

## **Lessons learned in virtual schooling:**

### **The Newfoundland experience**

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**Abstract**– In this paper, I focus upon the lessons learned about the development and delivery of virtual school opportunities to secondary school students in Newfoundland and Labrador. Through qualitative, quantitative, and mixed method studies, I have captured the experiences of students, teachers, course developers, and administrators in the formative years of a new virtual high school. Issues such as effective course design for this population of students, the benefits and challenges of online learning for secondary students, and achievement difference based upon delivery model and geographic location are explored.

During the 1995-96 school year, four schools created virtual schooling programs and offered courses to their students in the province of Alberta (Haughey & Muirhead, 2004). The following year the first two virtual schools in the United States were created: the Virtual High School (VHS) through a federal grant and the Florida Virtual School (FLVS) by the state legislature (Friend & Johnston, 2005; Pape, Adams & Ribeiro, 2005). The following year the VHS offered twenty-eight courses to twenty-eight schools that were a part of the initial consortium. The FLVS also began offering courses that same year with an enrolment of 157 students. Over the past decade, web-based virtual high schools have emerged as the primary delivery modes for distance education to rural students in North America.

In fact, the last ten years have seen a tremendous growth in virtual schooling. In Canada, from 1995 to 1999 there were 23 virtual school programs operating in the province of Alberta (Muirhead, 1999). In a national survey of virtual schooling in Canada, O’Haire, Froese-Germain and Lane- De Baie (2003) reported that Alberta had the most students engaged in virtual schooling, with approximately 4,500 full-time and 2,500 part-time K-12 in more than 20 schools. Contact North, the virtual school serving Northern Ontario, reported 11,222 registrations in their 548 courses for the year 2000-01, an increase of 12% over the previous year (Betty, Hebert & Sefton, 2002). More recently in British Columbia, a partnership of eighteen school districts offered a pilot electronic distance education program for 2200 students in 2001-02 (Kuehn, 2002). The growth has even been experienced in urban areas where over the past three years the

Vancouver School Board (the largest in British Columbia) and the Toronto School Board (the largest in Canada) have established their own virtual schools. The United States has experienced a similar, even more prolific growth (see Huerta and González, 2004; Pape et al., 2005; Setzer & Lewis, 2005; Watson, Winograd & Kalmon, 2004; Watson & Kalmon, 2005).

In this paper, I will illustrate the difficulties with the current literature and the challenges that this growth presents for virtual schools. I will also briefly review others who have conducted research into virtual schooling in Canada. In addition, I will describe the historical development of virtual school opportunities for secondary students in the province of Newfoundland and Labrador. Finally I will describe six different research projects that I have undertaken, either individually or with colleagues, to start to address the identified gap in the literature.

### Literature Review

One of the difficulties with the growth in virtual schooling is the lack of research in this new educational opportunity. While there has been much research into online and web-based delivery of curriculum at the post-secondary and corporate levels, there has been little more than individual evaluation studies (see Canadian examples Ballas & Belyk, 2000; Barker & Wendel, 2001; Kuehn, 2002) or reports based upon the perceptions of those involved in the delivery of virtual schooling (see Canadian examples Haughey & Muirhead, 1999, 2004; Muirhead, 1999; and almost any presentation at the Alberta Online Consortium's annual Online Learning Symposium). The problem with this traditional focus upon adult populations is that there are fundamental differences between how adults learn compared to the way adolescents learn.

Unlike the education of adult learners, Vygotsky (1962) felt that learning for a child was a social process that focused upon interaction within a zone of proximal development. The zone

of proximal development “is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p. 86). As Cavanaugh, Gillan, Kromrey, Hess and Blomeyer (2004) suggest that “since adults have progress through these stages of cognitive development, delivery of web based education at the adult level need not concentrate on methods that help the learner develop these cognitive skills” (p. 7). These methods designed to help the child learner develop the cognitive skills are intended as the guidance provided to these learners to ensure that they remain in the zone of proximal development.

Moore (1973) also reminds us that typically

in the education of children and adolescents, teachers can be expected to withhold control of much of the instructional processes; young people should not be compelled to assume a degree of autonomy they are not ready to hand, and so it is customary in child education for the preparatory and evaluation processes to rest entirely in the hands of the teacher, with learners assuming varying degrees of control of the executive processes. (p. 84)

Given this reality, that children are usually not ready to assume such autonomy, child learners require more structure in their educational settings, particularly in distance education settings where the lack of proximity to the teacher decreases one of the main sources of guidance to the learners in their zone of proximal development. The addition of structure to support the child learner in a virtual school environment can serve to replace some of that guidance. Regardless, it is becoming apparent that there need to be differences in how distance education and virtual school opportunities are structured and delivered to K-12 learners.

Unfortunately, much of the research that has been conducted in Canada on virtual schooling has been in the form of Master’s thesis and Ph.D. dissertations. While these kinds of studies do allow for an in depth consideration of a specific issue, these unpublished works tend to be isolated to the particular context being studied and also tend not to reach the research or

practitioner communities that they would hope to influence with their work. The first of this unpublished research in Canada was Litke (1998a), who conducted a two year case study of a virtual middle school in Alberta that explored the experiences, understandings, and perceptions of teachers, students, and parents, with a focus upon how these younger adolescents fair in an environment ideally suited for more mature, self-directed and motivated learners. Muirhead (2000) completed his dissertation work based upon the perceptions of thirteen teachers from four online schools in Alberta. More specifically, he examined “(a) the emerging issues associated with online teaching and learning in Alberta; (b) the development of online course content; (c) how teachers understood and planned for online interaction, learning activities, and assessment; and (d) the influence of professional factors” (p. i). Smith (2000) completed her dissertation work on the “success and failure in the implementation of virtual schools under the existing Alberta legislature [in an attempt] to determine both its strengths and its shortcomings as it focuses on inception, accountability, structure, program delivery, sustainability and the direction in which virtual schools are headed” (p. i). Finally, in his unpublished Master’s project Cooze (2004) investigated how different aspects of web-based course design served to either help or hinder students based upon their individual learning styles in a virtual high school course in Newfoundland and Labrador.

In terms of published research, Litke (1998b) was a shortened version of his dissertation study that was published in the *Journal of Distance Education*. More recently, Murphy and Coffin (2003) and Murphy (2003) have completed descriptive studies of synchronous instruction and constructivist teaching methods in web-based courses in Newfoundland and Labrador. However, these few studies represent the sum total of published “research” on virtual schooling in Canada – outside of the work that I have been involved in.

## Virtual Schooling in Newfoundland

The province of Newfoundland and Labrador has a population of approximately 500,000, with the majority living within a 150 kilometre radius of the capital region. The remainder of the province is sparsely populated. The majority of the 303 schools in the province are located in these rural communities. Approximately one third of these schools have been determined as “necessarily existent,” a term used when a school is located so far from another school that it makes bussing the students from that community to another school impossible due to distance or geography (Government of Newfoundland and Labrador, 2005). As with most schools located in rural areas, many of the schools in Newfoundland and Labrador do not have enough teachers and are therefore unable to offer many aspects of the provincially mandated curriculum. In this closed environment (Stevens, 1995), rural schools are not able to compete with their larger, urban counterparts and the quality of educational opportunity available to these rural students is not equal to that of their urban counterparts.

In 1988, after calls for a provincial distance education program (e.g., Riggs, 1987), the Government implemented such a program to provide courses to students in small schools courses that were important for post-secondary admission but were difficult to offer in rural schools due to small student enrolment. In its first year, there was one course with an enrolment of 36 students in 13 schools. By 1999-2000, there were 11 different courses offered with 898 enrolments (Brown, Sheppard, & Stevens, 2000). In 1990, the Government of Newfoundland and Labrador appointed a *Royal Commission of Inquiry into the Delivery of Programs and Services in Primary, Elementary, Secondary Education*. While the main focus of its report was the denominational education system that existed in the province at the time, the Commission

also recommended the creation of a School of Distance Education and Technology (Williams, 1993). The Commission felt that the Tele-medicine/TETRA model, along with the use of CD-ROMs, electronic bulletin boards, and computer databases would be able to serve as the delivery model.

In 1998, the Centre for TeleLearning and Rural Education (CTLRE) at Memorial University was in the process of initiated the Vista School District Digital Intranet. The CTLRE was interested in pursuing research concerning its involvement with the National Centres of Excellence (NCE), specifically TeleLearning NCE theme 4, which is focused on the development of “effective technology-based approaches to the major educational challenges facing Canadian schools” (National Centre for Excellence (TeleLearning), 2000). In this regard, the CTLRE partnered with the Vista School District to develop a district-wide intranet to offer university-level mathematics and science courses to all schools within the district. Funded through a federal grant, *The Vista School District Digital Intranet: The Delivery of Advanced Placement Courses to Young Adult Learners in Rural Communities* saw the development of four Advanced Placement courses for online delivery. This project, and others like it, produced authoring standards and templates that have been used as the basis for further province-wide web-based distance education initiatives.

#### *The Centre for Distance Learning and Innovation*

In 1999, the Government appointed a ministerial panel to, among other things, “examine the current educational delivery model and consider alternative approaches” (Sparkes & Williams, 2000, p. 2). In their report a year later, the ministerial panel recommended the creation of the Centre for Distance Learning and Innovation (CDLI) to be based upon the web-based

model that had been evolving throughout the province. This model was not to be “totally dependent on high bandwidth technologies [and have a] minimal reliance on synchronous communications, fixed schedules or other constraining elements” (Sparkes & Williams, 2000, p. 65). The vision of the CDLI was to provide access to educational opportunities for students, teachers and other adult learners in both rural and urban communities in a manner that renders distance transparent; eliminate geographical and demographic barriers as obstacles to broad, quality educational programs and services; and develop a culture of e-learning in our schools which is considered to be an integral part of school life for all teachers and students.

The CDLI began in 2001-02 with ten courses field tested in ten districts (i.e., one course per district), having a total of 200 student enrolments from 76 different rural schools. After the initial field test, the CDLI expanded its course offerings so that students from all over the province could access any course. Over the past four years, the CDLI increased its offerings to the point where there had 1,500 student enrolments from 95 different schools in thirty-five courses in 2004-05 (Government of Newfoundland, 2004a).

The CDLI also provides a variety of instructional support for students enrolled in any of their thirty-five courses. The two main sources of this support come from synchronous and asynchronous instruction. The CDLI has experienced and highly qualified teachers that provide, depending on the subject area, anywhere from 30% to 80% of the students scheduled time (which is 10 one hour periods over a fourteen day cycle) in synchronous instruction using the voice over Internet protocol software, *Elluminate Live*®. This software allows for two-way voice over the Internet, a shared, interactive whiteboard, instant messaging, application sharing, breakout rooms, and interactive quiz and survey management. Through this software, teachers

are able to provide synchronous instruction in much the same way that they would in a traditional classroom.

The asynchronous instruction is conducted using a course management system called *WebCT*®. This software provides the teacher and students with a variety of tools, including: a discussion forum, a shared calendar, an internal e-mail system, and a place to house the course web pages. The course web pages are designed by a team of two individuals: a teacher acting as a subject matter expert and a multimedia specialist to add images and interactive items into the content. The course web pages are divided up into the units called for in the provincially mandated curriculum guide, further divided into sections which are akin to themes that may flow in each of the units, and finally into lessons which are designed as the items of actual asynchronous instruction that can be completed in usually one to three hours of student time. Each Lesson is broken down into five component parts (see Figure 1).

*Figure 1.* Overview of the Lesson template

Unit 01 ► Section 01 ► Lesson 01



1. You Will Learn – briefly lists, in student friendly language, the instructional outcomes for the lesson;
2. You Should Know – lists, and when necessary elaborates on, knowledge and skills students are expected to have mastered prior to the lesson;
3. Lesson – is self-explanatory and may be broken into multiple pages;
4. Activities – contains further instructional events the student that students need to carry out in order to master the lesson outcomes; and
5. Test Yourself – offers an opportunity for the student to gauge the degree to which the outcomes were achieved. (Centre for Distance Learning and Innovation, 2003, p. 12)

In addition to the course web pages, teachers regularly utilize the course calendar to post upcoming work and assignments, deadlines, and a notification for quizzes and tests. Teachers also regularly use the internal e-mail system and discussion forums to communicate with their students outside of their synchronous class time (known as online time, as opposed to the non-

synchronous sessions which are known as offline time). Finally, it is not uncommon for teachers to post additional lecture notes, *MS Powerpoint* presentations, and useful websites in *WebCT*.

The CDLI also participates in the Tutoring for Tuition program. Through their participation in this program, the CDLI are able to provide senior secondary and post-secondary students in twenty-one different subject areas who are available for synchronous tutoring using the *Elluminate Live* software for two hours each day outside of the traditional school day (i.e., after 3:00pm on weekdays). The CDLI has also developed a series of 50-100 multimedia learning clips per course, for eleven courses that are evaluated with year-end standardized public examinations. These learning clips were developed by practicing classroom teachers and have been designed to provide a thorough review to complement in-class preparations for the public exams. Finally, the CDLI has created additional learning clips for four public exam courses based upon the June 2004 public exam and has provided resource course webs for two additional grade ten courses.

At the school level, each school would have one teacher that is assigned the responsibility of looking after the computers in the school, including the up to six computers that have been purchased by the CDLI and placed in the school with all of the necessary software and hardware for the students to be able to access all aspects of their web-based courses. The CDLI has also arranged for all schools that have students in courses offered by the CDLI to have ADSL, cable modem, frame relay, or high speed satellite (two-way) connections to ensure adequate bandwidth. In addition to the school-based teacher responsible for technology in each school, schools are also responsible for having a mediating teacher (i.e., m-teacher) or mediating team (i.e., m-team), which may or may not include the teacher responsible for the technology. The goal of this m-teacher or m-team is to provide supervision and support (although not

academic support) to the students enrolled in CDLI courses. These are the teacher(s) who proctors tests and exams, monitors student attendance and behaviour, and provide general support in gaining the independent learning and self-motivation skills that may be needed to succeed in the CDLI environment.

### Six Research Studies

Over the past five years, I have been involved with the organization on a continuous basis. During its first year of operation I was the Web-Based Initiatives Facilitator in the Vista School District for the CDLI. In this position I was responsible for the implementation and evaluation of the initial pilot course in the district. In its second year I continued some of the research agenda that I had begun the previous year with e-teachers and students from two different courses. During the third year of operation, I continued this research with one e-teacher and his two courses, along with accepting the position of web-based developer for their world history course. Last year, I was responsible for re-developing portions of this course and this summer I will be doing some work on Canadian history course. Overall, I have conducted six separate studies involving students, teachers, and designers with the CDLI.

### *The Role of the Mediating Teacher*

In their calls for the creation of the CDLI, Sparkes and Williams (2000) recommended the use of a school-based classroom teacher (a mediating or m-teacher) whose job it was to “ensure appropriate interaction” between the students and their “e-teacher” (p. 79). More specifically, this mteacher was responsible for all non-technical, non-instructional aspects of distance education in their own school. This study considered the role of the m-teacher in the

CDLI by examining how teachers in this role in one school district felt about the position after the first year. This study was conducted using two surveys, one given to the m-teacher at the mid-point of the year and one given to them at the end of the year.

During the 2001-02 school year the m-teachers expressed that they had quite a burden placed upon them due to the wide range of duties and time commitment associated with these new responsibilities. In addition to the time associated with the position, in many cases the mediating teachers responsibilities did include technical and instruction aspects. As has been well known, but rarely documented, in the previous audiographics distance education system the success of distance education in the province has been in large part due to the assistance provided by teachers in our rural schools above and beyond their contractual obligations to the school or the school district. It appears, at least in the first year of this new model for distance education, that this aspect of distance education (i.e., teachers providing additional time and performing voluntary duties) did not change. It should be noted, however, that after the first year of operation the CDLI changed the structure of the mediating role to include multiple teachers who formed an m-team. While the workload has probably remained constant or even increased, with additional teachers and administrators involved in this role the extra work has been spread out over more people. (For more information, see Barbour & Mulcahy, 2004; Mulcahy, 2002.)

### *Learning Styles, Student Performance and Web-based Design*

The purpose of the study was to determine whether the design of the Centre for Distance Learning and Innovation courses were favourable to specific types of learning styles. This particular study considered three learning style theories: traditional learning styles; David Kolb's theory of experiential learning; and Howard Gardner's theory of multiple intelligences. Thirty-

one of the forty-two students in a business education course during the 2002-03 school year completed the inventory.

While there were there are a number of issues that are raised for educators and instructional designers of e-learning material the most important of these appeared to be in designing e-learning environments, developers should make sure to include more audio items as students who were auditory learners or who possessed Gardner's musical-rhythmic intelligence scored lower than other student. There were also issues that are raised for educators who teach in an e-learning environment. The most important of these appeared to be that e-teachers should attempt to provide additional opportunities for students to interact in a verbal (e.g., audio or text-based) way, as again students who possessed Gardner's verbal-linguistic intelligence and those who scored high in Kolb's divergent and accommodative learning styles. (For more information, see Barbour & Cooze, 2004; Cooze & Barbour, 2005.)

#### *Teachers and Designers Perceptions of Web-Based Design*

The purpose of this study is to investigate the characteristics perceived to be important for an effectively designed web-based course for secondary school students by those who have designed courses for this population of students. The data collection process involved 30-60 minute telephone interviews. These interviews were conducted with different six course developers, e-teachers and individuals who have held both roles for the CDLI, after twenty-eight of the thirty-two CDLI course developers and teachers were contacted. All interviews occurred from June to August of 2004.

From an analysis of the interview transcript, I identified seven thematic categories which I refined into guidelines for developers. When designing web-based content for secondary school students, course developers should:

1. prior to beginning development of any of the web-based material, plan out the course with ideas for the individual lessons and specific items that they would like to include;
2. keep the navigation simple and to a minimum, but don't present the material the same way in every lesson;
3. provide a summary of the content from the required readings or the synchronous lesson and include examples that are personalized to the students' own context;
4. ensure students are given clear instructions and model expectations of the style and level that will be required for student work;
5. refrain from using too much text and consider the use of visuals to replace or supplement text when applicable;
6. only use multimedia that will enhance the content and not simply because it is available; and
7. develop their content for the average or below average student.

One of the interesting developments from this study was that the guidelines listed above had little similarity to online learning guidelines for instructional designers found in the literature, which further underscored the differences between the ways adults learn and how adolescents learn. (For more information, see Barbour, 2005a; Barbour, 2005b.)

### *Student Perceptions of Online Learning*

The purpose of this study was to investigate the perceptions of students who have completed courses from the CDLI on helpful and challenging components of web-based learning, specifically to explore web-based learning from the secondary student's perspective to inform the creation of strategies that can be implemented to assist web-based learning designers. A mixed methods approach, using both quantitative (survey) and qualitative (interview) data collection methods, was adopted. Eighteen different schools, representing all four school districts in the province of Newfoundland and Labrador, agreed to participate in this study. During the 2004-05 school year, a total of thirty-eight participants completed the survey and eight participated in a follow-up interview.

While a complete analysis of the data is still being conducted, some of the preliminary results from the survey portion indicate that overall students are fairly pleased with their web-based learning experiences. When asked “overall, I am satisfied with taking web-based courses,” 87% of the students indicated they were. This is a particularly positive result, given that two thirds of the students who completed the survey had only taken one or two web-based courses. As a possible explanation for that satisfaction, one of the themes from the interviews was the ability of students to access courses that had previously been unavailable in their school. This increased access was seen by the students as the greatest benefit of the CDLI. In addition to this, students also mentioned factors such as being able to interact with students from different parts of the province, the ability to increase their technology skills, and the opportunity to become more independent in their learning as other benefits.

The two initial challenges identified in the survey data were a lack of time and technical problems. Half of the students who completed the survey indicated that there was generally a lack of time to get everything that was required in their web-based course completed by the assigned deadlines. To re-enforce the first of these, one of the themes from the interviews was that students were simply unable to complete all of the seat/practice work that is assigned to them and often submit their graded work after the assigned deadline. Also, more than two thirds of students expressed that technical problems was the main challenge faced in their web-based learning. This was also a theme from the interviews, technical problems were common when it comes to the hardware, and particularly the software used for synchronous classes. In addition, many students expressed difficulties with being able to complete work at home due to the lack of necessary software or the fact that much of the asynchronous content is designed to be used at higher bandwidths than is typically available in these rural areas.

Finally, when asked which factors are important for success in a web-based course students selected well-organized content, motivation, and time management as the most important factors. Other factors that were seen as important were clear objectives, exercises, quizzes, technology comfort level, although not to the extent as the first three. Interestingly, students indicated that feedback was the least important factors in their success in this web-based learning environment.

### *Students Perceptions of Web-Based Design*

This study was a follow-up to the teachers and designers perceptions of web-based design study that had been conducted the previous year. This study involved interviews and focus groups with six students from rural schools. The interviews were conducted via telephone during May 2005 and the focus group was conducted in June 2005 using the *Illuminate Live* software. Like the previous study, the goal for this study was to determine characteristics of an effectively designed web-based course perceived to be important by these secondary students.

Based upon an analysis of the interview transcripts, students initially indicated that they don't use the web-based content that much. However, when I began to discuss each of the individual components of the template it did come out that they did use the content more than they initially let on. It should be noted that this level of usage was still not as high as the CDLI wanted, or even as high as was believed by the teachers and course designers that had been interviewed a year earlier. One of the barriers to using the web-based content is the amount of work assigned during offline time. Students simply reported having to complete too much seat work to spend more time using the web-based content. Other barriers included how little the e-

teachers actually used it and the fact that students did not necessarily trust that the content was accurate.

When the students were discussing web-based design they confirmed many of the perceptions that had been exposed by the teachers and course developers in the earlier study. For example, the students indicated that they didn't like text and preferred multimedia be used to explain concepts and provide information. The students also indicated that they wanted to have a good set of notes. Contrary to the belief by teachers and course developer's that the students simply clicked on random radio buttons and hit "submit" when completing the "Test Yourself" quiz feature, students actually expressed that they found the review questions quite useful. One point that was consistently raised by the students that wasn't a theme in the earlier study was that while students enjoyed the various media that the Internet was able to offer, in many instances they were unable to access it outside of school – limiting their ability to use the web-based course materials at home.

There were many other trends (e.g., dealing with institutional and school-based tutoring, challenges students experienced, expanding learning communities, the use of the synchronous content, the nature of their online learning) that were generated from these interviews, but were not germane to the research questions for this particular study which may prove valuable in future research projects.

### *Achievement Differences Between Students in Traditional and Virtual Courses*

The purpose of the study was to examine the student achievement in standardized public exams and final course scores in the province between different delivery models to determine whether or not students are succeeding in the virtual high school environment at the same rate as

their classroom counterparts. The final course scores and the standardized public exam scores for every student in the Province of Newfoundland and Labrador for the school years 2001-02 to 2004-05 were obtained and combined with information from the *High School Distance Education Course Report*.

When considering the students final course scores, the data indicated that for each of the first three years that the CDLI was in operation students from rural areas in the web-based courses and during the fourth year students from both the rural and urban web-based performed as well or better than any of their other counterparts. A similar pattern was found with the annual analysis of public exam scores. Like the final course averages, during the 2002-03 the web-based students in rural areas performed as well as any other group of students (excluding a single urban student who was enrolled in a web-based CDLI course). However, during the 2003-04 school year the performance of both rural and urban students in the web-based courses scored lower on their public exams than students who received their instruction in a traditional classroom. This past year this trend was reversed, with both rural and urban students in web-based courses scoring higher on their public exams than classroom-based students.

While annual comparisons of the students' public exam scores and final course averages are useful, a comparison of the total four year period is also in order. Table 1 provides such a comparison.

*Table 1. Students' scores based upon delivery model and location*

	Public Exam	Final Course Average
Web delivered rural	61.7 (n = 826)	69.3 (n = 3,452)
Web delivered urban	65.7 (n = 11)	66.3 (n = 81)
Web delivered total	61.8 (n = 837)	69.2 (n = 3533)
Classroom delivered rural	62.3 (n = 15,384)	68.5 (n = 90,190)

Classroom delivered urban	63.1 (n = 23,080)	67.7 (n = 115,029)
Classroom delivered total	62.8 (n = 38,464)	68.1 (n = 205,219)
# of missing cases	1,029 (2.6%)	5,650 (2.6%)
Total # of cases	40,330	214,402

This combined analysis indicated that over the four year period the CDLI has been in operation there had been some fluctuation in both performance measures when both delivery model and location are considered, but little difference in the overall performance of students based upon delivery model on both their public exam scores and final course averages.

### Conclusions

The results of these studies may have useful implications for web-based distance education programs in other jurisdictions. In one of the largest meta-analyses ever conducted related to distance education, Bernard, Abrami, Lou, Borokhovski, Wade, Wozney, Wallet, Fiset, and Huang (2004) found a very small, but statistically significant, positive mean effect size for interactive distance education over traditional classroom instruction on student achievement and a small, but statistically significant, negative effect for retention rate. While this meta-analysis is one of the best of its kind, its findings, as well as those derived from other related meta-analyses (Cavanaugh, 2001; Cavanaugh et al., 2004; Machtmes & Asher, 2000; Ungerleider & Burns, 2003), do not go far enough in specifying design guidelines for practitioners. Studies with interpretivist goals, such as some of these discussed above are clearly needed to reveal the reasons for such findings. Once we know the reasons why some students are successful in distance education, we will have a better foundation for designing more effective web-based learning opportunities for all students.

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