

**Evaluation of the
Rural Advanced Community
of Learners (RACOL) Pilot Project
Summative Report**

Prepared for Alberta Learning by

Education Evaluation Study

Academic Technologies for Learning
Faculty of Extension
Dr. Stanley Varnhagen, Evaluation Manager
Annette Fuchs, M.Ed. Evaluation Researcher

Economic Evaluation Study

Department of Economics
Faculty of Business
Dr. Melville McMillan, Professor
Neil Hepburn, M.Ed. Evaluation Researcher

Copyright © 2004



Ethics

A University of Alberta, Faculty of Extension Ethics Board Application was submitted and approved for this study. All guidelines were followed including acquiring participant consents, ensuring anonymity, and acquiring approval by the Fort Vermilion School Division #52.

Survey, focus group, and interview participants were asked to indicate their consent to participate by completing a Consent Form prior to the evaluative event. Where participants were under the age of consent, permission for their participation was obtained from their legal guardian or parent. Participants were free to withdraw at any time without consequences.

All information collected was coded to protect the participants' anonymity. Individual participant response sets were only seen by members of the evaluation team (the evaluation researcher and associates). Prior to publishing aggregated data, any identifying indicators were removed. Any exemplary comments used in reporting are not associated with any individual.

Information on the ethics component of this study can be accessed through:

<http://www.uofaweb.ualberta.ca/education/nav03.cfm?nav03=14557&nav02=14555&nav01=13187>

Acknowledgements

The author would like to acknowledge the funding for the completion of the RACOL summative evaluation study was granted by Alberta Learning. Earlier funders for this project included CANARIE and the Fort Vermilion School District.



Executive Summary

Introduction

In response to a request to evaluate the RACOL pilot project, the project was evaluated over a two year period using five primary methods: (1) observation of students and teachers in the classrooms, (2) interviews with stakeholders, partner representatives, and administrators, (3) focus groups conducted with teachers and students, (4) questionnaires completed by teachers, and samples of students who had completed a course(s) in the VPLE classrooms, (5) documentation research into school records.

Overview of Results

The Fort Vermilion School Division #52 RACOL pilot project has provided highly useful evaluative information to the University of Alberta, Alberta Learning and other jurisdictions in the province interested in pursuing similar synchronous activities.

We feel it is critical that the leadership of the Fort Vermilion School Division continue to provide the much needed research information Alberta Learning is seeking to feed into it's ongoing initiatives as well as support the gathering of information critical to the successful implementation of these systems in similar school divisions across the province.

Focus on Sustainability

The Evaluation Team has strongly recommend that:

- with the support of Alberta Learning and other school jurisdictions, a plan be constructed for a multi-faceted approach for preparing all targeted K-12 students to learn in this classroom environment, and for all potential teachers to teach in this environment.
- a coordinator be hired (or as a volunteer who will act as a champion for this idea) in the school division, or community, to be responsible for the research and on-going coordination of learning and business opportunities and activities with learning system.
- an expert individual or group completes a needs assessment of the communities short and long term learning needs.
- on-going professional development activities via internal strategies in the FVSD and from external sources, i.e. post-secondary institutions and consultants.
- all school jurisdictions continue utilizing similar distance education learning systems, be integrated and linked in an attempt to avoid redundancy of efforts by sharing lessons learned, best practices, resources, and sharing research findings nationally, and internationally.



Table of Contents

1.1 TERMINOLOGY.....	6
1.2 PROJECT BACKGROUND.....	7
1.3 EVALUATION BACKGROUND.....	9
1.3.1 EVALUATION TEAM.....	9
1.3.2 PROJECT MANAGEMENT.....	9
1.3.3 BACKGROUND.....	9
1.3.4 OUTCOMES.....	11
1.4 LITERATURE REVIEW.....	12
<i>Introduction</i>	12
<i>Administration and Management</i>	12
<i>Teaching</i>	13
<i>Professional Development</i>	14
<i>Students</i>	14
1.5 RESEARCH QUESTIONS.....	16
1.5.1 TEACHING AND LEARNING.....	16
1.5.2 ACHIEVEMENT / ECONOMICS.....	17
1.5.3 ADMINISTRATION.....	17
1.5.4 TECHNOLOGY.....	18
1.6 RESEARCH DESIGN.....	19
1.6.1 DATA COLLECTION.....	19
<i>Stakeholders</i>	19
<i>School Division Records</i>	19
<i>Administrators</i>	19
<i>VPLE Teachers</i>	19
<i>VPLE Students</i>	20
<i>Community</i>	20
<i>Timeline</i>	20
1.7 RESULTS.....	21
1.7.1 ADMINISTRATION AND MANAGEMENT.....	21
<i>Findings</i>	22
Policy and Directives.....	23
Technology.....	23
Teachers.....	23
Students.....	24
<i>Recommendations for Administration</i>	24
1.7.2 TEACHERS.....	26
<i>Findings</i>	26
Preparation Time.....	26
Classroom Effectiveness.....	26
Student Learning.....	27
Classroom Management.....	27
Pedagogy.....	28
Professional Development.....	29
Technical Problems.....	29
Technology Use.....	30
<i>Recommendations for Teacher Needs</i>	33
1.7.3 STUDENTS.....	34

<i>Findings</i>	34
Attitudes.....	35
Technology.....	35
Physical Classroom.....	36
Interactivity.....	36
Modes of Communication.....	37
Student Performance.....	37
<i>Recommendations for Student Needs</i>	38
1.7.4 CONCLUSIONS.....	39
1.8 KEY RECOMMENDATIONS.....	40
1.8.1 POTENTIAL CHALLENGES.....	40
1.8.2 SUSTAINABILITY.....	40
1.9 CONCLUSION.....	41
1.10 REFERENCES AND BIBLIOGRAPHY.....	43
1.11 LIST OF FIGURES.....	46
APPENDICES.....	47
A. VPLE CLASSROOM STRUCTURE.....	48
B. TEACHER SURVEY.....	49
C. STUDENT SURVEY.....	60

1.1 Terminology

Virtual Presence Learning Environment (VPLE)

A label created by RACOL project leaders to describe their interactive video conferencing classroom learning environment. See *Appendix A* for details on the structure of this learning environment.

CODEC (<http://www.whatis.com>)

The term **codec** is also an acronym that stands for "**co**mpression/**de**compression." A codec is an algorithm, or specialized computer program, that reduces the number of bytes consumed by large files and programs. In order to minimize the amount of storage space required for a complicated file, such as a video, compression is used. Compression works

Visualizer

Visual projector used to digitally transmit displays of documents, 3-D objects, photographs, slides, etc.

1.2 Project Background

One of the major challenges to rural communities is to provide high quality education for their inhabitants. With the evolution of broadband networks, it is now possible to facilitate even more effective learning for distanced students.

With the support of partial funding from CANARIE¹, The Rural Advanced Community of Learners Project (RACOL)² had developed a model of teaching and learning that exploited the potential of broadband networks and advanced digital technologies. Capabilities provided included broadcast quality digital video, streaming media, electronic whiteboards, and educational objects that could potentially aid in the facilitation of effective learning, and address the needs of students in rural and remote school districts.

The Fort Vermilion School Division #52 (FVSD)³ was the focal point of the RACOL project. Five high schools had been equipped with a Learning Suite that each can originate and receive broadcast-quality video and audio. Students or teachers at each location are able to see the teacher/presenter on one large monitor and the students on a second large monitor in “split screen” mode. Two smaller monitors also display these images at the back of each room. Each location also has a SMART Board™ 3000i electronic whiteboard, a visualizer⁴ used to project transparent and non-transparent objects, and CD-ROM/DVD/videotape player. Anything displayed at one location is automatically displayed at all. Each student has a question button and an “I’m lost” button. Each Learning Suite also contains 4 Polycom Via Video™ units that enable students at different locations to work together in small groups.

Everything that happened synchronously can potentially be stored and made available to members of the class asynchronously via streaming video. A special application has been developed to allow students to switch between the image of their instructor, students or the electronic whiteboard while the sound continues, and to bookmark locations in the stream for later review. This feature was not yet accessible by the end of the first year as there were still issues to resolve regarding firewall access. And finally, a key component of the project was to work with the sites to help them use this technology effectively.

Until March 31, 2004, the RACOL pilot project had been partially funded by CANARIE. Funding support from CANARIE has assisted RACOL to:

- Design and install the Learning Suites.
- Develop an expert control system and graphical user interface for optimal classroom usability.
- Develop a system for capturing synchronous classroom delivery sessions and make these available asynchronously, for students who would be able to connect to the FVSD

1 Details on CANARIE sponsored activities available at <http://www.canarie.ca/about/index.html>.

2 Details on the Rural Advanced Communities of Learners (RACOL) project and Virtual Presence Learning Environment (VPLE) available at: <http://www.racol.ualberta.ca>.

3 Details on the Fort Vermilion School Division #52 available at: <http://www.fvsd.ab.ca>.

⁴ Visualizer technology is defined in the terminology section of this report.

network to access lessons “after the fact,” (Boora, Davis & Montgomerie, 2003). Students are able to view lessons from home and have the added benefit of being able to pause and review while viewing.

- Design and run professional development activities and sessions directed towards helping teachers learn and practice new student-centered pedagogies; and, to access digital resources thereby creating equity to opportunities similar to students in urban communities.
- Deliver 8 high school courses using synchronous and asynchronous capabilities of the learning suite systems.
 - Develop and deliver three physics games aligning with Physics 20/30 curriculum.
 - Develop and deliver special seminars in aboriginal studies and fine arts.
- Design, develop and deliver a synchronous apprenticeship welding course.
- Design, develop and deliver a synchronous teacher assistantship program.
- Carry out a synchronous technologies CODEC (Compressor/Decompressor) technology evaluation providing an analysis of various videoconferencing codecs and their usability.
- Complete an evaluation of the technology, and a *partial* evaluation of the education and economic impacts of the project.
- Report on findings.⁵

The Academic Technologies for Learning (ATL), Evaluation Sub-Group⁶ was contracted by RACOL to complete an evaluation of the educational and technology aspects of the pilot project. The role of the ATL sub-group was to perform an education evaluation. The education evaluation encompassed evaluation of the technology impact on teaching and learning, pedagogy, professional development. Part 1 of this evaluation reviewed the technology impact on teaching and learning and was included in the final CANARIE project report⁷. This report covers Part II of the education evaluation with an emphasis on examining the impact on teaching and learning. A sub-group from the Economics Department at the University of Alberta was also contracted to undertake the economic evaluation.

In addition, a professor from Carlton University was contracted to undertake the evaluation of different videoconferencing CODEC configurations with particular focus on the examination of issues and usage.

⁵ The complete final report covered by CANARIE funding is available online at <http://www.racol.ualberta.ca/publications>.

⁶ Two sub-groups make up the RACOL Evaluation Team, ATL is conducting the education study and Economics Department is conducting the economic study.

⁷ This CANARIE report is available online at <http://www.racol.ualberta.ca/publications.html>. Available September 30, 2004.

1.3 Evaluation Background

To ensure the success of future distance learning initiatives in K-12 education and beyond, an in depth analysis and evaluation of a current system needs to be properly documented and disseminated to educational stakeholders locally, provincially, nationally and even internationally. That is the intention of this evaluation report.

1.3.1 Evaluation Team

The RACOL Evaluation group is made up of two sub-groups: The Education Evaluation Group and the Economic Evaluation Group. Together they coordinate all evaluation activities with the appropriate sub-groups at each stage of the evaluation process. Dr. Craig Montgomerie of the Department of Educational Psychology, Division of Technology in Education acted as an RACOL advisor to the evaluation team.

Education Sub-Group

Dr. Stanley Varnhagen, Principal Investigator
Annette Fuchs, Ph.D. Student, Evaluation Researcher

Economic Sub-Group

Dr. Melville McMillan, Principal Investigator
Neil Hepburn, Ph.D. Student, Evaluation Researcher

1.3.2 Project Management

Over a two year period, the Evaluation Team met on a regular basis depending on the level of activity. These meetings focused on the coordination of evaluation activities, evaluation progress, strategies for data gathering, and analysis of evaluation findings. From time to time other RACOL project individuals are brought into the meeting to share their expertise and/or be informed on a timely basis of important findings.

1.3.3 Background

The primary goal of the evaluation of the RACOL pilot project was to provide formative and summative results that would help the RACOL stakeholders improve the distance learning system, and to determine if the RACOL goals for teaching and learning were being accomplished. RACOL teaching and learning goals included:

Education

- that the classroom technology configuration and tools are provide the flexibility to meet teacher and student needs
- that teachers are exploring student-centered pedagogies made possible by the Learning Suites
- that teachers and students are interacting with the content by using the SmartBoard™ to interact, and/or visualizer to project transparent and non-transparent objects to each site
- that teachers and students enhance learning by accessing digital learning resources through the Internet

- that teachers and students are interacting with the aid of the technologies to communicate and share ideas amongst the different locations
- that teachers are capitalizing on the technologies and connectivity capabilities to provide concept understanding
- that teachers are exploring and making curriculum “best fit” decisions with the available technologies and other modes of teaching.
- to determine in which situations this learning system works best
- to determine ongoing professional development needs .
- to determine the differences of this mode of distance education over previous FVSD modes.

Economic Study

- an economic evaluation to determine the return on investment, the community perception of well-being and increased community control, the overall impact on costs and benefits and what are the barriers that arrive during implementation that are related to adoption of innovation.
- to determine the sustainability of the system.

Baseline and formative evaluations were conducted from the spring of 2002 to March 31, 2004. Questions needed to be asked and investigated to understand initial values and expectations, and to help improve the system over time.

Several informal disseminations of baseline and formative data findings were shared with stakeholders, and two formal reports were generated for inclusion in the final CANARIE report.

The study and SuperNet went slower than originally planned. CANARIE had only limited flexibility to adjust, so to get at the meaningful educational questions, additional research was needed, which Alberta Learning has helped facilitate.

What remained was the need to complete a *summative evaluation* of the RACOL pilot project in order to assess its impact and what was needed to sustain it beyond the pilot. Because the second and final semester of the pilot project would provide teachers with more opportunity to apply new pedagogical knowledge gained in professional development sessions, we felt it would also provide most crucial information to evaluate the impact on the Learning Suites specific to teaching and learning in this environment and in providing outcome measures against the RACOL’s education goals and recommendations for on-going professional development needs.

We had determined the following activities would provide sufficient data to produce the summative evaluation report on the RACOL project:

- 1) Comprehensive teacher questionnaire.
- 2) Second Semester Classroom Observation
- 3) Administrator, Teacher and student interviews & focus groups.

- 4) Analysis of data from Alberta Learning relative to student scores, completion rates and economic data

1.3.4 Outcomes

In accordance with the agreement with Alberta Learning, the Evaluation team has completed a summative evaluation of the Rural Advanced Community of Learners (RACOL) pilot project in Fort Vermilion School Division No. 52 that included the following activities:

- developing and administering a comprehensive teacher questionnaire; (See *Appendix B*)
- conducting second semester classroom observation;
- conducting administrator, teacher, and student interviews and focus groups;
- analyzing data from Alberta Learning relative to student scores, completion rates, and economic data (see RACOL Economic Evaluation Study);
- analyzing data collected from above activities; and
- conducting a reporting and sustainability workshop with Fort Vermilion School Division No. 52 staff.

1.4 Literature Review

A literature review was completed for the purpose of identifying potential administrative, teaching and learning concerns and barriers that should be investigated for the FVSD and community, and therefore support the construction of various evaluation methods and instruments.

Introduction

Overcoming connectivity, hardware and software barriers to access of learning opportunities is just a fraction of the many possible barriers to a successful distance education system. Some are new and others have plagued distance education since it was first conceived (Berg & Muilenburg, L.Y., 2000).

“Successful distance education program implementations rely not just on the installation of technologies and telecommunications infrastructures. They rely on consistent and integrated efforts of students, teachers, school administrators, support staff, and external partners. Failure, or at least falling short of a technology driven distance education program is more likely due to design and implementation flaws than the technology itself (Moore & Kearsley, 1996).”

Administrators in school divisions are already taxed with maximizing limited resources. Introducing a new learning system into existing education systems often means new policies have to be created, new roles assigned, jobs created, even departments to manage the new system. *Students* who are separated from others, have may have few if any opportunities to interact with their teachers face-to-face, and must rely on technical linkages to bridge the gap separating them from other class participants.⁸ *Teachers* are faced with the most formidable responsibility for shaping the success of a distance education program. In addition to their traditional role as teacher, they are also required to develop an understanding of the characteristics and needs of the distance students and how to interact within a technology driven classroom *Parents* are concerned about the impacts of the technology on their children’s learning. *Communities* on one hand are concerned about negative impacts on their privacy and preservation of their traditions, and on the other are hopeful that they will benefit from the potential for linking to learning opportunities.⁹

Administration and Management

Managing the implementation of a new distance education system into an existing organizational structure can be problematic. Most organizations are resistant to change. The barriers that will ultimately impede the development of distance education tend not to be technological or pedagogical, but rather be associated with organizational change, change in administrative and policy structures, and change in teacher’s roles (Moore, 1994; Cho & Berge, 2002). There are several administrative and management issues that can arise and hinder the

⁸ See Moore and Cozine, 2000 and Knipe & Lee, 2002 for a discussion on several potential barriers that impact the adoption and success of distance learning systems for students and teachers.

⁹ Preliminary discussions with Beaver First Nations and Mennonite representatives in the FVSD community indicated this as a primary concern of a possible negative impact for their culture and traditions.

process. Keeping up with and supporting new technology systems in schools often invites difficult social issues, issues around teacher and staff compensation, issues around time expectations and job security, legal issues and student support issues (Zane & Muilenburg, 2001). Finally, new logistics are also introduced, creating the need for technology specialists or technicians to manage specialized equipment (Sherry, L., 1996; Andrews & Klease, 1998). Involvement of policymakers in the planning process is critical to asking important policy questions and anticipating policy needs that might otherwise draw away from the focus of teaching and learning (Gellman-Danley & Fetzner, 1998). There is always the danger that implementing an innovation in schools can result in practice running before policy. Existing policies may often need to be "transformed" to match the new needs of schools using technology (NcNabb, 1999).

Teaching

Educational technology implementations are not transformative on their own, they require the assistance of teachers who must integrate technology into the curriculum, align it with learning goals, and use it to engage students into learning projects (Rodriguez & Knuth, 2000). Teachers have to become specialists not only in the content they are teaching, but also in using and circumventing troubles with the new technology and integrating the technology with their teaching styles. Furthermore, we can expect that teachers will be at different stages in their development therefore have very different needs depending on what they already know, their learning style, and the context in which they teach (SchoolNet Report, 2001). Research literature highlights several potential drawbacks or weaknesses that could also be realized in the FVSD.

General weaknesses in distance learning classrooms cited in research included increased problems with students missing deadlines and not completing assignments; an educational environment that was inferior to the traditional classroom; an absence of personal relationships with students and parents; the loss of discussion, stories, and "teachable moments"; the lack of parental involvement; the emergence of responsibility and authority issues; a lack of time; the occasional inappropriate use of the e-mail system (profanity); problems with clearly communicating instructions in text form; a lack of teacher articulation about the curriculum, program, and students; and difficulty in dealing with students whose major problems were academic (Litke, 1998).

Specific teacher weaknesses cited in literature indicate that teachers may not work well on camera, behind a microphone, and running various interactive technologies; teachers may resist or struggle with adapting to incorporating new models of teaching; teacher effectiveness will rely in part on how well they can operate and utilize the technology in their pedagogy; videoconferencing etiquette must be established, for example, learning when to mute the microphone and switch camera positions to avoid sending distracting noise, or turning your back on the remote site; teachers may not maximize technology to access broader range of resources; teachers may not see how students react to what they are saying or doing and therefore get a sense of how things went with an instructional strategy; teachers may not communicate as effectively with remote students than local; teachers may lack sensitivity to new factors that may impact students motivation to learn (i.e. isolation, camera, lack of interaction with other students, with the teacher, anxiety of new unfamiliar environment); and lastly, the potential for disruptive behavior is increased, especially in remote schools where there is minimal or no in-person

supervision (Moore, 1990; Moore & Kearsley, 1996; Moore & Cozine, 2000; Knipe & Lee, 2002).

Professional Development

According to the literature there are a number of factors that would contribute to a successful professional development program. Successful professional development needs to be situated in classroom practice and focused on student learning (Abdul-Haqq, 1995; Garet, Porter, Desimone, Birman, & Yoon, 2001; Lieberman & Wood, 2001; Putnam & Borko, 1997; Stein, Smith & Silver, 1999). It should enable teachers to review their own practices and beliefs (Abdul-Haqq, 1995; Stein, McRobbie, & Ginns, 1999). Professional development should provide teachers the opportunity to engage in professional dialogue with colleagues in similar situations, facing similar challenges, to provide encouragement, support and critical friendships (Abdul-Haqq, 1995; Stein, et al., 1999). Professional development should focus on content knowledge –also called subject discipline knowledge (Garet et al, 2001; Stein, Smith & Silver, 1999). Time, space and opportunity are needed for teachers to experiment with ideas and to reflect upon their experiences (Abdul-Haqq, 1995; Ball, 1996; Stein, et al., 1999). Finally, teachers must be included in planning for professional development (Steiner, 1999).

Students

While adequate technology and teacher preparation are an integral to a successful distance education program. This success also depends on attending to the needs of the students. Regardless of the educational context, the primary role of the student is to learn. Even in the best of circumstances this can be a challenging task for many, as it requires motivation, planning and an ability to analyze and apply the content being taught. When educational content is being delivered from a distance, additional challenges result because students are often separated from the teacher and from other students leaving limited opportunity to interact with teachers outside of class time and they must rely on technology to bridge the gap separating them.

Several common concerns are raised in the literature that may impact the student experience and ability to learn in the distance learning environment: interaction or immersiveness amongst teachers and students, differing perceptions and experiences of local versus remote students, impact of student demographics on their ability to learn more independently, student preparation to learn via distance, and teacher preparation to teach via distance in the new technology driven environment.

Research supports the importance of ensuring a significant level of student involvement, through interaction amongst and between students and teachers, as critical for the exchange of ideas and information. Researchers emphasize the need for students to have opportunity to participate in discussion, make presentations, ask and answer questions, share their views on a topic, and receive and give timely feedback on communications and assignments as critical elements to learning.¹⁰ These activities can be difficult in a distance education environment unless these are deliberately planned and encouraged by teachers. The nature of distance education requires learners become more self-directed, independent, in their learning process. This means students have to rely less on direction, encouragement, and feedback from teachers. The problem is that students will vary in their ability to perform in self-directed learning environments. In a situation where learners come together in a distance education classroom

¹⁰ (Moore & Kearsley, 1996). Moore and Kearsley (1996) (Schamber, 1988.) Knipe & Lee (2002) (Bates, 1995)

where it is the only way for them to take the course increases the likelihood that not all students will adapt to this type of learning. It is also essential to consider student's ages, cultural and socioeconomic backgrounds, interests and experiences, educational levels, and familiarity with distance education methods and delivery systems as factors that will influence student success in learning in these environments

Questions also need to be asked on the perceptions of local versus remote students. Traditionally, research in distance education has found that issues around feelings of isolation, or disconnectedness, motivation, quality of teaching, perceptions of achievement in class, accessibility to learning resources, and overall quality of their learning experiences are prevalent amongst remote students. Studies have found a high level of disagreement between local and remote students perceptions on the teaching methods and class activities that occurred during the classes with local students reporting a higher level of activity in receiving information and explanations from the teacher, reading and reviewing material, working within groups and making presentations to their classmates.

Research literature indicates inexperience, bad preparation and planning, unsuitable teaching strategies and inefficient training on the part of teachers has a bearing on the quality of teaching and learning in the video conferencing classroom, and that merely connecting classrooms at different locations does not necessarily create an effective learning environment. Teachers and students will need to be made aware and prepared with strategies to use in coping and dealing with these potential problems. Especially of interest will be what practices emerge through this process.

Research specific to the K-12 experience of distance learning via video conferencing is limited. Most research studies have been conducted with colleges, universities, and industry organization – adult learners. Some generalizations have been made above from distance education research in general as it was expected many of these issues would emerge from the RACOL pilot project.

1.5 Research Questions

Despite decades of attempts to integrate computer and telecommunications technology into education, the key questions that continue to be a research focus in the literature are:

- Does the use of the technology in the classroom help students to learn?
- Does the technology add to, or detract from the educative value of the education experience?
- Do teachers improve their own understanding and practice through technology?

Decisions for the sustainability and on-going success of the this new video conferencing distance learning system would in part depend on the responses to questions that would determine answers to the above questions. Therefore, these fundamental questions were a continuous theme throughout evaluation activities of the RACOL Pilot Project. The follow are specific research *topics* were generated from our review of the literature and expertise as evaluation researchers in the field of distance learning.

1.5.1 Teaching and Learning

1. How have attitudes changed from September 2003 to June 2004? What has impacted these changes?
2. What are the differences of this mode of distance education over previous modes used in the FVSD? Are these seen as improvements?
3. What has been the impact of professional development opportunities within RACOL?
 - What is being done to provide on-going professional development opportunities, post-RACOL?
 - What are the professional development needs?
4. What are barriers to on-going professional development opportunities. What has/will be done to encourage communities of practice amongst teachers?
 - How effective has this been?
 - What will be done to encourage communities of practice amongst teachers, post RACOL?
 - What support/resources is available for this, i.e. FVSD, Alberta Learning, ATA, partners?
5. What have teachers done to encourage students to work together amongst the locations?
 - What issues came up (technology and/or pedagogy)? How were these resolved?
6. What was done to prepare students for learning in the VPLEs in the first and second semester? What will be done in the fall 2004 semester? (i.e. the technology, the VPLE environment, new student-centered pedagogies, self-directed learning, communications with teachers/other schools, etc.) If so, how?

7. Have the technologies had an effect on teacher's pedagogy? In what ways?
 - What has changed in their pedagogies?
 - What have been the barriers to changes in pedagogy? (i.e. technology, PD, time).
8. How have teachers incorporated the VPLE equipment in their teaching? Do they perceive these as beneficial for their teachings?
 - Question/I'm Lost Buttons
 - SmartBoard™
 - Visualizer
 - Asynchronous Feed
 - DVD/CD-ROM Player
 - Web Cams
9. What differences are there between local and remote experiences in the classroom?
10. What external digital resources are teachers and students accessing using the Internet?
11. What changes have occurred resulting from the new distance education system? (policy, increased expectations on teachers and administrators, incentives).
12. What needs to be done to sustain the new distance education system?
 - What are the resources available?
 - What are the barriers at this time?
 - What plans are in place to acquire resources, timeline?

1.5.2 Achievement / Economics

1. Do the students appreciate the VPLE?
2. What impact does it have on student performance?
 - grades
 - class dropout rates
3. What are the implications for costs (e.g., larger class sizes reduces average costs per student for the VPLE system)?
4. What impact on the overall graduation/completion rate of students in the FVSD system

1.5.3 Administration

1. What provisions have and will be made for classroom supervision? What are the supervision needs for the future?
2. How do you see the VPLEs being used in the future by other teachers and students for class and extra-curricular activities?

3. How will learning opportunities using the VPLEs be coordinated going forward? (K-12, Adult Learning, Community Needs)?
 - What support is required to go forward?

1.5.4 Technology

1. What did they see as technology glitches of the first semester and second semester?
 - As the glitches were resolved, were there any surprises?
 - What are barriers to solving technology problems?
2. What value do they see in teachers and students accessing the asynchronous recordings presently and in the future? Why, or why not?
3. How could the VPLEs and components (question/I'm Lost buttons, SmartBoard™, visualizer, DVD/CD-ROM player, asynchronous feed, Web Cams, etc) be improved?
 - How are these being used?
 - Are there barriers to using the equipment?
 - Have there been any surprises, or unexpected outcomes in using the equipment?
4. How well is the SuperNet being used?
 - Have there been barriers to using the SuperNet?
 - Have there been any surprises, or unexpected outcomes in using the SuperNet?

1.6 Research Design

Multiple designs and multiple methods were used. This approach allows findings to be triangulated, which decreases the chances of spurious findings. Combinations of the following methods were used: interview (F2F and teleconference), focus groups, surveys (both online and paper based), observations, and analysis of other available data. In addition, when appropriate permission is attained, paper records of budgets and expenses were examined to help determine cost estimates.

Introduction of a major improvement in the distance learning technology utilized by the Ft. Vermilion School Division (audio-graphics to video conferencing) presents a relatively unique opportunity to evaluate the change.

1.6.1 Data Collection

The evaluation was undertaken with various groups – partner stakeholders, FVSD administrators, VPLE teachers and students, and the community. Coordination of data gathering activities amongst individuals from five schools spread out across a large district posed some issues. Face-to-face data gathering activities required several 2-day trips from Edmonton to the FVSD. The task of coordinating these trips with teacher, student and administrator availability and accessibility was always a challenge. The FVSD had made available Principal, Bev Hilhorst, to assist in these coordination activities.

The following outlines data gathering methods for each

Stakeholders

All stakeholder data was acquired by interviews conducted in person or via conference call. Stakeholders include industry partners, post-secondary institution partners, and community representatives in the McKenzie Region. See Appendix C for a listing of stakeholders interviewed.

School Division Records

Wherever possible, school records were accessed for information. See Economic Evaluation Study for details.

Administrators

All administrator data was acquired by interviews conducted in person or via conference call, via minutes from meetings and e-mail communications. Administrators include school superintendent (past and present), school and learning store principals, and school computer technology technicians.

VPLE Teachers

All teacher data to date has been gathered through observation in professional development meetings, minutes from these meetings, classroom observation, conversations with professional development coordinators, informal and formal interview discussions with the teachers, and survey.

VPLE Students

All student data has been gathered through survey, interviews, focus groups and classroom observation.

Community

Data on community reactions and interests was gathered through interviews, informal discussions with community leaders and FVSD administrators.

Timeline

Formative and summative evaluation activity took place over a two year period
Summative evaluation activities taking place from April to the end of June 2004.

1.7 Results

1.7.1 Administration and Management

Administrators in the FVSD continue to embrace the potential of the VPLE and the SuperNet as viable solutions to their problems of accessibility to learning opportunities in their school division and their community; and, as a resource for expanding learning opportunities. We are confident that with on-going support from Alberta Learning, industry and the community, that the RACOL implementation would continue in a positive and fruitful direction for this region of the province.

Below are discussions on significant outcomes, impacts and experiences that arose through data gathering activities relative to the administration and management of the VPLE suites in the FVSD.

To date discussions with individuals in the FVSD indicate nominal resistance to the new distance learning system. Several issues were identified in the first semester formative evaluation that required the dissemination of directives from FVSD central office administration. While many of these issues would initially appear to be minor, these have had a collective impact on the teaching and learning environment. Examples of these issues include:

1. *Scheduling of courses:* connecting schools and students meant also the need to coordinate the scheduling course offerings. Administrators continue to be active on this issue and schools are getting closer to a common schedule.
2. *Classroom Size:* In some first semester courses, some class sizes turned out to be too large for the VPLE classroom delivery. Students were without proper seating, teachers had increased need for classroom management of remote classrooms, students could not be heard by all in various suites when they asked a question, if it was a local site with really large numbers, this demanded more of that teachers time, distracting from remote students, and finally many students in remote classrooms were out of camera range. Administration and teachers feel the ideal classroom size is no more than 30 – 33 students in total, or approximately 11 students per VPLE classroom. Class sizes were reduced for the second semester.
3. *Getting information to Students:* Teachers and students must exchange resources and assignments. Several strategies have and are being explored that include faxing, e-mail and scanning. None of these modes have turned out desirable for various reasons, i.e. not all classrooms were equipped with fax machines which meant school staff and students had to run back and forth to deliver and send items. Other issues that arose using fax machines was the amount of time it took to organize the faxes sent and received, and the quality/readability of the transmission was not dependable. E-mail is the more effective solution, however there were instances of students abusing e-mail access and in some schools, this mode was removed.

4. *Synchronized Clocks:* There was the unanticipated need to synchronize clocks in schools. Because clocks were not synchronized, class start times and PA announcements were staggered causing disruption to classes. Classroom activities could not commence until all students had arrived, and all school announcements were complete. Clocks have since been synchronized.

Unsynchronized clocks also caused disruptions in classes that were held at the end of the school day because schools also had staggered end times. When the first school's day ended by the bell, students in this school would leave. They could not wait until the last class was dismissed, as they would miss their school buses. Therefore, teaching would cease at that point.

5. *Discipline:* Several discipline issues arose out of the VPLE classroom structures in the first semester that also required directives be implemented. Initially students in some schools were prone to not being on task because there was no supervision in their classrooms. This behaviour would become disruptive to students in other schools because disruptive students could be heard over the microphones. In some situations, students were also able to walk out of class more easily and visit with friends in the hallways. Students in non-supervised classrooms were also able to cheat on exams. Schools have individuals assigned as class monitors. One school has an actual classroom supervisor. Further discussion on this issue will follow in this report.
6. *Microphones:* Two problems presented themselves around microphones. One was that the batteries in the teacher microphones were used up quickly, almost once a day. Initially this was unanticipated and teachers were faced with teaching without the microphone and resorting to the central ceiling microphone and the whiteboards to communicate. Teachers learnt to have extra batteries on hand, and other options for microphone solutions are being explored. The other microphone issue was for teachers knowing when to mute the microphones in different locations, i.e. blocking out announcements from schools...

Signage in Classrooms: Initially teachers had to rely on physical cues in the classroom environments to know which school was which on the monitors. This was resolved by adding signage to each classroom make identifying each school easier.

Each of the above items had been addressed in the second semester or would be by the start of the fall 2004 semester start-up. (See CANARIE Report, March 31, 2004). Summative evaluation interviews were conducted with administrators in the FVSD. The interviews revisited several of the issues discussed above, explored next steps and requirements for sustainability. Below are findings and recommendations specific to summative evaluation activities.

Findings

In general, data continued to show continued improvements over past distance education learning systems used in the school division, and first semester VPLE use. Aggressive professional development programming, on-going communications with the teachers, and the

continued attention support of administration are all contributors to these improvements. Findings have been broken down into categories as follows:

Policy and Directives

- FVSD have reported that they are abreast of policy needs and are working to effectively address policy needs and directives.
- There is on-going concern that the technology gets justifiably used and supported by the community. They have identified the need to show it is viable and valuable to parents and the community.
- Senior administrators continue to work to send signals to the community that the technology is helping to build a stronger community at large, that can grow economically and be successful without its population leaving to seek learning needs elsewhere.
- Their desire is to ensure the continued impact on education opportunities in their community and, also on children services, life long learning attitudes, and that their community needs are addressed where they VPLE and SuperNet can contribute. The first attempt to deliver adult learning courses has provided insight into better strategies meeting this need for the community and discussions with administration continues to ensure this will be improved in the near future.

Technology

- Concerns were raised that the system is static, not portable. There is a desire to also have portable systems that can be transported to the classrooms for use by other teachers in their curriculum activities, i.e. accessing resources, virtual field trips etc.
- Asynchronous offering has become a problem because it is not as easily integrated into the FVSD network system.
- Technology experts have indicated that they feel a proprietary system is needed that is designed from current standards.
- Access to asynchronous recordings continues to be unavailable to teachers and students.
- Will transition to H.323 over time as this makes things work together more easily for them.

Teachers

- Regular professional development meetings and discussions continued with the University of Alberta during the second semester. They are concerned that on-going professional development opportunities are available and are actively exploring their options.
- VPLE teachers have received expressions from non-VPLE teachers of a desire to be also involved with the distance learning system. A need was identified to devise strategies that would give other teachers access to the system.
- Turnover concerns, is currently 50% 2 of the 4 teachers teaching in the VPLE are leaving and so that means two new teachers to requiring training.
- Administrators are exploring a mentorship program as a means of maintaining trained teachers for the VPLE. One strategy is to have teachers team teach courses on the system, where one teacher is novice who will act as a mentor for the other. This is possible when, for example, two physics 30 classes are scheduled for the same time,

traditional and VPLE, they would be combined to VPLE only and the two teachers would team teach.

Students

- The first year of running VPLE courses has confirmed that not all students can benefit from this learning environment. Administration has concluded that Grade 10 students are not in general ready for this classroom structure, at least not without adequate preparation. Further details on the appropriate “student profile” for learning via VPLE are discussed in the Economic evaluation study of this report. Strategies for this would be considered as part of on-going needs to address. Also, administrators found that students in non-academic courses also struggled to learn in this less structured environment. Again, their needs will be addressed as a future need.
- Student preparation and orientation will be implemented in the start of the Fall 2004 semester. One strategy discussed was to invite younger students for field trips to view the classrooms and start becoming familiar with this environment.

Recommendations for Administration

Recommendations are in part a continuation of formative evaluation findings. Based on our final analysis of the data in relation to the FVSD administration and management of RACOL, our recommendations are that the FVSD administration, with on-going consultation and support from various RACOL partners, continue to work towards the following:

1. Continue to provide all interested teachers with professional development support that will help them to:
 - a. Design student-centered approaches to teaching their subjects.
 - b. Integrate more interactivity between each the locations.
 - c. Integrate activities that help students to learn more about each other’s cultures and religions in an effort to develop bonds amongst students in the various communities.
2. Encourage teachers to explore different technologies to find best fit relative to the subject or topic or concepts they are teaching. Not all technologies are suited to all content. At times a blend of technologies provides the best learning experience for students. Teachers are going to need considerable help and support for this one. Teachers working in isolation are going to have a difficult time with just the required curriculum.
3. Encourage teachers to view playbacks of recordings of their teaching and the teaching of their colleagues in order to share new teaching strategies, and assess their own presentation styles, video presence and pedagogy. This can be done individually or in groups with discussion around what works well and what did not in order to extract best practices. However, teachers will require the support of the network technicians and the school infrastructure. On-going professional development would be essential to supporting this process by providing expert perspectives and feedback to teachers.
4. Open opportunities for using the VPLEs to other students and teachers, i.e. running lunch hour and after school sessions for special interest groups, music, brown bag lunch discussions on topics from completing math tutorials, to building a canoe, crafts, to the

sharing and planning of basketball strategies on the SmartBoardTM. This can be tested first with small pilot projects and will also need the support of the school through supervisory personnel etc.

5. Encourage teachers to meet regularly with teachers within their school jurisdiction and with teachers in other school jurisdictions to create a culture of support through a community of practice by sharing experiences and strategies for teaching, and creating best practices models. This will again require technical support, especially when meeting with other school jurisdictions since they will likely be using different video formats (e.g., H.323).
6. Continue to explore possibilities for supervision in the classrooms to:
 - a. help students with technology problems,
 - b. to help deal with discipline and test taking concerns (i.e. keeping students on task in remote locations, and preventing the temptations to cheat on tests),
 - c. act as a liaison between teachers and students for sharing resources (i.e. retrieving and sending faxes, photocopying, etc, and
 - d. assisting students and teachers in facilitating learning activities by acting as teacher's aids or student coaches.
7. Create or assign a position of distance learning coordinator and liaison for all activities related to the FVSD (McKenzie Region) VPLeS that would include:
 - acting as a representative for the McKenzie regions distance learning needs
 - working towards the integration with other similar Alberta and global initiatives
 - assessing the adult learning needs of their community and working in partnership with post-secondary institutions to explore how this can be accomplished
 - seeking on-going support from stakeholders (Alberta Learn, industry, post-secondary institutions, etc.)
8. Create a position, possibly a voluntary coordinator, to be responsible for coordinating adult learning offerings and scheduling etc. There is a need for better investigation into the specific needs of the community. So far Welding has not had the interest initially expected in terms of the number of participating in the initial course offering. While there is a need for certified Welders, many individuals can currently practice in the area without certification and therefore the opportunity to take classes was not seen as important. Better understanding of the perceived needs of the community could be helpful in promoting opportunities so others see the relevance.

Issue of coordination, who will oversee and organize these strategies and other uses of the VPLeS. At this time it falls onto the Learning Stores principal and continue to establish and coordinate partnerships with post-secondary institutions for adult learning opportunities, work with the community in assessing their needs and the timing of their needs.,

9. Ensure those providing adult learning needs are sensitive to the real learning needs of the community, and the timing of those needs. This discussion should also include employers in the community/region. Suggest performing a needs assessment to determine these needs, for

the short term and long term.

10. Need to investigate what policies and protocols need to be in place to use the suites by those outside the school, i.e. supervision.
11. Continue to include the cultural, religious, and family values of the community in decision-making activities.
12. Continue to work with the communities to build trust in the system and its usefulness to the entire community. Community buy-in will occur if allowed to achieve an adequate comfort level, sense of control, degree of trust, patience, slow pace and empowerment of people. Community needs to be assured the technology has value, usefulness to developing and sustaining their community, and provides the security they want.

1.7.2 Teachers

VPLE Teachers were surveyed, observed and interviewed in order to determine where they were relative to research findings, and formative evaluation findings.

Findings

Teachers remained receptive throughout the first year of teaching in the VPLE. While teachers did report having experienced some difficulty in adjusting to the new classroom and having experienced some increased stress teaching in this environment, they remain optimistic about teaching with technology in general, and feel their experiences have been worth the extra effort and adjustment period. By the end of the second semester teachers reported they felt much more comfortable with the VPLE classroom than they did in the first semester. They continue to look forward to experiencing the potential of the new the distance learning system and to challenging themselves in their teaching strategies and gaining valuable experience for the future of their careers.

Preparation Time

It was expected that teachers would require more preparation time for teaching in the VPLE. Extra time was provided by administration. When asked to indicate how much more time teachers actually spent in preparing for VPLE classroom instruction relative to their regular classroom instruction activities, they reported increased preparation time up to twice as much as regular classroom. Teachers also reported that they expected their preparation time to decrease by at least half as the same courses are repeated, and that they expected preparation time to increase with new courses.

Classroom Effectiveness

On average, teachers rated their classroom effectiveness as 85% of that in a regular classroom environment. For each of the issues raised below, at least 3 out of 4 teachers indicated these as contributors to their perceived decrease in effectiveness.

Teachers surveyed indicated:

- that the VPLE media itself reduced their classroom effectiveness (3 out of 4).
- that their lack of presence in the remote classrooms reduced their classroom effectiveness (4 out of 4).
- that if there were supervision in remote classrooms, it would improve their teaching effectiveness (3 out of 4).

The percentage of impact of each of the above varied amongst teachers. The highest impact reported was due to their lack of presence in the remote classrooms.

Student Learning

All teachers reported their overall success rate for accomplishing student learning as 80% - 90% of that of the regular classroom. Success rates were reported as approximately 10% - 20% lower for remote students than local. A combination of on-going professional development, student preparation, and teacher experience should improve these numbers.

Classroom Management

Teachers reported that typically students that are not well prepared to work in a “quasi-independent” learning role will shut down, close their books, when asked to do some work. Initially teachers found this student reaction was magnified in the VPLE classrooms. Teachers perceived that students felt it was their right to not work when a teacher was not physically present in their classroom – often teachers would see students leave the classroom to chat in the hallways. The study also found that students would sometimes use the system as a scapegoat for not succeeding in class – blaming the system for not completing assignments, etc.

Specific summative comments from teachers included:

- Disciplining remote students is difficult at times because the consequences for bad behaviour are delayed.
- Still a challenge at times to monitor remote student behaviour and progress during class time. In part find still difficult to remember to watch students on the monitor once in teaching mode. Often discipline attempts were only in reaction to a disturbance and the need to bring students back on task. Feel still need to work on this aspect of classroom management in this environment.
- I am trying and learning new strategies to deal with classroom supervision and management, i.e. one teacher suggested having students work together to solve problems by asking students to take turns in writing out the steps of the problem solution on the whiteboard. This required they be attentive while waiting their turns. This teacher also found this strategy helped students to become more comfortable with the whiteboard and stayed on task. (Math)
- Need a human contact at each site that they could rely on to in part help with discipline and in part to get materials to students and to them on a moment's notice. Contacts used to check attendance and collect assignments. These people were valuable and school support staff also able to fill in where gaps created.

Teachers continue to explore alternatives for classroom management in this new distance learning environment, and utilize the available classroom monitors.¹¹

Suggestions were made by teachers that student would be screened for their preparedness to learn in the VPLE and provide a way for them to acquire necessary pre-requisites.

Pedagogy

Overall, teachers feel their focus was initially to become confident with the technology and the classroom environment. Once they felt relatively confident, they were able to focus on their teaching strategies. Teachers continue to express a desire for professional development activities that focus on pedagogy.

Below are specific second semester teacher comments regarding their experiences in planning and teaching content in the VPLE classrooms:

- Found lesson planning is more crucial than ever and also takes more time to complete as think through available technologies and teaching objectives and resources. Still not entirely confident without the lesson plan.
- Have learnt to remain more teacher directed than technology directed. Made decisions first about what wanted to teach, then the best way to do this with the available equipment. This was quite time consuming initially.
- Initially found relied more on what knew already and then gradually pushed to test out possibilities of the equipment more and more.
- Somewhat difficult to set up group dynamics, discussion and get the feedback you desire. Difficult to replicate what do in traditional classroom group activities in the VPLE – difficult to engage remote students.
- Weakest points for teaching in this environment is the lack of non-verbal cues that they rely on in the traditional classroom environment, i.e. if students are struggling with understanding concepts; and providing encouragement at a distance; and working with shy kids who don't want to be put on the spot (zoomed in on) without traumatizing them.
- Found aboriginal kids less likely to engage with the system and would rely on other students to be their spokespeople. Had encouraged these kids to use e-mail for feedback, but then feedback is delayed.
- Now feel freer to try different combinations of pedagogies with the technology to see what works best for their content delivery.
- Also found is sometimes slow to diagnosis problems in this teaching environment, for example, at times problems don't present themselves until you receive a blank assignment from a student.
- Found tended to become more dependent on one piece of equipment over another, i.e. some more whiteboard dependent and others more PowerPoint oriented.
- In part because, start with what comfortable with and then branch out from there.
- Would like to make more effort to work with Web cams so can work one-on-one with various students, especially those that are difficult to engage with the overall system.

¹¹ An individual has been assigned in each school to monitor activity in the VPLE classroom in their school, as well as assist students with sharing of documents between their school and the remote teacher.

Teachers varied in their stages and frequency of working with the technology to deliver their content. (see *Technology Use* section below). The study has made some additional pedagogical tools available and teachers need to take some additional time to learn about and try these tools. In some cases, it is just a matter of having the time to explore the potential of the other classroom technologies, and for others there is a risk that they will not explore. Professional development activities need to focus on helping teachers to explore all of the classroom technologies, and existing research, that will help them to determine which works better for teaching what concepts, and for interacting with students. Teachers should also be encouraged to document their content /concept specific pedagogy experiences for sharing with colleagues.

Professional Development

Professional development of breadth and depth was the strategy chosen by RACOL to alleviate the potential for these drawbacks. RACOL researchers created a program based in part on the rudiments of traditional professional development research.¹²

The following are second semester teacher comments reported on their professional development experiences to date:

- Would like to continue to participate in professional development activities and explore appropriate use of equipment relative to their instructional needs, including the web cam technology.
- PD is important, especially about survival, but lots has to be learnt on the job – is steep learning curve and should continue to have PD throughout the year both on the equipment and the pedagogy.
- Still remained a need for more integration of students from various schools into classroom activities and communications amongst the groups. Feel teachers would be in a better position to introduce this into their lesson plans in the fall 2004 term. Embrace as part of continuing PD activities.
- Happy and comfortable to become mentors to other teachers in their schools, however are some time constraints.
- Establish a buddy system that pairs an experienced VC teacher with a newcomer.

The FVSD has established a buddy system for helping new teachers to the VPLE environment. Professional development activities in partnership with the University of Alberta will continue in the second year. It is also expected that partnerships with Alberta Learning, and the outcomes of their research will generate additional professional development opportunities.

Technical Problems

Overall, teachers reported experiencing fewer technical problems during the second semester. Teachers also reported experiencing less stress in the second semester with dealing with the technology, making things go much smoother.

Specific second semester teacher comments reported relative to the technology in the VPLE classroom include:

¹² The final report on the RACOL PD strategy outcomes is available at <http://www.racol.ualberta.ca/publications.html>, see .pdf document C. Professional Development.

- Clarity of remote classrooms on monitors a problem when had 4 sites on monitor, much better when just two. Suggest taking local site off of monitor? When attempted to boost the clarity found lost synchronous of audio and video and felt this was more important than clarity.
- When class sizes are small, not need to use the microphones, can just rely on the ambient one in centre of ceiling.
- SmartBoard™ has been valuable.
- Visualizer was better alternative at times than the whiteboard (SmartBoard™), depending on what you wanted to accomplish.
- Lighting in front of the whiteboard can be a problem at times, i.e. glare, students would need to turn off the lights in order to get a better view of material presented.
- There is a need to assist janitorial staff in knowing how to clean the equipment properly. There is a risk of things being shifted, button being pressed, cords getting unplugged, etc.
- When I am teaching on the whiteboard, I have look in two directions to see the students. Suggest positioning the monitors further back in the classroom so that the teacher has to only look in one direction.
- Need to find alternatives to using the fax machine to exchange documents between students and teachers, found spent a lot of time sorting through faxes and dealing with temperamental, overloaded fax machines.

Technology Use

All four FVSD VPLE teachers were surveyed on their frequency of use of technology in the VPLE classroom and in general, and for what they used the technologies (see Figures xx-xx below). The data reported would be most valuable in comparison to findings a year from now, after an additional year of professional development. It is difficult to discuss a desirable frequency of technology use in the VPLE at this time as it will likely vary upon the course, material, instructors, and students. We suggest this is an item that should be more closely examined in the future.

Figure 1: Teacher VPLE Technology Use

Category	Daily	Weekly	Monthly	Once or twice a year	Never	Not Available
Computer in general	3	1				
Word processing packages (i.e. Microsoft Word)	2	1		1		
Spreadsheets (i.e. Microsoft Excel)		1		2	1	
Database (i.e. Microsoft Access)					4	
Graphical Applications	1	1			2	
Presentation software (i.e. PowerPoint)	2	1		1		
Desktop publishing		1			2	
World Wide Web (WWW)	1	2		1		
E-mail	1	2	1			

Search engines (i.e. Infoseek, Yahoo, Google, MSN)	1	1			1
Simulation Programs		1	1		2
Drill/Practice Programs, tutorials				1	3
Chat Rooms					4
CD-ROMs			1	1	2
Videos (VHS)	1		1	1	1
Videos (DVD)			1	2	1
Internet Games				1	3
Digital Camera					3
Visualizer	1	3			
Question Buttons	2	1			1
SmartBoard™™	3				
Web Cam				2	2
Electronic Schedulers/Calendars					4

Several factors may influence what technologies are used and how often at this early stage in their VPLE classroom experience. Teacher experience and confidence with the technologies is one factor. Teachers had also reported that student dynamics and the number of students in class were also factors in determining which technologies they used and how often. As discussed above under the *Professional Development* section, teacher use of the technologies would be accelerated with both experience, and on-going professional development.

Figure 2: Teacher Use of Technologies

Use of Computers in Classroom	VPLE	Tradition Classroom	Both	Neither
To organize and record student information	1		2	1
For student assessment/grading	1		3	
Word processing	1	1	2	
Email (i.e. communication with colleagues and students)	2		2	
To collect data and perform measurements			1	3
To create visual displays of data/information (i.e. graphs, charts, maps)	1		3	
To plan, draft, proofread, revise and publish written text		1	3	
To create graphics or visuals of non-data products (i.e. diagrams, pictures, figures)			4	
To create visual presentations	2		1	
To perform calculations			2	2

To create models or simulations	2			2
To support individualized learning	1	1		2
To create instructional material/design lessons			4	
To deliver course content	3		2	

Figure 3: Technologies Used for Student Homework

√	Technology
3	Word Processing
2	World Wide Web (WWW)
1	Search Engines
2	Presentation Software
2	Spreadsheets
-	Database
-	Graphical Applications
-	Desktop Publishing

In part, teachers may be restricted on which technologies can be a part of homework assignments by the level of accessibility to these technologies for students at home, and in their communities. Discussions with students did however indicate that a large majority did have computers at home, and a lesser majority had Internet connectivity.

The following are teacher desires for further professional development for the technologies available in the VPLE classrooms:

- Create a class Internet site/portal for access to links, resources, homework assignments etc., and would be valuable for access to daily lesson plans, and yearly plans.
- Learn about advanced presentation software.
- Learn more about NetMeeting and web cams

The following are teachers' comments on what they felt was *most discouraging* about teaching in the VPLE:

- One teacher commented that on days when the technology was malfunctioning, students in remote sites were misbehaving, and things were just out of control and could not do anything about it as directly as could do in the traditional classroom, were very discouraging days. All teachers expressed discouragement at having to frequently call for help regarding classroom management situations that they would normally manage on their own in regular classroom setting. Teachers expressed a desire to solve their own classroom management problems.
- Another teacher reported it was most discouraging when the microphones would not work and they would have to abandon their original teaching plan and/or rely on another technology that limited what they originally wanted to accomplish in that day's lesson.

The following are teachers' comments on what they felt was *most encouraging* about teaching in the VPLE:

- It was most encouraging when trying some “cool thing” to teach a difficult concept that could not be done in the regular classroom, and it worked. I could see the lights go on in the students’ heads. It makes it worthwhile.
- Best days were when attempted to work labs into the remote locations. Each location came up with the same, correct results. That was exciting.

The following are teachers’ commitments for improving their VPLE teaching:

- Continue to develop visual materials, i.e. PowerPoint/electronic presentations.
- Attempt to rotate their presence amongst all VPLE classroom locations.
- Include comprehensive lab activities in their pedagogy.
- Find strategies to integrate more students from all sites through use of Web Cams and NetMeeting tools.

Teachers indicated consensus that enrolment, retention and performance would be impacted in a positive direction by:

- Ensuring there are student and parent orientations events to the VPLE environment.
- Ensuring that students are tutored on how to work in an independent classroom environment
- Ensuring that students are screened for the appropriate pre-requisites for learning in the VPLE environment and the subjects they have chosen.

Overall teachers indicated that screening out potential non-performers, working with students falling behind to improve their skills and /or commitment, and providing orientation to students to work in the VPLE environment, were the *very important* issues to address for the VPLE learning environment.

When asked to assess the support available to them, teacher comments included:

- Provide teachers with a comprehensive guidebook on using the technologies.
- Provide on-going and up-to-date information on in-services and other PD opportunities also in a guide book format
- Continue providing VPLE technical support as a priority, very appreciated.
- Provide more professional development in the area of pedagogy.

Recommendations for Teacher Needs

The following recommendations are in part continuous from formative evaluation findings, in part stimulated from student focus group discussion, teacher interviews, administration interviews, and conclusions derived from data analysis.

There is concern by the RACOL professional development team that FVSD will not be resourced enough to continue to offer professional development opportunities to the existing, and new teachers that would ensure the system is used properly. Teacher’s may fall into very traditional teaching mode, or not continue to explore possibilities with the technology. Teachers will need on-going professional development support to help to build and maintain the connections between the locations amongst students, and with themselves and the students in all locations, and teaching strategies in this environment, and to learn more about the possibilities of the technologies features. On-going professional development support to provide expert perspective and assessment feedback is strongly suggested. Further suggestions include:

1. Teachers design collaborative and interactive, learning activities in an attempt to foster tolerance amongst students from different communities, through better understanding about their cultures and religions. Students also expressed an interest in communicating more amongst the different locations in the context of various activities inside and outside of the course.
2. Teachers may require guidance in finding and accessing Internet resources in order to pursue more creative and student-centered teaching activities. This will also require professional development, or periods release time.
3. Suggest teachers create more activity around encouraging students to use the question button and the “I’m lost” button, as well as introducing activities that requires interacting with the SmartBoard™. Many students still expressed they felt uncomfortable with these aspects of the technology. This was not as a result of the technology itself, but rather the idea of being singled out or the focus of the cameras and therefore classmates. Student can normally be uncomfortable when they are required to be in front of their classrooms.
4. Encourage one-on-one communications using the computer station cameras. VPLE classroom computers have been equipped with Web Cams to provide for one-on-one communications with teachers. And, especially work for situations where immediate feedback is required and where students need encouragement and support in private
5. Teachers rotate schools from time to time to provide face-to-face encounters for each remote classroom giving students a chance to get to know their teacher(s).
6. Continue to test and retest pedagogy ideas using the various classroom equipment and to document and report successes and failures to colleagues as part of their community of practice.
7. Continue to learn and explore (through formal professional development, and through their own research) and share methods using available technologies for daily interaction and communications with students in remote locations.
8. Continue to explore and share successful classroom management strategies.
9. Continue to provide frank feedback to administrators and researchers to help educate the broader community of practice and evolution of the practice of technology driven distance learning.
10. Continue to lobby for increased use of the Internet for access to resources provincially, nationally, and internationally.

1.7.3 Students

Student data was gathered through survey (see *Appendix C*), observation, interview and focus group activity. One trend important to mention early is that students in different high schools tended to report different experiences, i.e. students in one high school reported more positive experiences, while students in another high school reported more negative experiences. This difference appeared to me more related to the dynamics of the school, community, student demographics and perhaps just the type of individual that was selected for research.

Findings

Formative evaluation findings in the first semester indicated all students were reserved on their experiences in the classrooms, with most preferring to not repeat a course in the manner if they had a choice. Also, some remote students had already indicated they felt their class average was

lower than their normal average, and that of students in the non-remote classroom (see Economic Study for details on performance findings). The FVSD administration has indicated commitment to reviewing student achievement scores, from semester to semester, in order to help determine the impact on student learning in the VPLE, over a longer period of time to be sure all relevant variables are accounted for. However, if students' perception is that their scores are lower when using the VPLE, that can affect their likelihood to take courses this way in the future, even should their perception be inaccurate.

Summative data gathering findings indicated second semester students were less reserved, than in the first semester, in sharing their opinions and experiencing in the VPLE classrooms – even if it was their first time in the VPLE classroom. Several students had taken a class in both semesters and expressed overall improvements over from the first semester to the second. Several first time students reported equally positive experiences as those reported by second semester students.

The following addresses student reactions to the VPLE classroom environment and its' technologies, classroom interaction and communications, and learning activities. Data also addresses differences amongst students in remote versus local classrooms.

Attitudes

Many second semester students still reported they took classes in this format because there was no other option, and that they still preferred the regular classroom environment. All students agreed that they would choose the VPLE course offerings over other distance learning offerings, i.e. audio graphic, teleconference or correspondence. Remote students reported more dissatisfaction than local students. Overall reasons reported for regular classroom preference included:

- remote students found it difficult to be self-disciplined enough to stay on task, especially if they were the only student in a remote classroom
- remote students felt they needed more interaction with the teacher
- remote and local students felt needed more interaction with students in other schools
- remote and local students felt technology problems were disruptive
- remote and local students found the noise from students off task in other schools was disruptive

Several students felt that if the above problems were resolved, they would be more receptive to taking courses in the VPLE classroom. Students felt that the addition of class monitors has helped some to resolve many of the disruptions caused by students who were not on task ...”monitors helped because they made sure people did not leave the classroom during class and we were paying attention.” Monitors could also answer questions and keep things under control.

Technology

Students who had taken courses in the both semesters indicated that technology problems had lessened in the second semester. Students who were taking courses for the first time in the second semester indicated that most technology problems lessened as the semester progressed.

Students in remote locations reported they were able to resolve the minor technology problems for themselves.

Students reported the *disruptive technical related problems* were related to system restarts, and audio, whiteboards, and visualizers not always working. Minor problems included glare from the whiteboards and this was resolved by shifting the position of the whiteboard, or turning off lights. Teachers preferred students did not turn off the lights since that meant they could no longer see the students. This points to an inherent conflict between what is best for the students for seeing the material, and what is best for the teacher for class control and discipline.

Students expressed most frustration with the *equipment restarts* at the beginning of class. Initially students indicated that start-up technical problems would take 10 minutes to 20 minutes to resolve and they would have to wait, just sit and talk. Some would disrupt the entire class period because the teacher would have to find another way to deliver their class. This appears to have been more of a problem in the beginning of the school year and had lessened towards the end of the first semester, and throughout the second.

Audio: Audio problems were more prevalent in the beginning and teachers and students resorted to using the whiteboard. In rare instances, the whiteboard would also be affected by the same problem causing the audio problem. In some instances students were given control over the whiteboard on their end and were able to continue to communicate.

Zooming in feature. When students pressed the buttons in front of them, this caused the video to zoom in on them, so others at remote site could see the student asking the question. Most students remained reluctant to use this feature to ask questions or make comments because of the zooming, and their reluctance to call attention to themselves. A few indicated no discomfort with using it. Students are sensitive to have the attention drawn to them and what they have to say. Many preferred to not use feature some did not mind at all and found used it more as the semester progressed. Use varied from never to daily. There could be cultural reasons that would discourage this attention, so this issue could be ongoing.

Physical Classroom

Student comments regarding the physical classroom environment were positive. Many indicated they felt privileged to have a smaller class size and nice chairs to sit in.

Interactivity

A high level of interactivity between students, and between students and teachers is important to achieving learning (Moore & Kearsley, 1996; Bates, 1995). Overall students reported almost no opportunity to interact with students in other locations either on a classroom activity or a fun activity outside of their course. Students reported that most of the time they had no idea who was in the other locations. They expressed a desire for more interactivity with students in other school locations. With a few isolated exceptions, students felt this did not change throughout the year. Having had a chance to become comfortable with the new teaching environment, second semester teachers were better prepared to evaluate and pursue their effectiveness at fostering interactivity in their classes. They continue to explore strategies.

Modes of Communication

The following are second semester student responses to discussions about communications with their teachers during, and after class time:

- During class time students could ask questions freely or buzz in.
- Students preferred to shout out questions.
- Students could e-mail during class time for a while but e-mail privileges were removed in second semester because students were abusing e-mail for “forward” etc. Some resentment reported at losing this contact with teachers as e-mail provided them with some privacy.
- Student reported that teachers often asked if students could hear them but rarely asked how they were doing or if they understood.
- Some students reported feeling like outsiders in from the teacher saying it felt like watching TV at times and that they would no longer really listen to the teacher because of this. They indicated that this was because the teacher was not looking at their classroom, no eye contact. This speaks to the differing ability of instructors in dealing with the far students.
- Other students said they felt like outsiders in the beginning of semester, but reported that the class eventually just felt normal (like a regular classroom) to them. Felt connected to the teacher.
- Students indicated they often just helped one another out instead of asking questions and that they were comfortable with this. This was unique to one school and course.
- Students also reported preferring to ask the classroom monitor questions before they would ask their remote teacher. They found this helpful.
- Student reported being able to telephone their teacher but felt it was too late after the class was over, or they did not have time. Given that the teachers are often only directly available during the class (unlike teachers in the same school), having multiple methods of contact, including email, is increasingly important.

Student Performance

Of greatest concern was that some students reported lower averages than usual in the VPLE classes. Some reported this average as being quite significant. Another factor to consider is that in a single school, a student might always perform well, relative to his or her schoolmates, but in this process, the student is now competing with the better students across the entire district. As a result, their status may not be assured in this broader context.

Students’ perceptions of why their grades went down included:

- they did not work as hard as normal because there was not the same pressure from the teacher to get things done in class, i.e. students felt they could defer their school work for homework later in the day, and later never came.
- did not always feel needed to listen the teacher. “Would have listened better if the teacher was in the classroom”.
- did not feel engaged in learning.
- hearing students in other classes who were not on task was disruptive, and distracted them from paying attention to the teacher.

A quantitative analysis of student performance provides support for student reports of grades dropping. (See Economic Evaluation Study of the RACOL project).

Common responses to the question of what students *like the least* about the VPLE classroom included:

- the lack of teacher presence to ask questions privately.
- most frustrating is not having the teacher there, cannot approach them after class and don't always want to zoom in because it is not private and everyone can hear what you are asking.”
- having never met the teacher fact to face
- when equipment was not working
- teacher could not always hear remote students comments clearly

When asked what students would do to improve the situation they reported:

- more group interaction amongst schools on learning activities
- more teacher interaction and acknowledgement of remote students
- teacher visits to their school so they are local students (most remote students had never met their teacher F2F and this was important to them)
- a supervisor in every classroom, or even just someone checking up every 10 minutes
- would like to have teacher in their classroom at least once a week.
- teacher more available to help if did not get something.

Common responses to the question of what students *like the most* about the VPLE classroom included:

- when they could see students in the other classrooms
- using the whiteboard
- “Liked the most seeing other people form other schools and can say hello in the morning to friends in other schools because otherwise don't see them that often.”

Recommendations for Student Needs

The following suggestions are based on our analysis of data from the second semester.

1. It is suggested that students be provided with an orientation on the VPLE classroom and their technologies, the protocols for communicating with other students, and communicating with teachers. Some of the orientation activities might include:
 - a. Provide this orientation to all students prior to reaching the point of taking a VPLE delivered class, for example field trips to observe and participate in the VPLE classroom.
 - b. Participating in extracurricular activities, or special learning activities in the VPLE.
 - c. Encourage students to provide their ideas on how to support one another in the remote locations.
 - d. Exploring strategies for getting the most out of the delivery.
 - e. Exploring strategies for working more independently.
 - f. Exploring options for communicating with teachers privately.
 - g. Including parents in the orientation activities.

A comprehensive orientation strategy will likely eliminate many of the issues students

experience by helping them to perform better in the VPLE, and by drawing out more of their concerns and ideas for solutions ahead of time.

2. Students need to be less hesitant to ask questions from the remote sites. This may be accomplished with coaching from an in-classroom monitor, through persistent teacher prompting and probing activities, and with some practice during orientations. Teacher may also discuss a preferred, predetermined communication plan with each student and follow-up/connect with students through this mode.
3. Encourage teachers to create activities (learning or extracurricular fun activities) that require interactivity amongst and between schools.
4. Encourage teachers to create activities that require more student interaction with the VPLE technologies, i.e. Web Cam, Internet, visualizer, whiteboards, and Q&A buttons.
5. Continue to provide teachers with professional development in the areas of pedagogy, technology use, and presentation style.

1.7.4 Conclusions

Overall attitudes have changed from September 2003 to June 2004. These changes have been primarily impacted through adjustments made through administrative directives and policy, and through experience with the technology, and teaching and learning in this environment. This mode of distance learning, despite still being in a formative state, is viewed as an improvement over other alternatives, i.e. audio graphics, teleconferencing, and correspondence, in solving the problem of accessibility to learning opportunities for these remote students. Many of the concerns raised by administrators, teachers and students are currently being addressed with success. Second year data would reveal if these issues and concerns are attributable solely to the VPLE mode of distance learning, and if this mode as an alternative to other distance learning modes continues to be valuable for the needs of the Fort Vermilion School Division.

Major barriers to using the VPLE and its technologies for teaching and learning are not due to equipment problems, but rather are the result a need for on-going exploration by teachers on strategies for using the technology to benefit their classroom instructional, classroom management, and communication needs for with local and remote students. Barriers that impact the sharing of resources between and amongst students is in part a technology problem. While faxing, scanning and e-mail have been deemed less desirable, these remain the most viable options for now and strategies for improving this problem are currently being addressed by FVSD administration and teachers.

Opportunities for fulfilling on-going professional development needs continue to be explored. Relationships are continuing with the University of Alberta, and are being organized through the research efforts Alberta Learning. At the time of this report writing, a research study is underway to evaluate K-12 video conferencing distance learning activity throughout the Province of Alberta. The outcome of this study will be a program that links school jurisdictions and teachers in a community of practice that will support and grow teaching and learning in this environment.

1.8 Key Recommendations

1.8.1 Potential Challenges

1. Continuing to offer clear advantages over regular classroom delivery of courses.
2. Continuing to improve the effectiveness of this mode of distance education over correspondence, audio graphics, and teleconferencing.
3. Increasing student motivation, ability and responsibility to learn in this quasi-independent learning environment.
4. Preparing subsequent cohorts of students to learn in this environment, both academic and non-academic oriented students.
5. Continuing to maintain student performance at the same level as regular classroom performance.
6. Helping teachers maintain the integrity of their teaching principles by effectively using the available technologies for their instructional needs.
7. Helping teachers to encourage and maintain interactivity between and amongst schools.
8. Ensuring that remote site assistance and supervision is knowledgeable in the VPLE classroom technology, presentation and student needs.
9. Maintaining on-going efficient level of teaching expertise in the VPLE classrooms (pedagogy, technology, presentation style, camera presence, and on-going self-evaluation).
10. Introducing learning opportunities to the community.

1.8.2 Sustainability

The following are key recommendations are based the RACOL Evaluation Study and encouraged to ensure the sustainability and on-going enhancement of the VPLE distance learning system in the Fort Vermilion School Division and surrounding community:

- We strongly recommend, with the support of Alberta Learning and other school jurisdictions, that a plan be constructed for a multi-faceted approach for preparing all targeted K-12 students to learn in this classroom environment, and for all potential teachers to teach in this environment.
- We recommend that a coordinator be hired (or as a volunteer who will act as a champion for this idea) in the school division, or community, to be responsible for the research and on-going coordination of learning and business opportunities and activities with learning system.
- We recommend an expert individual or group completes a needs assessment of the communities short and long term learning needs.
- We recommend on-going professional development activities via internal strategies in the FVSD and from external sources, i.e. post-secondary institutions and consultants.
- We recommend that all school jurisdictions continue utilizing similar distance education learning systems, be integrated and linked in an attempt to avoid redundancy of efforts by sharing lessons learned, best practices, resources, and sharing research findings nationally, and internationally.

1.9 Conclusion

Sustaining this learning system will be complex and goes beyond just funding. It is important to this school division, the surrounding community as well as the various educational stakeholder groups within Alberta to be provided with current and up to date information regarding the impact of implementing a synchronous learning system and sustaining it as part of the ongoing offerings of a secondary school division in Alberta. Not only was it critical to meet with the administrators, teachers, students and the community of Fort Vermilion School Division to discuss the issues we identify as important to sustainability and ongoing operations, it was important that strategies, and support mechanisms provided by the RACOL partners would enable a smooth transition from the RACOL project to a fundamental learning system as part of Fort Vermilion's educational portfolio.

Additional funding from Alberta Learning has enabled this process of gathering and disseminating critical information to benefit the stakeholders of the Fort Vermilion area, and inform educational groups interested in synchronous learning systems in other school jurisdictions across Alberta. This information also aligns itself with the initiatives supported by Alberta Learning's research group into videoconferencing over SuperNet in Alberta, as well as the initiatives being undertaken by the Stakeholder Technology branch and their proposed activities surrounding a provincial videoconferencing VPN on SuperNet.

Teaching using videoconferencing is much more than simply linking location together using standard videoconferencing codecs. It includes the effective use and integration of other equipment such as question and "I'm lost" buttons, interactive whiteboards, visualizers, media delivery systems and most importantly teachers who are prepared to teach in this environment. The evaluation will address these issues.

It is intended that this summative evaluation report will provide insight into the impact of the RACOL project on the FVSD, as well as the expectations for its impact on the community. The impact of the RACOL project is just beginning to unfold now that administrators, teachers, students, the surrounding communities (including First Nations and Mennonites), and industry stakeholders have begun to experience this new learning system. Feedback to date indicates a high level of enthusiasm as these groups begin to realize the possibilities for meeting their varying needs, and the potential opportunities this learning system could provide.

On track with the Alberta Learning 2004-2007 Business Plan Strategic Priorities, chief administrators in the FVSD have identified next steps in utilizing the VPLE technology to make accessible high quality distance education opportunities to all individuals in this region and to promote life long learning.

Their goals include:

- providing language courses to younger students, i.e. grade 4 students,
- expanding on adult learning opportunities within the region and increasing access to learning opportunities from other locations, i.e. post secondary institutions. Adult learning opportunities will include apprenticeship and industry training as a priority.

- First Nations individuals in this community had indicated they felt that students would be more successful in their post-secondary learning endeavors if they were able to remain more visually connected to their community to reduce the negative impacts of the transition away from culture, community and family; or even better, if they did not have to leave their community to seek the learning opportunities they require to participate in the region's labor force.
- Other community groups have expressed interest in being able to access learning opportunities that would enhance their current business practices, productions, and services.
- connecting to other provincial, national and international school jurisdictions and support networks.
- partnering with local industry in identifying learning needs, and making accessible, timely learning opportunities.

Fort Vermilion School Division #52 has provided direction in this area of synchronous technology usage over the Alberta SuperNet, and research on this project has provided highly useful evaluative information to Alberta Learning as well as other jurisdictions in the province interested in pursuing similar synchronous activities.

It is important that the leadership of the Fort Vermilion School Division continue to provide the much needed research information Alberta Learning is seeking to feed into it's ongoing initiatives as well as support the gathering of information critical to the successful implementation of these systems in similar school divisions across the province.

1.10 References and Bibliography

Abdal-Haqq, *Making time for teacher professional development* (Digest 95-4, 1995). Washington, DC: ERIC Clearinghouse on Teaching and Teacher Education.

Alberta Innovation and Science *SUPERNET to connect communities to the 21st century at warp speed*, November 2, 2000. [Online] <<http://www.gove.ab.ca/can/200011/9894.html>> [May 12, 2004].

Alberta SuperNet. Government of Alberta. [Online] <<http://www.albertasupernet.ca>> [May 12, 2004].

Baker, E.L. & O'Neil, H.F. Jr. (1994) Eds. *Technology Assessment in Education and Training*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Bates, A.W. (1995) *Teaching, Open Learning and Distance Education*. London: Routledge

Berge, Z.L. & Muilenburg, L.Y. (2001). Obstacles faced at various stages of capability regarding distance education in institutions of higher learning. *Tech Trends*. 46(4): pp. 40-45.

Berge, Z.L. & Muilenburg L.Y. (2000). Barriers to distance education as perceived by managers and administrators: Results of a survey. In Melanie Clay (Ed.), *Distance Learning Administration Annual 2000*.

Boora, R., Davis, A.R., & Montgomerie, T.C. (2003, June). Converting Synchronous Instruction for Asynchronous Delivery. In D. Lassner & C. McNaught (Eds.), *Proceedings: ED-MEDIA 2003--World Conference on Educational Multimedia, Hypermedia & Telecommunications* (167 - 170). Norfolk, VA: Association for the Advancement of Education.

CANARIE (2000). CA*net 3. [Online] <<http://www.canarie.ca/advnet/canet3.html>> [May 12, 2004].

CANARIE e-Learning Program RACOL Final Report, April 2004. [Online] <<http://www.racol.ualberta.ca/publications.html>> [October 12, 2004].

Clark, Richard E. (2001). *Assessment of Distance Learning Technology*. In Walter F. Heinecke, Laura Blasi (Eds) "Methods of Evaluating Educational Technology". Information Age Publishing, Greenwich, Connecticut. Pp 63-78.

Foshee, Don R. (1997). *Planning the Smart Classroom: A practical primer for designing interactive video learning environments*. V-Tel Smart Videoconferencing.

Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.

Haertel, Geneva D. and Barbara Means (2003) Eds. *Evaluating Educational Technology: Effective Research Designs for Improving Learning*. Teachers College Press. New York, New York.

King, C., & Montgomerie, T.C. (2003, June). Surveying the Impact of Full Motion Video In Post-Secondary Teaching Environments: Alberta Video Classroom Network Evaluation. In D. Lassner & C. McNaught (Eds.), *Proceedings: ED-MEDIA 2003--World Conference on Educational Multimedia*, Heinecke, Walter F. Laura Blasi (2002) Eds. *Methods of Evaluating Educational Technology*, Information Age Publishing. Greenwich, Connecticut.

Hypermedia & Telecommunications (249 - 252). Norfolk, VA: Association for the Advancement of Computing in Education.

Lieberman, A., & Wood, D. (2001). When teachers write: Of networks and learning. In A. Lieberman & L. Millar (Eds.), *Teachers caught in the action: Professional development that matters*. New York: Teachers College Press.

Litke, C.D. (1998). Virtual schooling at the middle grades: A case study. *Journal of Distance Education*, 13(2), 33-50.

Montgomerie, T.C., King, C., & Dropko, K. (2003, June). A Needs Assessment and a Design for a Distance Education System: The Rural Advanced Community of Learners (RACOL). In D. Lassner & C. McNaught (Eds.), *Proceedings: ED-MEDIA 2003--World Conference on Educational Multimedia, Hypermedia & Telecommunications* (199-206). Norfolk, VA: Association for the Advancement of Computing in Education.

Montgomerie, T. C., Davenport, M., & King, C. (2003). Providing Quality and Equitable Distance Education. In *Proceedings: PTC2003: Global Broadband / Global Challenges*. [CD-ROM]. Honolulu, HI: Pacific Telecommunications Council. (4,592 words)

Montgomerie, T.C., Irvine, V., & Davenport, M. (2001, Jan 14-18, 2001). Design and Implementation of a Next Generation Distance Education System. In *Proceedings: PTC2001 From Convergence to Emergence: Will the user rule?*. Honolulu, HI: Pacific Telecommunications Council.

Moore, M. (1994). Administrative barriers to the adoption of distance education. *The American Journal of Distance Education* 8(3): 1-4.

Moore, M. and Cozine G. (2000). *Web-based communications, the Internet, and distance education*. University Park, PA: The American Center for the Study of Distance Education.

Moore, M., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth.

Moore, Michael G. (1990) Background and Overview of Contemporary American Distance Education, *Contemporary Issues in American distance Education*, (ed. M. G. Moore), Pergamon Press, USA.

Putnam, R. & Borko, H. (1997). Teacher Learning: Implications of the new view of cognition. In B. Biddle, T. Good & I. Goodson (Eds.), *The international handbook of teachers and teaching*, (1223-1296). Boston, MA: Kluwer.

Reeves, Thomas C. & Hedberg, John G (2003). *Interactive Learning Systems Evaluation*. Educational Technology Publications, Inc. Englewood Cliffs, New Jersey.

Report of the National Broadband Task Force. The New National Dream: Networking the Nation for Broadband Access [Online] <<http://broadband.gc.ca/pub/program/NBTF/index.htm>> [March 6, 2004].

Stein, S., McRobbie, C. & Ginns, I. (1999). A model for the professional development of teachers in design and technology. [Online] <<http://www.aare.edu.au/99pap/ste99273.htm>> [November 1, 2001].

Stein, M., Smith, M., & Silver, E. (1999). The development of professional developers: Learning to assist teachers in new settings or new ways. *Harvard Educational Review*, 69, 237-269.

Steiner, L. (1999). What the research says about professional development that works. In *Professional development: Learning from the best*. [Online] <<http://www.ncrel.org/pd/toolkit/lftb.pdf>> [December 18, 2002].

Wenger, E. (1996). Communities of Practice: The social fabric of a learning organization. *Healthcare Forum Journal*, 39(4), 20-26.

Wenger, E., McDermott R., & Snyder, W. (2002). *Cultivating Communities of Practice*. Boston, Mass.: Harvard Business School Press.

Wenger, E. (1998). *Communities of Practice: Learning, meaning and identify*. Cambridge, UK: Cambridge University Press.

Willis, B. (Ed.) (1994). *Distance education: Strategies and tools*. Educational Technology Publications, Inc.: Englewood Cliffs, N. J.

1.11 List of Figures

<i>Figure 1: Teacher VPLE Technology Use</i>	30
<i>Figure 2: Teacher Use of Technologies</i>	31
<i>Figure 3: Technologies Used for Student Homework</i>	32
<i>Figure 4: Sample FVSD VPLE Classroom Set-Up</i>	48

Appendices

.....	<i>A. VPLE Structure</i>
.....	<i>B. Teachers Survey</i>
.....	<i>C. Student Survey</i>

A. VPLE Classroom Structure

The technical design or equipment strategy of an interactive video-conferencing classroom is only as good as it is relevant to the instructional goals, needs and pedagogies of the end user.¹³ Literature emphasizes that technology decisions should always be driven by people and applications, rather than by technology.

Structuring an interactive video conferencing classroom conducive to effective teaching and learning requires attention to several details. Instructional objectives, audio systems, room selection and location, classroom environment (electrical, acoustical, lighting, cabling, wireless, heating/ventilation/air conditioning, network connectivity, etc), room design and configuration, equipment needs (audio, camera, displays, student interaction, network interface equipment, optional teaching tools, CD_ROM, document camera, SmartBoard™, presenter camera system, student camera system, student response devices and instructor workstations), will all influence this teaching and learning environment.¹⁴

Figure 4: Sample FVSD VPLE Classroom Set-Up



Back of a classroom with monitors and web cam computer stations.



Front of a classroom with SmartBoard and monitors.

¹³ See Don R. Forshee's article "Planning the SmartClassroom." Don Forshee is the President of Innovative Interactions, Inc. and a recognized pioneer and publisher in the field of distance-learning.

¹⁴ Photos of the resulting VPLEs can be viewed at <http://www.racol.ualberta.ca/photogallery.html>
Details on the VPLE design and its technologies are available at <http://www.racol.ualberta.ca/publications.html>

B. Teacher Survey Sample



**Fort Vermilion School Division #52
Teacher Evaluation of the
Rural Advanced Communities of Learners (RACOL) Pilot Project**

If you have questions about the following survey items, please do not hesitate to contact Annette Fuchs, RACOL Evaluation Coordinator at (780) 492-5975 or annette.fuchs@ualberta.ca.

Name: _____

Course(s) Taught in VPLE Classroom and in which 2003/2004 semesters:

Course(s):	Semesters 1 and/or 2: (please circle)	
_____	1	2
_____	1	2
_____	1	2
_____	1	2

A. Teaching Information

Personal Education Completed B.Ed. M.Ed. Ph.D. Other: _____

Other Formal Education Yes No

If yes, please specify: _____

Total Teaching Experience (*as of end of 2003 school year rounded to nearest whole number*)

Please specify: _____ years

School of Employment _____

Years Teaching at this School (*rounded up to the nearest whole number*)

Please specify: _____ years

B. Overall Impressions

B1. How difficult would you rate teaching is in the VPLE classroom?

Very Difficult 1 _____ 5 Very Easy

B2. How would you rate your comfort level teaching in the VPLE classroom now in comparison from when you first started?

Not at all comfortable 1 _____ 5 Very Comfortable

B3. What is your overall impression of teaching in the VPLE classroom?

Very Negative 1 _____ 5 Very Positive

B4. Are you looking forward to continuing to teach in this environment? Yes No

B5. How would you rate the value of this experience for your future career goals in teaching?

No Value 1 _____ 5 Very Valuable

B6. How do you think your attitude has changed (if it has) about teaching with technology in general?

Much Worse 1 _____ 5 Much Better

C. Professional Development

C1. Approximately how often do you integrate each of these applications into your teaching activities in the VPLE classroom? (check “√”one box for each category)

Category	Daily	Weekly	Monthly	Once or twice a year	Never	NOT AVAILABLE
Computer in general						
Word processing packages (i.e. Microsoft Word)						
Spreadsheets (i.e. Microsoft Excel)						
Database (i.e. Microsoft Access)						
Graphical Applications						
Presentation software (i.e. PowerPoint)						
Desktop publishing						
World Wide Web (WWW)						
E-mail						
Search engines (i.e. Infoseek, Yahoo, Google, MSN)						
Simulation Programs						
Drill/Practice Programs, tutorials						
Chat Rooms						
CD-ROMs						
Videos (VHS)						
Videos (DVD)						
Internet Games						
Digital Camera						
Visualizer						
Question Buttons						
SmartBoard™™						
Web Cam						
Electronic Schedulers/Calendars						

Comments regarding the above: _____

C2. How do you currently use computers in any of your classes (VPLE and/or traditional)? (Check all that apply.)

Use of Computers in Classroom	VPLE	Tradition Classroom	Both	Neither
To organize and record student information				
For student assessment/grading				
Word processing				
Email (i.e. communication with colleagues and students)				
To collect data and perform measurements				
To create visual displays of data/information (i.e. graphs, charts, maps)				
To plan, draft, proofread, revise and publish written text				
To create graphics or visuals of non-data products (i.e. diagrams, pictures, figures)				
To create visual presentations				
To perform calculations				
To create models or simulations				
To support individualized learning				
To create instructional material/design lessons				
To deliver course content				

Other (please specify): _____

C3. Do you design homework that requires students to use any of the following technologies?

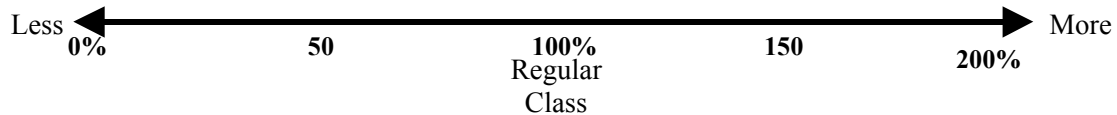
√	Technology
	Word Processing
	World Wide Web (WWW)
	Search Engines
	Presentation Software
	Spreadsheets
	Database
	Graphical Applications
	Desktop Publishing

C4. What type of technology would you like to learn for classroom use?

D. Preparation Time

Complete the following questions referencing the scale below. The % of time for regular classroom preparation is 100%.

For example, if your preparation time for the VPLE classroom had increased by an hour more than your usual two hours of preparation time for regular classroom teaching (3 hours in total), you would record your overall preparation time as 150%; that is 100% (as normal) + 50% more time spent in preparation..



D1. How has your preparation time for this VPLE course compared to your preparation time for this same course when taught in a regular classroom setting?

Preparation time was _____% of that for a classroom setting.

D2. If you were to teach a *same* course again using VPLE (e.g., next school year), how would your estimate of your preparation time compare to that for a regular classroom setting?

Preparation time would be _____% of that for a classroom setting.

D3. If you were to teach a *different* course using VPLE, how would your preparation time compare to that required for a VPLE course that you are currently teaching, or have recently completed?

Preparation time would be _____% of that for the past VPLE course.

E. Your Classroom Effectiveness

E1. Please rate your effectiveness in the classroom when teaching this VPLE course as compared to teaching these same students in a regular classroom environment?

I would rate my effectiveness as _____% of that in a regular classroom environment.
(Please reference the scale at the top of the previous page when answering this question. Take your effectiveness in the regular classroom as 100%.)

E2. Did the VPLE media itself

_____ improve _____ reduce _____ leave unchanged

your classroom effectiveness? Please report an estimated **percentage change** due to the VPLE media:

_____ % change in effectiveness due to the media. *(Indicate plus or minus amount if not 0. 0 indicates no change.)*

E3. Did your lack of presence in remote classrooms

_____ improve _____ reduce _____ leave unchanged

your effectiveness? Please report an estimated **percentage change** due to the lack of your presence in the remote classrooms:

_____ % change in effectiveness due to lack of classroom presence. *(Indicate plus or minus amount if not 0. 0 indicates no change.)*

E4. If there was supervision (available for aid) in the remote classrooms, would that

_____ improve _____ reduce _____ leave unchanged

your effectiveness in those classes? Please estimate the **percentage change** in your effectiveness in remote classes if supervision was provided there:

_____ % change in your effectiveness *(relative to no supervision)*. *(Indicate plus or minus amount if not 0. 0 indicates no change.)*

E5. Feel free to comment on your effectiveness and/or factors that influenced your effectiveness. *(Additional space available on the last page of this survey.)*

F. Student Learning

Please reference the scale at the top of the previous page when answering questions. F1 a,b and c.

F1. Please rate the overall success of your VPLE course(s) in terms of accomplishing student learning relative to the regular classroom environment:

- a) Overall, this VPLE course was _____ % successful relative to the regular classroom (*taking the regular classroom as 100%*).
- b) For the students in the classroom from which you taught, this VPLE course was _____ % successful relative to the regular classroom (*regular classroom at 100%*).
- c) For the students in the remote classrooms, this VPLE course was _____ % successful relative to the regular classroom (*Indicate plus amount if more stress a negative amount if less stress and 0 if no change.*)

G. Stress

G1. Did you find VPLE instruction for you...

_____ more _____ less _____ as (no change)

stressful as teaching the same class in the regular classroom setting. How much difference did you experience?

_____ % change in stress (*increased if more and decreased if less if not 0*)

H. Student Performance

H1. For this course, please report the pass and dropout rates as follows:

	Your Classroom	Remote Classes	Total Class
Pass Rate	_____	_____	_____
Dropout Rate	_____	_____	_____

Please report the actual numbers determining the ratio in each case; e.g., 8/9,15/17, etc.

I. Improving Your VPLE Course

I1. What could be done to improve your VPLE course?

J. Improving the FVSD VPLE Courses

J1. Please think of the potential for improvement in three areas:

- i) **enrolment** – i.e., attracting at least those students who would consider the course in a conventional classroom setting,
- ii) **retention** – i.e., avoiding dropouts of those who initially enrolled,
- iii) **performance** – i.e., success/learning of those students writing final exams.

a) For these three factors, what needs to be done generally to make the VPLE courses offered in the FVSD better?

Improving enrolment: _____

Improving retention: _____

Improving performance: _____

b) Please add any other suggestions that you have for improving the VPLE courses and include the objective that you see each enhancing.

c) Based on the scale below, rank the importance of *each* suggestion (0 = not relevant to 5 = very important) and add your own suggestions: (*circle one for each*)

	Not Important					Very Important	Not Relevant
a) add supervision in remote classrooms,	1	2	3	4	5	0	
b) provide a teacher aid in remote classrooms,	1	2	3	4	5	0	
c) screen out potential non-performers,	1	2	3	4	5	0	
d) work with students falling behind to improve their skills and/or commitment,	1	2	3	4	5	0	
e) make the courses more appealing and effective for students.	1	2	3	4	5	0	

Other: _____

C. Student Survey Sample

Video-Conferencing Course Student Feedback Survey

January 21, 2004

Name: _____

Course: _____

Date: _____

Please mark with an **X** to indicate whether you were in a classroom with the teacher present, or in one of the remote, linked classrooms.

Teacher was in my classroom.

I was at a remote, linked school.

1. Personal Information

a) Grade

b) Age

c) Sex (*check one box*) Male

Female

2. Your Video-conferencing Learning Experience

You have taken your course by video-conferencing. Have you ever taken any other distance learning course(s) . . .

a) by video-conferencing? **Yes** _____, **No** _____

If yes,

Course _____, Date _____

Course _____, Date _____

Course _____, Date _____

b) by audio-graphics (SmartBoard™ and Voice)? **Yes** _____, **No** _____

If yes,

Course _____, Date _____

Course _____, Date _____

Course _____, Date _____

c) by correspondence? **Yes** _____, **No** _____

If yes,

Course _____, Date _____

Course _____, Date _____

Course _____, Date _____

3. Satisfaction with the Course

To the best of your ability (given the information you have), make the following judgments by marking an **X** beside each statement.

a) I rate this video-conferencing course *superior/equal/inferior* to taking the same course from the same teacher . . .

	Superior	Equal	Inferior
i) in a regular classroom setting	_____	_____	_____
ii) as an audio-graphics distance-learning course	_____	_____	_____
iii) by correspondence	_____	_____	_____

b) How much better or worse do you rate this video-conferencing course than the same course from the same teacher. . .

i) in a regular classroom? (*Mark the appropriate level on the scale with an X or write in your response if it is not included on the scale under **Other**.*)

								Other _____
25%	50%	75%	100%	125%	150%	175%	200%	
Half as		Equally			50%		Twice	
Good		as Good			Better		as Good	
	(<i>Worse</i>)	←		→	(<i>Better</i>)			

ii) relative to audio-graphics? (*Mark the appropriate level on the scale with an X or write in your response if it is not included on the scale under **Other**.*)

								Other _____
25%	50%	75%	100%	125%	150%	175%	200%	
Half as		Equally			50%		Twice	
Good		as Good			Better		as Good	
	(<i>Worse</i>)	←		→	(<i>Better</i>)			

iii) relative to correspondence? (*Mark the appropriate level on the scale with an X or write in your response if it is not included on the scale under **Other**.*)

								Other _____
25%	50%	75%	100%	125%	150%	175%	200%	
Half as		Equally			50%		Twice	
Good		as Good			Better		as Good	
	(<i>Worse</i>)	←		→	(<i>Better</i>)			

c) Do you feel that you learned more (or learned more easily) from the video-conferencing course than you would have learned in a normal classroom? (*Check two.*)

_____ learned more _____ did not learn more

_____ learned more easily _____ learning was more difficult

d) Independent of the learning, did you prefer the video-conferencing classroom environment over that in a regular classroom? (*Check one.*)

_____ prefer the video-conferencing classroom environment

_____ prefer the regular classroom environment

e) Would you recommend this video-conferencing course to others? (*Check one.*)

_____ strongly recommend

_____ recommend

_____ neutral

_____ not recommend

_____ definitely not recommend

f) Do you plan to take another distance learning course? Yes _____, No _____

g) If you were to take another distance learning course, would you prefer to take it by

_____ correspondence

_____ audio-graphics

_____ video-conferencing? (*Check one.*)

or _____ I never want to take another video-conferencing course.

h) If you had the choice between taking a course in a regular classroom setting or by video-conferencing, all else the same, which would you choose? (*Check one.*)

_____ regular classroom

_____ video-conferencing

i) What was the major reason that you took this course? (*Check one.*)

_____ interest only

_____ needed for high school diploma

_____ needed to qualify for post-secondary education

_____ other

- j) If this course were not available by video-conferencing, what would you have done? (*Check one.*)
- not taken the course
 - take it by correspondence
 - take it by audio-graphics, if available
 - attend another school
 - other, Please explain _____

k) Was taking this course in a classroom setting an option for you? Yes _____, No _____

4. Your Plans

a) Your future education plans are to . . . (*Check one.*)

- not complete a high school diploma
- obtain a high school diploma only
- attend a trade or technical school (e.g., Fairview College, NAIT)
- attend a college (e.g., Grande Prairie Community College, Fairview College, Grant McEwen Community College)
- attend university (e.g., University of Alberta, University of Calgary).
- other. *Please explain* _____

b) Has the availability of video-conferencing courses at your school influenced your education plans?

Yes _____, No _____

How?

- increased the probability of me completing a high school diploma
- increased the probability of me attending technical school, college, or university
- other. *Please explain* _____

c) What type of employment do you plan to have following your formal education? (*e.g., farmer, nurse, logger, oil/gas drilling or service, welder, teacher, etc.*)

I plan to become a _____

5. Your Family

- a) What parents live in your home? _____ Mother _____ Father _____ Other adult (s)
- b) How are your parents normally employed? (e.g., homemaker in your home, farmer, receptionist, trucker, teacher, retail clerk, oil/gas well servicing)

	Mother	Father	Other
Employment			

- c) Is the person who earns the most income in your family self-employed? Yes _____, No _____

- d) What is the highest level of education that your parents completed?

	Mother	Father	Other
less than high school			
high school completed			
trade/technical qualifications			
college			
university			

- e) You estimate that your parents' total household income is . . .

_____ below average
 _____ about average
 _____ above average

of that in your community. (*Check one.*)

f) Do your parents consider it important that you . . .(check the appropriate response)

	Not Important	Fairly Important	Very Important
complete high school?			
go to technical school or college?			
go to university?			

g) Do you have any brothers or sisters that are or have lived away from home in order to . . .

	Yes	No
attend high school?		
to get further education?		

h) Does your family own a personal computer? Yes _____, No _____

Is it connected to the Internet? Yes _____, No _____

Thank you very much for your cooperation in responding to these questions. Your help is greatly appreciated.

Please return the completed questionnaire to your teacher or school office as soon as possible.

If you have any questions about this questionnaire, contact Professor Melville McMillan at the University of Alberta; melville.mcmillan@ualberta.ca, or 780-492-7629.

Or, contact Dr. Stanley Varnhagen, Stanley.Varnhagen@ualberta.ca (780) 492-3641.