEL does for me and what it has done for my teacher candidates is that it has given us exemplars of good practice because the technology tools have almost forced that movement away from talking about what this theory is into the actual experience. And it really produces evidence of good learning and good teaching.

The York faculty offered many insights on ABEL’s strengths and weaknesses based on what they had witnessed over the course of the ABEL project. Collaboration in terms of working with other faculty members, and of teachers working with each other and outside experts, had been in their view very high, and one of the great strengths of ABEL. The long-term nature of collaborative endeavor in ABEL was seen as affording teachers the opportunity for ongoing peer review, in which they reflected together on their various practices. The faculty lead stated that the combination of small group conferences, email lists, online forums, and chat in parallel with videoconferencing proved to be an ideal mix for fostering collaboration. The inter-jurisdictional and inter-provincial dimension of ABEL collaboration for curriculum development was cited as an important and creative step in breaking teachers out of their isolated positions, helping to create a community supportive of change. The eclectic mix of participants was seen as an important strength of the project, helping to build a diversified community of practice:

I think it is bringing people from different backgrounds, different experiences, and different expertise together to work on some problems that we all agree are important. I think the collegiality is a very important thing that has happened. And the technology adds a new dimension to the whole discussion, so that you start off with issues that are important to you and you add this other little thing into the pot.

The weakest aspect of the collaborative activities, according to some faculty, was the large group meetings, which were not highly structured and dissolved into talking heads. Those activities were seen as frustrating and requiring better planning and orchestration.

Another key to ABEL success was perceived to occur when a primacy was placed on pedagogy over technology:

No matter what you do on videoconferencing or any place else, it is going to be superficial because I think the technology itself is not going to generate important questions about learning and teaching. It can aid in that but that is not the starting point. So as soon as we start talking about interactive classrooms or inquiry, then some important issues start to be raised and that is when some good discussions emerge.

ABEL was seen as still having some way to go in bringing pedagogical change to the forefront, but progress was being made.

## **6.2. University of Alberta**

The Faculty of Education at the University of Alberta offered a graduate course at the master's level for ABEL teachers over the spring and summer of 2003; this on-line course made use of videoconferencing for face to face sessions, although scheduling the course and these sessions was difficult, as the course instructor noted:

Because of the differences between teachers' schedules and [that of] the university, what I ended up doing was running the course as two separate courses.... In practice, however, online meetings incorporated most participants. It was difficult to schedule sessions as in an ordinary course, primarily because of the time differences and the different teaching schedules of the participants. Also, more than once we experienced severe technical difficulties that prevented sessions from taking place.

Course participants were able to structure their course work around the projects that they developed for ABEL, providing a very close link between their classroom practice and their coursework. Like ABEL itself the course was highly participant-driven: the six teachers involved were given complete freedom in choosing their major paper topic. Five of the six participants completed a course evaluation survey after the course had ended. They reported that the course encouraged them to take responsibility for their own learning, and that they were able to work through course materials at their own pace. Nearly all agreed that it was relevant, and that they could apply what they had learned to their teaching practice. It was seen as interesting and thought provoking, encouraging the application of creativity, it fostered discussion of course concepts with other participants. However the level of contact with the instructor was considered too low, and there were concerns expressed about a lack of feedback by a few students. Videoconference meeting times were found to be too irregular and infrequent. On balance, however, most participants valued their course experience.

## **6.3. Seneca College**

Seneca College planned to provide pedagogical support for ABEL through the participation of six of its faculty, who were to work with teachers as consultants in ICT, related pedagogies, and the subject areas in which they specialized. These faculty were granted a course release so that they could devote time to the project. The Seneca College lead was involved in initial project planning, and was central to the management and facilitation of the 2002 ABEL Summer Institute which was held on Seneca's King (Ontario) campus. However in the end only one of the faculty, a math instructor, worked directly with ABEL teachers. In the words of the Seneca College lead,

The other ones did not seem to be quite as good a fit between our post-secondary college level interest and the K to 12 interest that the majority of the project teams focused on, understandably.

Kurt, the math instructor in question, was very committed to the project, attending the second ABEL Summer Institute and working closely with Dara, Wendy, and the Galileo team on the MC<sup>2</sup> math learning project over both school years. Asked why he had been so successful, the Seneca College lead said “I think it has something to do with his own willingness to go out and say, ‘Here I am, let me look at some of your stuff and see if I can make some suggestions.’”

For Kurt, being attached to ABEL and his social interaction with people who participated in ABEL was seen as being the key factor in his professional development. He was excited by the new possibilities that videoconferencing has opened up for his work. He also saw its use in ABEL projects as having a meaningful impact on students, noting their high level of excitement and engagement. He had observed students using higher-level thinking and problem solving in the MC<sup>2</sup> math conferences, and demonstrating self-management and a strong capacity to collaborate.

Seneca also made available two of their course programs to ABEL participants. The first was a six-course program in designing curriculum that was modeled on a Master’s level curriculum, and the second a four-module program that is shorter and more applied in focus. Both were offered on-line, and any one of the courses would be available free of charge to ABEL teachers. Seneca faculty thought these would be a valuable contribution as they sensed from the first ABEL Summer Institute that some of the teachers “knew very little about the use of technology for curriculum development”. Only one teacher began a course, but dropped out at the halfway point. The Seneca College lead offered an explanation:

My sense was that [the teachers] felt it was too much of an investment of time. They really are at the Master’s level and equivalent to 40 to 42 hours of traditional kind of learning per course for the CTC one; for the other one the modules are more brief.

Seneca College faculty (usually Kurt) participated in many of the teacher videoconferences, and presented on occasional topics in those events such as how to prepare students for a videoconference. Four other faculty worked with videoconferencing with their own college students, which was a direct result of the college’s exposure to ABEL.

Despite their limited involvement, the Seneca College lead indicated that participation in the ABEL project had been “exciting” for the faculty:

It did give them some new ideas which they tried out with their own students. I think it was stimulating and it did impact how they taught in the classroom. I know of one faculty member in particular.... who integrated some video conferencing with experts and authors of the books that she was teaching in her

class, which she had not even thought about before her participation in the ABEL project.

One factor that had impeded Seneca's participation initially was poor videoconferencing reliability and an initial lack of connection to CA\*Net4. The issues were mostly resolved after several months, in part by the purchase of a new set of videoconferencing equipment.

Had she the opportunity to start the process over again, the Seneca College lead indicated that she would have made more of a concerted effort to get the faculty connected with teachers "up front" "because by the time I was prodding them to try to get involved with subject matter teams, the teams had already progressed to the point where it was difficult [to bring them in]". Despite the challenges faced by Seneca in its involvement with ABEL, the lead thought their participation in the project had been very worthwhile, and they planned to continue their involvement in the initiative. She anticipated that some funding would be available to continue offering a few faculty release time.

#### **6.4. Galileo Educational Network**

The Galileo team was a very active participant in ABEL, contributing to most teacher videoconferences (they led two videoconference sessions on inquiry learning) and to both ABEL Summer Institutes. They also consulted with several groups of teachers as well as individuals who were trying to incorporate greater degrees of inquiry learning into their projects, and provided extensive feedback to teachers using Galileo's Intelligence Online environment to scaffold the development of inquiry learning projects. The network's theoretical and practice perspectives on inquiry learning were a central component of the ABEL model. According to Dr. Sharon Friesen, a Galileo co-founder, the role of inquiry learning in ABEL is in adding expertise to information, asking new questions, juxtaposing new ideas, and working with students to develop a knowledge building community:

[Students] become communities of inquiry, not just taking information and analyzing it and then turning it back into a report but rising above and pulling the pieces together to ask new questions of the information that is coming forward. And then from that to build a very deep understanding and some new knowledge so that it can enter people's experience again and they can build on it. So it sees both teachers and their students as contributors [to] new ways of doing and new ways of working and new ways of knowing, not consumers of information, so really pushing that edge of knowledge building.

Sharon saw ABEL as having had some success in moving towards this ideal. In her view, ABEL has brought about a transition of students moving from being consumers of information and teachers moving from being consumers of professional development to a position in which they are taking agency in and responsibility for creating knowledge (not necessarily new knowledge) of the world. Based on her experiences with the project she concluded that ABEL had made a significant difference in teachers' practices and

student achievement, which she found “really exciting”. She sees it as innovative, as creating new ways of working, as helping to redefine teaching, and as bringing larger perspectives into education:

It is not just delivery, it is not just implementing...[it's] teachers as creators in a much more global sense, connecting students in a way that is far more rigorous and [addressing] far more global topics as well. The kids get a sense, and the teachers as well, of not just themselves in their self-contained classroom, but [as being] part of a connected Canada and also as connected global citizens as well.

For Sharon and Galileo, working within ABEL initiated their professional development in the area of working with teachers through videoconferencing.

## **6.5. Banff Centre for the Arts**

Sara Diamond from the Banff Centre played a key role in the initial planning and organization of the project's learning component, and was active in this component throughout the project. She worked closely with teachers in the Arts and Multimedia project, bringing together Banff Centre artists-in-residence to participate in presentations and dialogs with students, and use videoconferencing technologies to demonstrate and talk about their and students' work. Sara saw the teachers she worked with as having a high commitment to the project, a willingness to take initiative, and to adapt and reinvent technologies even when they are faulty. She perceived them as having created strong local working groups that implemented an effective mix of classroom applications and face-to-face, Internet-based, and videoconferencing-based dialog.

## 7. Institutional issues and impacts

### 7.1. School Level

The institutional and administrative culture of the typical high school is not one that readily supports the kind of open-ended pedagogical exploration and teacher-driven initiatives that the ABEL professional growth model advocates. One of the project's learning leads elaborated on this tension, and what it required of participating teachers:

Very often in today's classroom there are very specific expectations in terms of accountability put on the teacher, in terms of reporting, in terms of everything from teaching [to] evaluation and assessment, and even in terms of the way the teachers are now evaluated, the look-fors that a principal is required to identify when they come in to evaluate the teachers. In some ways, the teachers have to transport themselves out of that mind set and say "I'm taking a risk and I don't know where it's going to go, and I can pretty much guarantee that it's going to be a bumpy ride. But this is what I'm willing to do, this what I'm attempting to do, and I'm really confident and really anticipating what will come out that will ... help support the sustainability of what's good in this project."

Initially participating teachers' energies were focused on learning about ABEL and coming to grips with its model of teacher-directed and work-embedded professional growth. Their early exploratory efforts received varying levels of support from school principals; a few preferred to stand aside and let the creative teachers who had volunteered with the project "run with it," feeling that the teachers themselves were in the best position to decide how to proceed. Others worked more actively in support of the project by coordinating the needed equipment, logistics, and scheduling, providing psychological support for risk-taking, and explaining the rationale for the project to other teachers in the school. The principal from the Toronto board was most actively involved in supporting the program: she was the only principal in ABEL to attend teacher learning event videoconferences, and was a member of the learning leads group. She brainstormed with teachers and supported them in generating project ideas, dealt with the many logistic and administrative complexities attendant upon the school's involvement, and participated or observed at most of the videoconferences held at the school. Her intensive and time-consuming commitment to the project was vital, as her school had the highest level of staff participation in ABEL (eleven teachers), yet received less pedagogical support from the project than schools in the other two districts, had fewer computing resources and less technical support available to its participating teachers, and (most importantly) its participating teachers were not given any regular course release by the school board (as they were in the other two school boards).

As ABEL began to be more firmly grounded in schools over the 2002-03 school year, ABEL teachers in a few sites were called upon by administrators to play expanded roles in the making colleagues aware of ABEL; and as they become more technically adept, many assumed an informal leadership role in the infusion of ICT into the school and supporting teachers in its use. They introduced other teachers to the ABEL project and

related technologies both through informal conversations and more formal departmental meetings. At one school the principal formally assigned specific departmental responsibilities in that regard to each member of the ABEL team. ABEL teachers at another school in the same region have assumed a liaison and leadership role with feeder schools, setting up events related to ICT initiatives. Several principals remarked in interviews conducted in the first quarter of 2004 that awareness of ABEL had gradually diffused through the staff, and participating teachers were now seen as leaders in ICT at the school. Many teachers were beginning to express an interest in the kinds of projects they were seeing their ABEL colleagues pursue. Three additional teachers are known to have joined the project after its first year, even without the incentive of release time.

## **7.2. Beyond the School**

A nucleus of ABEL teachers from several schools, together with project leads, have been involved in a number of outreach activities, giving talks about ABEL at regional heads and administrator meetings, to school trustees and other interested parties, and presenting papers at regional, national, and international educational conferences. The reception at these events has been very positive. A learning lead describes what happened when Edmonton teachers presented to their board of Trustees:

We gave a board presentation and all three schools presented their work to trustees and right away all of the trustees were thinking, you could just tell, they were all thinking, I want this for my jurisdiction.... and they are questioning me as to how can we do this.

Over the course of the project, one additional school in southern Ontario was brought into the ABEL network, and the local family of schools to which the Toronto school was attached has decided to spend some of their discretionary development funds on acquiring a mobile videoconferencing station that can be shared between the schools on a rotating basis. ABEL teachers intend to offer workshops in videoconferencing and pedagogy to the family of schools.

## **7.3. Inter-jurisdictional**

Both teachers and ABEL project leaders see the professional connections, collaboration, and community that ABEL has fostered as its greatest strength. Building and sustaining that collaboration across educational and political jurisdictions has been one of its greatest hurdles. At the institutional level challenges would arise when

Institutions want to participate in ABEL and then they try to adapt it to fit into what they have to achieve; that is a problem, because sometimes that is not where it needs to go, or that is where we run into some challenges around communication issues.... [T]he slightest difference in goals can make it very hard to sustain.[A project manager]

A conflict of this type led to the departure of one commercial partner who had not understood the goals of the project when they had agreed to participate. Another private partner failed to provide ABEL with important software upgrades that could have substantially reduced users' problems with that vendor's software tool. There were also tensions generated by the fact that members of the project management and learning teams were being remunerated by different boards of education. In conjunction with funding shortfalls that generated a need to find additional monies, this occasionally led to conflicting priorities.

A lack of effective inter-institutional coordination resulted in a failure to place pre-service teachers at York University with ABEL host teachers in the Toronto and York Region school boards for their practicums as had been planned. Only a few student teachers were placed in ABEL schools and with ABEL teachers.

Differing provincial policies and guidelines sometimes impeded collaborative work at the school and teacher levels. As one ABEL lead explained, "You've got different provinces that have different objectives and expectations and curriculum documents, and so on" that have to be at least partially integrated if meaningful collaboration is to happen. It was mentioned earlier that a few Edmonton teachers were reluctant to involve their students in collaborative inquiry projects due to what they perceived to be tight curriculum constraints that left them minimal time to cover a wide range of mandated content. This was especially critical at the grade 12 level in Alberta, where students had to be prepared for province-wide diploma exams. Ontario teachers had more flexibility in shaping their curricula as they set their own exams.

Inter-provincial differences in high school programs also had to be worked around. Certain subject topics are taught at different times of the year or in different years in the two provinces, and this occasionally prevented a teacher from being able to develop a meaningful partnership with a colleague in the same discipline. An Ontario history teacher wanting to work on an inquiry project in ancient Greek history with another class was unable to find one—ancient European history is not part of the curriculum in Alberta high schools. (Through Galileo she was able to locate two grade 6 classes that were not part of the ABEL project with which to conduct an interactive tutorial on the Greeks a month after the inquiry unit had ended.) Several parallel examples could be given. Groups of teachers made creative accommodations to work around these curricular disparities, either by working with classes across grade levels and/or by shaping projects to meet part but not all the requirements of each teachers' curriculum. Cross-grade projects worked effectively where students were appropriately matched and prepared, but when large disparities existed between classes in the ability to meet project challenges, interclass dialog was often significantly affected. Another approach to dealing with curriculum matching difficulties taken in a few cases was to make the project focus largely extracurricular and student participation optional (most notably in the MC<sup>2</sup> project described in Appendix C).

Curricular issues were not the only inter-jurisdictional obstacles teachers had to overcome in order to have their classes collaborate effectively. As mentioned earlier, scheduling synchronous events (nearly always videoconferences) was often a major



challenge given different school timetables, course lengths (semestered vs. full-year), and class and teacher schedules, as well as the two hour difference in time zones between Alberta and Ontario. Sometimes the only timeslots that could be agreed upon resulted in Alberta students missing lunch, or Ontario students staying after school—something teachers were very reluctant to request as it generally impeded student engagement to some degree. At other times students had to be pulled out of various classes to participate, disrupting other teachers' agendas. Differences in the school year calendar—Edmonton's school year consisted of two semesters, as did York Region's, whereas the Toronto Board school year had three terms—meant there were several pre-exam and exam periods during the year in which videoconferencing was untenable, making scheduling even more of a challenge. Teachers would often have to expend considerable time and effort in order to negotiate these obstacles.

Many of the technical reliability issues that impacted ABEL's implementation were complicated by the inter-jurisdictional nature of the project. The technical team based at York had expert knowledge of its own network, but when problems developed in broadband usage their specialists would need to work in tandem with those at the various boards and elsewhere to try and troubleshoot issues. According to the technical lead, making those connections in a timely manner was often impossible, and inter-institutional cooperation from some partners on the technical side was far from optimal. Even when it was possible to collaborate, the complex nature of the local area and wide area networks involved in each jurisdiction frequently made it difficult to find the origin of reliability problems.

Collectively these inter-jurisdictional obstacles presented a formidable challenge to ABEL's success. It was the dedication and perseverance of both the teachers and the ABEL leadership teams that made progress possible. The ABEL leadership usually responded quickly to meet changing needs and circumstances and address emergent problems where they could, whether these were technical (as when videoconferencing microphones were replaced in an attempt to reduce audio problems) or logistical (as when the content, size, and timetabling of the teacher videoconferences were shifted in response to teacher feedback). The learning and management teams played a critical role in moving teachers from all three boards through initial periods of drift, inertia, and mild skepticism to increasing levels of engagement and self-directed initiative through their efforts at community building and their support for risk-taking and experimentation. Their work behind the scenes in providing the administration and coordinating the logistics required to keep all of the pieces of the project moving forward in the different institutions and jurisdictions involved was in many ways the backbone of the entire enterprise; without it the project never would have left the realm of possibility.

## 8. Moving ABEL Forward

Maintaining the momentum for transformation in teaching and learning that has developed in the ABEL community will be a major challenge, particularly in light of the substantial reduction in financial resources that the initiative now faces. Meeting this challenge successfully will require addressing several problematic aspects of the ABEL model as it has been implemented in this project, and advancing it in new directions.

### 8.1. Technological Issues

The teachers participating in the ABEL Project demonstrated an outstanding capacity for dealing with the frustrations and disappointments arising from wasted efforts, loss of time, and foregone educational opportunities that resulted from the videoconferencing and other technical failures that have been recounted in this report. These failures were seen to be a consequence of using leading-edge technology in a trial implementation; teachers were very patient with them and would rarely be discouraged from “trying again”. Research on the adoption of innovations has repeatedly shown that so-called “early adopters” who volunteer to participate in innovations (as the ABEL teachers did) are far more willing to tolerate these kinds of challenges and uncertainties than the mainstream population of their organization (Rogers, 1995). As several of the ABEL teachers themselves made clear, it would be unrealistic in the extreme to expect that an average teacher would be willing to make use with such unreliable and complex technology. Teachers were virtually unanimous in seeing this unreliability and complexity, especially in the case of videoconferencing, as the major weakness of the project. They complained about the amount of time required to set up and break down a conference, and the need of some to rely on colleagues, technicians, or a trained cadre of students who had to be pulled out of class in order to use the equipment—arrangements that were considered to have no long-term viability. When asked what was required, several teachers and one learning lead drew an analogy to the use of a VCR: “you stick in the tape, you hit play, and you are a go”. Teachers want an easier setup (or better still—a dedicated facility that requires no setup at all), and above all videoconferencing and streaming systems that function with extreme reliability and are robust, so that problems like background echoes, weak audio, excessive time delays, pixilation, and degradations of audio and video synchronization do not impede the natural flow of dialog. As was mentioned earlier, there were a few ABEL teachers who felt that their repeated exposure to technical failure was causing them to lose their enthusiasm for using the technology. Any serious attempt to scale up or even sustain the ABEL community in the long run will need to discover more reliable and transparent technologies for videoconferencing and streaming that can if not eliminate at least greatly reduce these aggravations. It will also have to ensure a consistent base of technical support to resolve issues quickly if they do arise. In addition, there needs to be an easy way for teachers to easily broadcast screens from software applications so they (and their students) can make use of various digital media and data representations as an integral part of their collaborations during videoconferences.

## 8.2. Collaboration and Community Building

The essence of ABEL lies not in the technology it employs but in the connections and collaborations that teachers and other ABEL participants have established amongst themselves in mutual support of their collective endeavour to further advance their teaching. The well-established ABEL learning community that has developed over the past two years has been largely successful in providing the psychological and pedagogical support needed to foster the risk-taking required for exploring new possibilities for teaching and learning. The paramount importance in the ABEL model of creating for teachers the space for self-directed and reflective experimentation in order to build their own professional knowledge, rather than asking them to assimilate prescribed practices and content, makes the scaffolding provided by the community that much more vital, especially in the light of the countervailing forces inherent in traditional school cultures.

Maintaining that community and allowing it to strengthen and grow will require certain preconditions. It will be important to retain the ABEL community website, for it serves as a communication nexus for staying current with community developments, maintaining old relationships through forum discussions, and building new ones. It also provides links to important resources and tools that teachers need to continue to have access to, such as WebCT. Even more fundamentally the site has a symbolic and psychological value as the outward manifestation of the community's continued existence, and its elimination would likely contribute to an erosion of community solidarity.

The maintenance of multipoint videoconferencing in some form, whether through CA\*Net 4 or some other route, seems essential. It is the foremost medium in ABEL for supporting real-time and authentic interactions across distances, and as such it is the key technological tool in the ABEL platform. It serves a critical role in supporting collaboration amongst teacher groups both large and small, and has proved nearly indispensable in quickly moving collective planning for ABEL projects forward. The rich level of interaction it makes possible between community members works to maintain a level of social cohesion within the group that no other medium short of face to face meetings can come close to matching. And if the cohesion weakens, ABEL's momentum will be lost.

While it may not be practicable, negotiating some form of synchronous course timetabling for teachers who wish to work together over a semester or year would be a powerful way of addressing one of the main challenges that ABEL teachers currently experience: scheduling mutually optimal conferencing times for student videoconferencing. By making possible more regular conferencing sessions without imposing on students by pulling them out of classes or asking them to stay after school, teachers will feel much more comfortable engaging their students in longer term inquiry projects that involve ongoing collaboration across classrooms rather than the one-off events that have often been typical. Students, for example, could begin to work in small cross-class groups on inquiry projects, something that has not happened to date. Increased access to conferencing would provide a major tool for advancing project pedagogy.

If financial support for course release time continues to be made available, the practice of scheduling that release time for ABEL teachers in the same period—which proved so beneficial at schools in York Region, allowing teachers to collaborate in brainstorming design ideas and help each other master technical knowledge—could be extended across schools, allowing teachers to collaborate much more actively between schools by means of videoconferencing during their ABEL work periods. It is anticipated that such an arrangement, by allowing clusters of teachers in the same subject area to work together, could accelerate project development and advance project design.

To further promote teacher collaboration, there is a need for a simple and easily accessible means for teachers to find and post tentative project ideas that teachers in the same discipline will see immediately on entering the ABEL site. One way to approach this would be to make different home pages for teachers in different disciplines, with the project events, ideas, and queries related to that discipline prominently displayed. Cross-disciplinary materials common to all sites would be available through a clear link on the home pages.

The limited number of teachers participating in the project to date has for some teachers constrained the availability of suitable partners for projects. Lacking others to work with sharing common courses or curriculum, several teachers wound up doing “solo” projects with their classes, despite their eagerness to work with colleagues. This frustration could be partly addressed by having any available resource staff actively seek out such teachers, bringing them together and assisting them in developing ideas for possible cross-disciplinary projects. A more complete answer to this constraint would be to gradually scale ABEL up. Bringing in more teachers in each subject area would increase the potential number of partners significantly, making it easier for teachers to come together in collaborative teams.

Collaboration could be further fostered by removing some of the impediments imposed on it by certain software tools that are part of the ABEL platform, and bringing others on board that are more specifically geared towards providing collaborative workspaces. Both WebCT and IO had limitations in this regard that frustrated teachers trying to use them for collaborative work. Teachers in the Energy Project found that only one instructor mailbox was available in a WebCT-created course, and only that instructor’s name was listed in the course, making it harder for teachers and students to communicate with each other in a multi-class course. And in IO, only one person can create and modify an inquiry teaching plan being developed. What is needed are tools that will allow a group of teachers working synchronously to plan and create easily while they are videoconferencing, accessing appropriate media as needed.

More frequent and substantive collaboration with experts might be achieved by addressing the need mentioned by several teachers for a tool to quickly locate and contact these individuals so that they can easily be brought into the classroom through videoconferencing as required to dialog with students about specific issues. This requirement could be addressed through the provision of a directory of experts and others who are willing to be contacted on short notice for participation in events.

### 8.3. Advancing the Pedagogy

ABEL teachers have made great gains in their ability to use ICT and broadband resources and to bring those into their teaching over the course of the program. And many of these teachers were able to transform their teaching in their ABEL projects by putting key elements of inquiry learning into practice. ABEL projects were implemented that emanated from questions meaningful to students, and dealt with real-world issues of social importance. Students were often given opportunities to produce artifacts that had true personal or social value. Many projects required students to draw upon and develop their collaborative, critical inquiry, and self-management skills. Opportunities were provided to interact with distant peers to expand knowledge and perspectives. Adults with experience and expertise in various domains were accessed, both as mentors and research resources. Students typically had the freedom to choose from a range of technologies and resources in developing their presentations and artifacts, and could often present their inquiry results to meaningful audiences beyond the classroom walls in rich and engaging ways. Given the limited resources and relatively short time frame available to ABEL for bringing about a transformation in the teaching practices of its participants, these are impressive accomplishments of which the ABEL team can justly feel proud. However, the process of transforming teaching in the ABEL community is far from complete. A majority of projects did not incorporate all or even most of these inquiry elements, and the level and quantity of student-to-student and student-to-expert discourse observed in videoconferences and discussion forums was often quite limited. And with a handful of notable exceptions teachers did not indicate that their ABEL experience had led to substantial shifts in their teaching outside of the ABEL project context (although a number of them did state that their experiences were leading them to reflect on their practices and how they might be enhanced).

Further advancing teacher pedagogy is central to ABEL's sustainability. Why? To date, students have been involved in at the most a handful of events, and so the excitement engendered by the novelty of such experiences (what one teacher termed "the Wow! factor") is still very much in play. But as this excitement recedes, "talking-heads" presentations are not likely to maintain student interest; more meaningful interaction will be required. If the use of broadband tools is subsumed back into traditional ways of teaching, the higher levels of engagement students have typically exhibited when using these resources will greatly diminish<sup>3</sup>. Only by employing these tools in the service of well-designed student-centred and inquiry-based learning can that engagement be maintained and student outcomes strengthened. And teachers will need to see those favourable outcomes—they are the prime motivation for continuing with their ABEL work. If and when teachers lose their release time for engaging in ABEL activities, their participation will only be sustained if they see a very high payoff for their students; otherwise, the additional time suddenly required to continue pursuing meaningful ABEL projects will generate too much resistance.

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<sup>3</sup> The experience in this trial offers indirect support for this contention, for it was the projects that were most inquiry oriented that usually achieved the most dramatic and sustained impacts on student learning.

What could be done to further advance teacher pedagogy, to deepen and extend the transformations that show so much promise? A number of possibilities suggest themselves. As mentioned above, advancing opportunities for more extensive and ongoing collaboration—both teacher to teacher and class-to-class—should greatly reduce a major impediment bringing students into more interactive inquiry projects.

Increased experience with videoconferencing would also act to reduce student inhibitions that interfere with productive interactions. Holding preliminary, informal interclass sessions which allow students to develop more social comfort with each other across the virtual divide would likely result in more educationally meaningful exchanges in later conferences.

Pedagogical consultants should continue to be made available to participating teachers on a regular basis, and these consultants should collaborate more fully (but in a non-directive manner) in the project planning process to ensure that projects are designed so as to maximize interactivity. Steps should be taken to place well-prepared student teachers who have worked with ABEL resources in their pre-service classes with ABEL teachers, to collaborate in planning and implementing projects. Such placement could both engender new project directions and reduce host teachers' preparation time by sharing the associated workload.

Teachers should have ready access to an extensive library of high quality classroom-practice video with associated commentaries that illustrate the application of inquiry learning in all disciplines. Not only would viewing these video segments provide teachers with concrete teaching models to emulate, it could reduce the perceived risk of trying an inquiry approach by allowing teachers to see that the process can be implemented successfully, and with positive outcomes. A recent start has been made in providing this service by ABEL faculty through their Inquiry Learning site, which provides access to a few videos of this type, but the lack of ongoing funding will limit its development and thus its utility. Other sources for inquiry learning video are available: There currently exist several major repositories in the United States, and one of these has indicated a willingness to provide ABEL members with access to this material at no charge.

#### **8.4. Time for Exploring, Learning, and Planning**

The well-known aphorism “time is of the essence” pithily sums up the centrality of that resource to the ABEL experience. Teachers need time to explore, time to learn, time to reflect, time to dialog and collaborate, time to plan and implement, time to set up and test equipment—the list is extensive. Even those teachers in York region who had the most generous course release allotment of about 80 minutes per day noted that there were many times when that proved insufficient, and extra time had to be spent planning and preparing for projects. Time pressures were much more intense at the Toronto school, where teachers had no course release and had to draw on substitute teachers to free up ABEL work periods, a practice they were very reluctant to engage in (for reasons outlined earlier). It can be hard for an outsider to grasp just how much extra time it can take a teacher to explore and develop new ways of teaching using technology, especially

when it incorporates inquiry learning. A Toronto teacher who developed a month-long ancient history inquiry unit indicated that normally she would spend about three hours “refreshing” her curriculum for the unit every year, as compared to the forty plus hours she spent creating an inquiry oriented version of the unit. She learned and grew a great deal from the process and in no way regretted the experience, but she was not sure she would want to spend that much time developing other projects. While her case may be extreme because of the length of the unit developed, the great majority of teachers reported that time pressures had been a major element in delimiting their ABEL experience. Those with release time provided to them found it hard to conceive of doing what they had done without it. It is clear that teachers without regularly scheduled release time available to them were less likely to develop significant, curriculum-embedded projects; they generally reported being less well informed about the tools and resources ABEL had to offer, and participated less frequently in teacher videoconferences. (It should be kept in mind that the teachers at the Toronto site, a “semi-alternative” school, are open to change and are frequently involved in other teaching activities that would be considered innovative, and as indicated earlier, had outstanding support from their principal for their ABEL involvement).

Taken as a whole, the evidence from our observations, case studies, and interview data strongly suggests that loss of release time will diminish the speed and extent to which the ABEL model is able to foster transformation in teachers’ practice. The exact extent to which this will be the case is hard to judge. A number of teachers—primarily those who had regular release time—have formulated plans for substantial projects they want to pursue after their release time ends, but even some of these teachers admit that the pace of their progress is likely to slow down. Other teachers see themselves using videoconferencing for the occasional guest speaker, or tapping into the online media resources for clips to use in their teaching, but do not foresee doing intensive project development work without further release time. It seems likely that some of the teachers who have implemented the most advanced projects, having passed through a significant part of the learning curve involved in utilizing broadband technology in support of student-driven learning, may now be skilled and self-sufficient enough to continue their growth without the need for release time. Maintaining a critical mass of such teachers in the community will require the institution of the changes suggested above.

If and when new teachers are brought into the ABEL experience, it seems imperative that some form of release be provided for them over the first several months of their participation. The open, teacher-directed, job-embedded nature of the ABEL model requires teachers to spend a considerable amount of time exploring, sense-making, and community-building before significant project development can take place, as the first several months of teacher involvement in ABEL clearly revealed. Now that the ABEL community is well established the time required to acculturate new members into it may be somewhat reduced, especially if experienced teachers are willing to take on mentorship roles. But any expectation that a teacher can jump into the ABEL experience without some additional time to pass through those critical first stages of the process is likely to lead to disappointment. Trying to put teachers through the process without providing that time may lead to a gradual corruption of the model itself, as the lack of

success that is likely to follow could trigger a drift to a more prescriptive and directive approach to professional development in order to “speed up the process”.

## **8.5. Summing Up**

ABEL has largely accomplished what it was set out to achieve: bring a community of educators together to foster transformations in teacher practice and student learning through a collaborative learning and inquiry process facilitated by broadband technologies. This report has provided evidence that the large majority of participating teachers (and to some extent participating faculty) have undergone transformations in their knowledge, skill, perspective, and practice. After overcoming initial uncertainties and challenges with the capable assistance of a responsive learning and management team, most ABEL teachers have been encouraged and rewarded by the professional growth they have attained, both through their community participation and their classroom-embedded projects and activities. Their sense of accomplishment has also been nourished by the promising outcomes many of their projects have been seen to foster in students—higher levels of engagement, deeper learning, and a growing capacity for effective collaboration and self-directed, inquiry-based learning. Provided the requisite support structures and resources discussed here are maintained, and the modifications suggested in this report are implemented, there is reason to be optimistic that the ABEL community can both sustain itself and deepen its capacity to transform teaching and learning



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## **10. Appendix A**

### **List of ABEL Partners**

Banff Centre for the Performing Arts

Barrier Free Education (University of Toronto - Resource Centre for Adaptive Technology)

CineRoute - National Film Board

CIRC

Edmonton Public Schools

IO (Galileo Educational Network)

GT

Histor!ca

Learning Object Repository - Ministry of Ontario

Magic Lantern - Insite

mScope

Ontario Science Centre

ORANO

Rogers

Seneca College

Shaw

Statistics Canada

Toronto District School Board

Curriculum Resource Bank - TV Ontario

University of Alberta

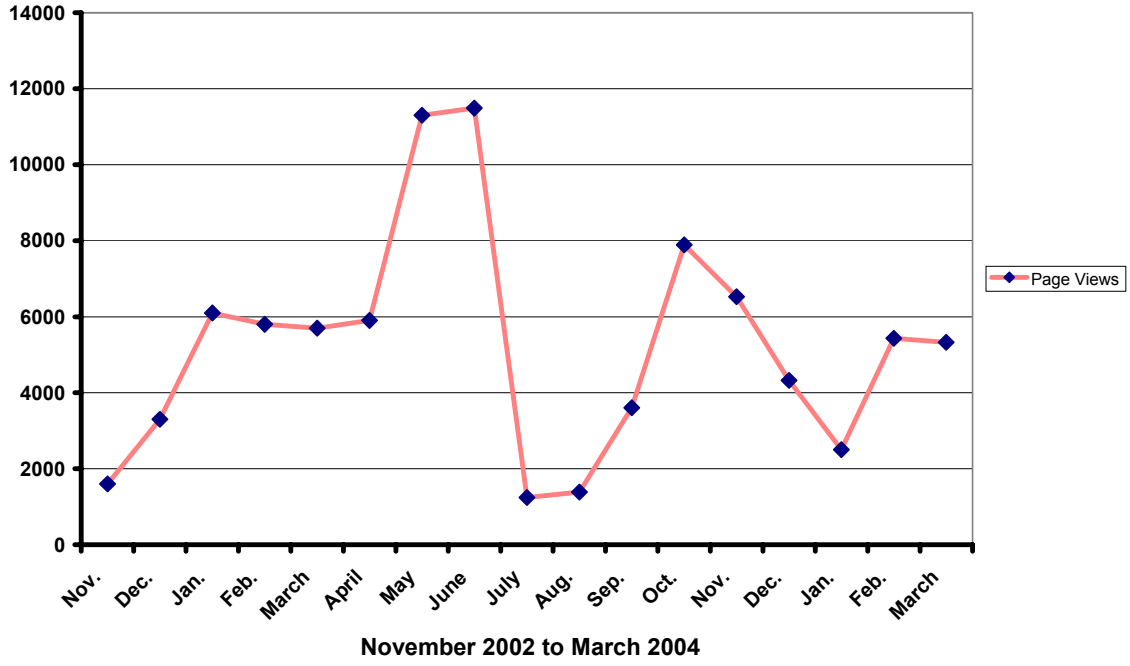
VSee - (VSeelab / Stanford University)

York Region District School Board

York University - Faculty of Education / Institute for Research on Learning Technologies / Computing and Network Services

# 11. Appendix B

## ABEL Community Page Views per month



## 12. Appendix C

### Teacher Professional Development Videoconferencing Events

Event	Description	Month
Large Group Session: Review of the draft plan for the Learning Component	Review of the draft plan for the Learning Component, which describes the roles and responsibilities of the ABEL teachers and support team members and maps out the professional development program.	September 2002
Large Group Session: Presentations on inquiry learning	Short presentation by Sharon Friesen of Galileo on inquiry learning, followed by each school presenting a critique of an inquiry learning project they had previewed. Presentations and discussions on the elements of inquiry, organizing classroom for inquiry, and ways to collaborate with and support each other in implementing inquiry.	October 2002
Large Group Session: Collaboration at a distance	Collaboration at a distance. Each site shares a short presentation on this topic. The session also included round tables on building a shared culture, and facilitating subject-specific collaboration.	November 2002
ABEL Tools Series: Video Streaming	Video Streaming tutorial	November 2002
ABEL Tools Series: Anlon/LCMS	Anlon/LCMS course management system tutorial	November 2002
Large Group Session: Elements of inquiry	Sharing the elements of inquiry by means of video clips developed at each site that illustrated aspects of inquiry..	December 2003
Large Group Session	Review of the research and evaluation plan. Review of the subject area project groups. Outline of plans for the upcoming learning event on videoconferencing. Each site chooses one of the topic areas that Karen had set forth to present on at that session.	January 2003
Subject Series -Arts	Arts Videoconference	January 2003
Subject Series - Science	Discussion session for Science teachers .	January 2003
Subject Series - Social	Discussion session for Social Studies teachers .	January 2003
Subject Series - English	Discussion session for English teachers	January

		2003
Subject Series - Math	Discussion session for Math teachers	January 2003
Large Group Session: Technical Considerations	Site set-up tours for each site, production considerations, technical training, VC etiquette. Guests from new content partners E-STAT and the Ontario Ministry of Education discuss the potential uses for E-STAT and the Object Learning Repository.	February 2003
Arts / Media Group Session	Discussion session for Arts /Media Group .	February 2003
Arts/Music	Arts/Music event planning session Hosted by Todd McNicoll.	March 2003
Large Group Session: Why videoconferencing?	Planning a videoconference (sharing experiences) (Middlefield / Vaughan) Why use videoconferencing? (Ursula Franklin).	March 2003
Math Group Planning Meeting	Math Group meet to plan a videoconference opportunity for students to be given a problem and ask clarifying questions.	March 2003
Planning Meeting for DNA fingerprinting field trip	Teachers involved in the Ontario Science Centre DNA project develop plans for student videoconference	March 2003
Math Group Session	Discussion session for Math teachers	April 2003
Science Group Meeting	Discussion session for Science teachers	April 2003
ABEL 501 (U of A)	An opportunity for teachers enrolled in, or still considering, the ABEL 501 course, to interact with instructor.	April 2003
Math Group Session	Discussion session for Math teachers	April 2003
Social Studies Group Session	Discussion session for Social Studies teachers	April 2003
Large Group Meeting: ABEL Sharing and Planning	Hear details and draft the activities for the ABEL Summer Institute in Banff. Get status reports and project updates from the subject area groups.	May 2003
ABEL Tools Series: WebCT	WebCT course authoring (the ANLON courseware replacement).	May 2003
ABEL 501	The second meeting of the ABEL 501 course group, to provide further direction and suggestions as to how to best write up teacher experience as a case study	May 2003
ABEL Science Group	Follow-up of discussions from the April meeting. An opportunity to provide updates on projects, and to discuss plans for the ABEL summer conference and activities next fall.	May 2003
Faculty of Education Learning VC	Karen Andrews and the York U Faculty of Ed meet to share Learning component activities	May 2003

	and plan for the next quarter	
Social Sciences Group Session	Discussion session for Social Studies teachers.	May 2003
ABEL Tools Series: IO	IO and Macromedia Course Authoring (one alternative to the ANLON course management system)	May 2003
Large Group Session: ABEL Summer Institute	Discussing ABEL Summer Institute plans	June 2003
WebCT	WebCT tutorial	June 2003
Dreamweaver Workshop	Point-to-point Dreamweaver hands-on workshop for Vaughan S.S.	June 2003
Dreamweaver Workshop -	A Dreamweaver tutorial session with Galileo Educational Network for Ursula Franklin Academy	June 2003
LOR Training Session	Learning Object Repository Workshop - a session that teaches how to retrieve objects from and submit objects to the LOR.	June 2003
Large Group Session: ABEL sustainability	This large group session addressed ABEL sustainability.	September 2003
Large Group Session - Session 1 Ensuring Student Interaction	Topic: Ensuring Student Interaction in Broadband Learning; with participants from York U, Vaughan, UFA, J. Percy Page, Victoria, and Galileo.	October 2003
Large Group Session - Session 2: Ensuring Student Interaction	Topic: Ensuring Student Interaction in Broadband Learning; with participants from Middlefield, Huron Heights, York U, Seneca and Centre High.	October 2003
Large Group Session: Increasing Learning Opportunities	Topic: Increasing Learning Opportunities; with Middlefield, York U, Huron Heights, Centre High, Galileo , J. Percy Page	November 2003
Large Group Session: Increasing Learning Opportunities	Topic: Increasing Learning Opportunities; with Vaughan, UFA, J. Percy Page, Seneca, Victoria, YorkU	November 2003
Final Group Session for 2003	The final (and festive) group session for 2003. Presentations and reflections on the successes achieved throughout this calendar year. Sites: Victoria, Galileo, YorkU ( 2 sites - Management Team and Jim Poole), Middlefield, J Percy Page and Ursula Franklin Academy.	December 2003
Group Session: Skills students need and ABEL model	Focused on the skills that students need for the future world of work (and life) –possibly resulting in the need for new teacher skills- and how the ABEL model might facilitate the development of those skills. Sites: Middlefield,	January 2004

	Huron Heights, Seneca, YorkU Centre High and J Percy Page (Karen A.) Facilitator: Galileo	
Group Sessions: OnWebOS presentation	<p>Presentation to introduce OnWebOS, an online conferencing and collaboration utility that allows several users to work together in a virtual environment.</p> <p>Kevin Pitts, Faculty, Seneca College facilitated the first session from York U. Participants: Vaughan, UFA, J. Percy Page, Victoria, Galileo, York U. - Project Office (with York U recording).</p>	February 2004
Group Sessions: OnWebOS presentation	Chris Wilson, Faculty, Seneca College facilitated the second session from Seneca's Newnham Campus. Participants: Middlefield, Huron Heights, Seneca, Centre High, York U.	February 2004
Videoconference with the UK	Karen Andrews and teachers from J Percy Page shared their work using videoconferencing in the classroom with teachers from Scotland to explore possible connections to collaborative project work that UK/ABEL teachers may wish to try.	March 2004

## 13. Appendix D

### ABEL Project Case Study Summaries

#### Case I: The Arts and Multimedia Project

The Arts and Multimedia Project connected students in a Toronto and an Edmonton school, exposing them via videoconference and website research to professional artists at the Banff Centre for the Arts. The project was conceived at the 2003 ABEL Summer Institute, at a meeting involving arts teachers and a senior artist from the Banff Centre. In the fall, teachers at schools in Edmonton and Toronto selected classes to participate in the project: two classes—one in video and animation, and one in music—with students from grades 10 through 12; a grade 12 film and video, and a grade 12 visual arts. Students, teachers and artists participated in two videoconferences, in October and December of 2003. Shortly before the first videoconference the students were introduced to the work of the artists, whose task during the conference was to explain their creative process, inspiration, and reasons for making art. Following this conference the students developed and produced individual art projects, based on project themes and using media appropriate for their courses: lyrics performed to music; short live-action or animated videos; self-portraits painted in greyscale. At the second videoconference, several Banff Centre artists heard and saw the students' compositions, and gave verbal feedback. Work was graded, and for varied amounts of credit: the music projects were worth 30 percent of the term's work, while the videos represented 15 percent of the grade for that course.

The theme of the project, inspiration and transformation, was developed at the Banff meeting. Goals were for students of the arts to gain exposure to peers in different parts of Canada as well as to professional artists; to learn about what inspired artists; to inquire into their own inspiration and creative process; to transform that learning into works of art, to share that work with their peers and to receive feedback from both peers and artists.

Teachers assessed student involvement in the activities as positive overall. Although some found the ideas of “inspiration and transformation” difficult for their younger students to conceptualize, others observed that students were “excited and interested” and that creativity and motivation increased with the prospect of an audience. Teachers found that despite a perceived gap between the theme and the content of the artists' presentations, the access to professional artists was invaluable. And there were what one called “happy surprises”—students were engaged in reflective thinking about their own inspiration; for the most part they took charge of their own projects, and “an impressive series of works” was made.

The project had its share of challenges. An early plan to involve York University teacher candidates as mentors had to be dropped due to workload concerns. Early uncertainty related to this issue meant a delay for one class in joining the project, though the teacher ultimately managed to incorporate the ABEL work into an ongoing unit. Release time used for planning, and for learning technical skills, at times made the Toronto school



teachers, who were relying on substitute teachers, feel they were neglecting their students. Arranging videoconferences was “always a last-minute scramble” due to teaching timetables and the scheduling issues of the Banff artists: a third proposed conference was ultimately cancelled. As well, having to schedule video sessions near the end of the Toronto school day meant that when these went overtime, students with after-hours commitments had to leave before they ended. Technical problems during videoconferences, including interrupted and unsynchronized video and audio, pixilated images, and low and even non-functioning downloading of art from both the artists’ websites and the schools, frustrated teachers and distracted students.

Teacher response to the project varied. One teacher felt that the first videoconference was almost unnecessary—doubly so for students who had missed other classes to attend—since in her view the artists had failed to adequately take up the project’s theme. For this teacher and others it thus became necessary to spend extra class time on discussion, leaving less for creating art. Another teacher felt that while work of the Banff artists—painters and photographers—was interesting, it was less relevant for the music and film/video students, who were “bored and distracted” during the videoconferences. There was a general sense that events were rushed: URLs for the artists’ websites, and subsequently the students’ projects, which were to be viewed prior to their respective videoconferences, were not accessible until a day or two ahead of time, which teachers felt was inadequate for preparation. From an aesthetic perspective, videoconferencing was seen by some as a barrier to engaging intimately with art, for example when very large pieces had to be reduced substantially in size to be uploaded. Nevertheless, teachers found the project beneficial overall. Some felt they had learned a great deal regarding videoconferencing and other technologies and applications. One, disappointed that the project had not resulted in a creative collaboration among participants, nevertheless valued, as did the others, the opportunity to view and respond to the work of other teachers and their students, as well as to interact with the Banff artists.

Students’ evaluation of the project was likewise mixed, as indicated by results of a post-project survey administered to some of the classes. In general, the film/video students were most satisfied with the project, and the music students liked it least, perhaps because the videoconference involving music had been cancelled. Of the 38 students who responded, only three found themselves more interested in the project, and fully half felt they had learned less, than in previous units in the same course. While they did register concerns about time lags and organization of videoconferences, audio and video as such seemed a lesser concern—for about two thirds, both were at least adequate. This did seem to not translate into perceived usefulness, however, as the same number found these sessions either “hardly” or only “a bit” useful: one student felt that videoconferencing was “used poorly” and the content “frankly uninteresting,” while another simply stated, “I learned zero.” Comments about the artists’ presentations, project themes, and feedback on student work were also mixed. However, many students found the exposure to the artists’ work interesting, and almost all were at least as satisfied with their work in the project as with previous work in the course. One student wrote of feeling inspired by “knowing what I can become.”

Despite the impediments to a smooth process, the teachers remained optimistic about the potential for this type of project, and expressed a willingness to take up something similar in the future. Commented one, “Even though it caused a lot of stress, it was a great learning experience.” One teacher was planning to use videoconferencing for cross-Canada events involving drama improvisation. Another, while allowing that the collaboration she had been seeking had been achieved to a lesser extent than hoped, commented that whatever the obstacles, “each experience with videoconferencing teaches something”, and was looking forward to renewed collaboration, this time involving her “Computers in Art” students, with the Banff Centre.

## Case II: The Energy Project

The Energy project had its genesis in an earlier project undertaken in the 2002-03 school year by two science teachers from the York Region Board of Education. At the ABEL Summer Institute in 2003, these teachers began planning for an extended and expanded version of the earlier project in conjunction with two science teachers from an Edmonton school that were interested in having their grade 10 Science classes participate. Beginning in October the group interacted regularly through the ABEL discussion forum, email, and the occasional multipoint videoconference to develop their project. WebCT was used to create a project locus for students which included specific project requirements and expectations, a deadline calendar, links to energy research resources and planning and software tutorials, detailed assessment rubrics, and student access to email, chat, and discussion groups. The teachers were periodically able to work collaboratively in the WebCT design space while videoconferencing, allowing for rapid decision-making about and implementation of content and design elements.

The learning objectives for the project were several: to give students some choice in pursuing a research project that would meet the energy unit expectations of the teachers' respective curricula; to have students engage in educationally meaningful interaction with distant peers via videoconferencing and online discussions around energy issues and so develop a comparative understanding of different regional perspectives on energy in Canada; and to develop student facility in online research, communication, and computer-based presentation. The Edmonton teachers were interested in determining if projects of this type would be workable within the Science 10 course, which was a basic grade 10 science course for academically challenged students. (The York Region courses were both academic stream: grade 9 science and grade 11 physics.) All of the teachers were looking to develop their knowledge of WebCT (which none had prior experience with).

The students in all four classes were introduced to the project in-class via a live walk-through of the sections of the WebCT project site, and shown how to use the chat, email, and discussion groups. The content and format requirements for their completed projects were outlined: students were required to make two discussion group entries that were to be graded, one outlining their findings and views on an aspect of energy use, and another responding to someone else's posting. Students were allowed to select one or two intra-class project partners (depending on the class), and could choose the type of energy source they wished to research. Projects had to address specified topics (e.g. source advantages and disadvantages), and students were either encouraged or mandated to use an electronic report format, such as a PowerPoint presentation, web page, or Word document. No additional class time was devoted to project work in York Region, but one Edmonton teacher allotted two 80 minute periods for project research on computer, and the other elected to give over one or two of periods per week to the project for several weeks.

About a week following the project introduction, students from all four classes participated in the first of two videoconferences; they introduced themselves to each other, met a few energy experts (engineers with experience in the energy field) who

would be available for questioning both in the videoconferences and the online discussions, and asked the experts some initial questions about energy types, energy use, and conservation issues. There were technical glitches that delayed the scheduled start of the conference by 20 minutes. As most of the shortened session time was devoted to the introductions, few questions were asked, and many of the Edmonton students were off-task and inattentive for significant parts of the conference. Two further videoconferences were held several weeks later, a few days after the scheduled due date of the projects; each involved one class in Edmonton and one in York Region. These sessions were devoted to discussions about various forms of energy and their implications, with the teachers encouraging student participation by eliciting questions, asking students about their views on various energy issues, and occasionally paraphrasing student answers to clarify and raise additional questions. The topics discussed included the viability of the Candu nuclear reactors and the impact of burning hydrocarbons on greenhouse gas levels. A few students at each school read from sections of their reports. Most students seemed shy about participating. Students at the York region sites were largely on-task, but the focus and participation levels at the Edmonton sites were lower, with the teachers needing to take the lead in responding on some occasions.

The grade 11 teacher found her students' projects to be well researched and designed, and to present coherent and elaborated positions. Most students received an A or A+ grade. Students' contributions to the online energy discussions were rated highly as well. Marks for most of the grade 9 students were in the B range; on the marking forms their teacher noted areas where their projects were lacking in depth or supporting evidence, or did not have the requisite references. The projects submitted were generally well organized and creatively designed. Students in both classes made more use of charts, diagrams, and photos than typical of Bristol-board projects. Both York Region teachers thought the overall quality of the project reports was about the same as those done more traditionally, but that the projects had fostered more interaction and communication, due to the online discussion and the videoconferencing. Students in the grade 10 basic science courses were not so successful; only some of them achieved satisfactory project outcomes and the teachers were reconsidering how much marking weight to give their projects in the course grade. One grade 10 teacher remarked that the rubric standards were set at a level slightly beyond what his students could be expected to achieve. These students' participation rates in the online discussions were very low, and they also contributed less to the discourse in the videoconferences, and made very few contacts with the online experts. The Edmonton teachers also noted that some students had not been far enough along in their project work at the time to be able to contribute meaningfully to the second videoconference. The grade 10 students did gain more proficiency with ICT tools and online research, however, and it was noted that those who had made an effort learned more about energy than they would have in a traditional project.

Most students in York Region indicated in a survey that they found the project more interesting than traditional work, most commonly because allowed them to meet and exchange ideas with students elsewhere via videoconferencing. They reported doing roughly the same amount of work for these projects as others they had done, and most thought the quality of their work was not different from normal, although a handful thought that better research resources available to them had led to do higher quality work.

The forum discussions were thought interesting by a majority, as they brought new knowledge, and a let them see others' viewpoints. The online energy experts were rarely consulted, however, due to students either having no questions to ask or lacking time to ask them. Videoconferencing was generally viewed positively as a means for exchanging perspectives and getting questions answered (but many thought the first videoconference was poor due to technical problems and a lack of meaningful interaction). Project difficulties the students cited included problems in time management and staying on top of deadlines, the lack of useful online chat with students in the distant class, and the limited amount of "useable" videoconferencing time which limited the amount of interaction. A majority indicated that they would like to participate in other projects of this type, although they wanted the videoconferences to be in class time rather than after school, and wanted to see greater participation by their distant peers.

The teachers felt that they had grown significantly in their ICT skills over the course of the project, and had benefited professionally from their collegial collaboration. They felt they had learned many lessons about how this form of teaching could be better implemented in the future. They cited the need to get experts interacting more directly with students, to reduce student group size at videoconferences so proportionately more students can actively participate, and to foster true inter-class collaboration by having students in two classes work together on a project report. Two teachers noted a need to have participating classes more closely matched in age and ability level to promote greater interactivity and make collaboration workable and task requirements more realistic. These modifications would allow the project to build on what was perceived as its central strengths—heightening student interest and engagement, affording students the opportunity to be exposed to and reflect on the different perspectives of peers in other regions of the country, and to draw on experts and other resources not accessible in the classroom.

### Case III: The MC2 Project

The MC<sup>2</sup> project provided high school mathematics students with the opportunity to engage in math problem challenges with remote peers by means of videoconferencing, online discussion groups, and instant messaging. Building on experiences with an earlier version of the project, two teachers—one in Edmonton, one in Toronto—recruited volunteer participants from grade 11 Advanced Placement and grade 11 enriched mathematics classes at their respective schools. These students were introduced to each other and to the project's math mentors, drawn from York University, Seneca College, and the Galileo Network, via a videoconference in the early fall. They then began the process of using the web and math texts to seek out challenging problems that would later be presented to their remote peers either during one of several videoconferences conducted over the school year or (less frequently) via an online forum all students had access to. The problems students chose to present were of several types, including algebraic, trigonometric, logical, pattern deduction, and geometric. In videoconferences, the problems were presented verbally on-camera, and were also written out and illustrated on large sheets of foolscap. The students receiving the problems would then work at solving them either singly or in small ad-hoc groups and present their solution steps to the student who offered the problem for verification either in the same videoconference or (more rarely) online later. Occasionally teachers and mentors would offer suggestions as students worked during the videoconferences. While students at the Edmonton school received no credit for participation, those in Toronto were eligible to receive up to 2% bonus marks depending on their level of participation.

The goals of the project were to offer an enrichment activity that gave students the opportunity to research, present, and solve interesting problems, problems that would expose students to different aspects of mathematics than they would encounter in classrooms; to get them to explore alternative problem solving strategies in greater depth; and to foster growth in their collaborative and communicative skills.

Student engagement and motivation during project activities was perceived by the teachers as being strong, and both were pleased with the level of initiative and self-direction many students demonstrated. Students' communication and presentation skills were also seen as benefiting from the project; many students developed careful graphical presentations of their problems or solutions which they used during videoconferences. The videoconferencing work with a distant group was seen as increasing students' ownership of the learning process, its perceived authenticity, and their level of engagement.

Scheduling regular videoconferences proved to be a challenge as students in Toronto had to be pulled out of regular math classes to participate in videoconferences, and some were anxious about missing work. The infrequent occurrence of the conferences created an episodic quality to the project, and impeded students' ongoing participation in problem solving activities. Discussion forums would have a brief burst of use just after videoconferences with students posting and responding to problems, but then would be dormant for weeks afterwards. One teacher was concerned that some students were using the project more as an opportunity for engaging in a math quasi-competition than as an

occasion for collaboration, although she valued the sense of pride and responsibility students demonstrated in representing their school to others.

The teachers saw their pedagogical role in MC<sup>2</sup> as moving away from traditional direct teaching to coordinating and coaching, and were looking for ways to foster even more student leadership in the project. Noted one teacher, “I have taken more of a back seat and allowed the students to drive the process.” They both thought that the collaboration resulting from the project had contributed significantly to their professional growth.

The participating students had varying perspectives on their experiences with the project. Survey data revealed that the majority found the activities “fun” or “interesting”, and most valued the opportunity to interact with peers at another school around math challenges. Some students reported that they were learning new ways of approaching problems, or exploring new areas of mathematics and its application. “It gets you thinking about how math is used in the real world” one student commented. “I think it has led us to approach questions from different perspectives” wrote another. A greater comfort with communicating and presenting, and improved social skills were other reported benefits of participation cited by a few students each. However nearly all students were critical of the recurrent technical glitches they saw as plaguing the videoconferences, and some had problems posting to the discussion forums that took months to be resolved (they were using accounts carried over from a similar project the previous year which did not allow users to post to the forums). Scheduled real-time chats outside of school hours were critiqued for lacking participants. There were divergent views about many other aspects of the project: some thought the mentors did not offer meaningful input into the process, while others valued their contributions. Both the kinds of problems being presented and the nature and extent of the forum discussions were considered weak by some but not others. Despite these limitations, most students indicated that they would like to continue using the project’s approach to learning. Suggestions for improvements included better building ties to the math curriculum, rescheduling conferences so less class time was missed, holding more frequent and structured sessions, and (especially) improving the reliability of the technology.

Looking forward, the teachers were planning to expand the range of project activity to include more curriculum-related challenges (a challenge in itself given the differences in the math curricula across the two jurisdictions). With the assistance of Galileo staff they were also exploring the use of simpler and more integrated online forum software in order remove obstacles and thus encourage greater student dialog and discussions around problems, and were actively looking at involving math students from other countries in the project.

## 14. Appendix E

### ABEL Videoconferencing Events In Which Students Were Involved

Event	Description	Month
Space event	Interactive talk by astronaut Steve McLean hosted in York Region	November 2002
Forensic science	Presentation by Toronto detective at Middlefield on forensic advancements; videoconference with Victoria on temporary line	December 2002
Peace and Security in the 21 <sup>st</sup> century	Panel discussion and Q&A with Senator. Roche and others; J. Percy Page hosts	April 2003
Innovative Thinkers Series	Two artists from Banff Centre for the Arts discuss landscape in their work from Banff via videoconference with Ursula Franklin Academy (UFA) students	April 2003
Innovative Thinkers Series	Lawyer involved in Harvard mouse Supreme Court case discusses patenting life and legal issues related to same, and answers questions at UFA; J. Percy Page students participate	April 2003
Innovative Thinkers Series	Peace activists discuss work and answer questions at UFA; Alberta students participate	April 2003
Innovative Thinkers Series	Dr. Ursula Franklin at UFA interviewed on peace work by UFA students, viewed by Alberta students	April 2003
Embryology presentation	Presentation by Prof. Bagnall on fetal development at Victoria with remote participation at Middlefield C.I.	April 2003
Math P2s project	Mathematics problem solving challenge shared between J Percy Page and UFA students with academic mentors (2 videoconferences)	April-May 2003
Hanna's Suitcase	ANLON-based novel studies unit culminating in Middlefield student videoconference Q and	May 2003



	A with author (held in conjunction with Nat'l Library of Canada Broadband Book Club)	
Ontario Science Centre virtual field trip	Genetic fingerprinting lab: Middlefield students, with remote participation by J. Percy Page class	May 2003
John Manley address	Address by John Manley at Vaughan S.S. and ensuing discussion, , with J. Percy Page students and staff online	May 2003
Barbara Reid	Students at Middlefield have workshop with author/illustrator Barbara Reid (2 schools in Ottawa and Nunavut participate)	May 2003
Ancient Greece project	Grade 11 students at UFA tutor two classes of Calgary grade 6 students in classical Greek history, answer their questions	May 2003
Human Rights Fest	J. Percy Page and Victoria students participated in Vaughan presentation by Raheel Raza on "Women and Islam"	May 2003
Energy project	Culmination of web-based collaborative project work as science students at Vaughan and Middlefield presented and discussed their work on energy consumption and production via videoconference	June 2003
Arts and Multimedia project	Arts and Multimedia--Inspiration and Transformation. Introduction to project by artists-in-residence from the Banff Centre. Hosted by Gord Balbar.	September 2003
Peaceful Social Change	A conference hosted by J Percy Page featuring a speaker from the Gandhi Federation to discuss non-violence and social change.	October 2003
MC2 project	An session conducted by Seneca, Galileo, J. Percy Page and Ursula Franklin Academy to link students in an introductory activity for MC2.	October 2003
MC2 project	An online meeting between J. Percy Page and Ursula Franklin Academy teachers and students to exchange math problems and their solutions	November 2003

	solutions.	
Holocaust Speaker	Experts in the field joined the participating schools- J. Percy Page, - Middlefield CI, Vaughan SS.	November 2003
Dr. Bagnall	Biology Videoconference with Dr. Bagnall, from U of A on embryology	November 2003
Canada In Song	A live performance by Mike Ford for Mike Clare's history class at Huron Heights and a Grade 10 history class at Vaughan S.S.	November 2003
MC2	Online math problem solving exchange involving J. Percy Page and Ursula Franklin.	November 2003
Arts and Multimedia Project	Second of a series of two videoconferences for the Arts and Multimedia project undertaken by York University, Ursula Franklin Academy, The Banff Centre, J. Percy Page School, and The Victoria School of the Performing Arts.	November 2003
Democracy & Iraq	J Percy Page, Galileo Network, a non-ABEL Galileo connection, and The National Sports School collaborate on a social studies inquiry titled Democracy & Iraq. This was a two-day point-to-point videoconference.	December 2003
Improv practice	An interactive videoconference between students at Middlefield Collegiate and Victoria school for improv practice.	December 2003
The Story of the Ihalmiut People	A mock trial of an Ihalmiut woman accused of infanticide participated by UFA and Vaughan SS to develop students' skills and understanding of the art of persuasion.	December 2003
Energy Project Large Group Discussion	An online meeting between Middlefield, Vaughan, and J.P. Page classes, as well as Galileo, York University, and the experts who will be assisting the students with their project.	December 2003
DNA from OSC	A short session between the OSC, J Percy Page and Middlefield students hosted by Dr.	December 2003

	Allan Busch.	
Mock Trial (Middlefield/JPP)	A mock trial event with J Percy Page as well as St. Joan of Arc (YRCSB) hosted by York U, Middlefield, and Justice Morin attending from CRC in Ottawa.	December 2003
Gwyne Dyer	Gwyne Dyer, renowned journalist and author, presented a critical examination of issues of Canadian and American foreign policy and the war in Iraq to students at Victoria Composite High School in Edmonton and Mark's class in Newmarket.	December 2003
Mock Trial (UFA / JPP)	A mock trial event between law classes at Percy Page and Ursula Franklin Academy	December 2003
CANARIE E-Learn ABEL Math Demo	ABEL Math live Demo for the CANARIE E-Learn Conference in Vancouver.	January 2004
Energy Project - Student Interaction	A videoconference with students from Vaughan and J Percy Page to discuss their views on energy issues.	January 2004
Canadian Arab Friendship	A Member of the Canadian Arab Friendship Association delivered a speech to J Percy Page, Vaughan, and Huron Heights.	February 2004
MC2 – Organizational Meeting	J. Percy Page, Ursula Franklin, Seneca, and Galileo were involved. A couple of students from each of the schools were available to give some feedback and provide some directions as to what they would like to do in the future.	February 2004
Charter Challenge	An online simulation created by the Education Network of Ontario and the Ontario Bar Association for high school students from Middlefield CI, J Percy Page, Holy Heart HS from St. John's, NF and Ottawa as part of the 2004 Law Day Program to help students gain a better understanding of	March 2004

	the Canadian Charter of Right and Freedoms.	
Mock Parliament	A mock Parliament event involving Middlefield, Galileo, and Susanne Bechtold (Calgary).	March 2004
Parasites	A presentation and discussion conducted by Professor Davey from York U on the relationships between humans and various parasites hosted by Camille Hunt at Middlefield.	March 2004
MC2	An online environment for Ursula Franklin and J. Percy Page students, which provided them with a chance to exchange math problems and solutions.	March 2004
Mock Trial	A Mock Trial event in which the 'judge' was Tricia Chrzanowski, a lawyer for McLennan Ross in Edmonton; participants were students from Middlefield and J Percy Page.	March 2004

## 15. Appendix F

### ABEL Activities And Projects In Which Students Were Involved But Did Not Make Use Of Videoconferencing

- The development and deployment, using IO, of a student survey project at J. Percy Page using data from Estat on Canadian diversity, unity, and regionalism
- Students create video tutorials on the use of graphics calculators at UFA
- Students create animated videos that advocate the arts in holistic learning; project involved English, graphics, composition, and animation students at Victoria
- The application of Tutor Buddy video segments in several courses in York Region
- The use of IO to design and deliver a Grade 11 English ISU project for a class of ESL students.
- students at Vaughan Secondary School conduct a survey about cloning, genetic foods, and privacy issue and post results in the ABEL Community site.
- Students compose a song and record it digitally using different ABEL tools at UFA and upload it onto the ABEL community site to share among participating schools.
- Students use Barrier Free software for an assignment for philosophy class at UFA.
- The use of IO and creation of a web site at Vaughan for a unit in writing comparison and contrast essays. The web site contained assignments, the evaluation, and links to sites for students to research.
- Math students at J Percy page create multimedia objects designed to teach trigonometry.