

Examining Enrollment Trends in Schools Participating in Online Learning in Newfoundland and Labrador

Michael Barbour, Director of Doctoral Studies and Assistant Professor, Sacred Heart University, mkbarbour@gmail.com & Dennis Mulcahy, Professor, Memorial University of Newfoundland, dmulcahy@mun.ca

Introduction

In their review of the open-source literature related to K-12 online learning, Cavanaugh, Barbour and Clark (2009) described how much of the research in the field had focused on comparing student performance of online students with the performance of students in the traditional brick-and-mortar environment in an effort to “prove” that K-12 online learning was as effective as traditional schooling. However, historically, distance education programs were primarily designed for a select group of students, specifically those with higher aptitudes, higher achievement, and greater aspirations for post-secondary education.

In Newfoundland and Labrador, the Centre for Distance Learning and Innovation (CDLI), the organization responsible for K-12 online learning (virtual schooling), began operating in 2001-02 with a limited pilot program and became available to all students during the 2002-03 school year. It is designed to meet the needs of rural students. Two thirds of the province’s approximately 300 schools are located in these rural areas, with nearly half designated as necessarily existent¹. CDLI has attempted to break from this pattern as more rural schools rely on its services. As such, they have aimed to deliver more courses suited, not only to those with higher aptitudes, higher achievement, and greater aspirations for post-secondary education.

The purpose of this study was to investigate whether there was a greater percentage of rural students enrolled in basic-level courses at schools where the only option for academic-level courses was through the CDLI. In Newfoundland and Labrador, students who graduate with only basic-level courses are ineligible for college or university acceptance without taking remedial courses at the community college level. For this reason, the issue of whether students have access to academic-level courses is an important one.

Literature review

Comparisons of K-12 face-to-face versus online learning

As Cavanaugh et al. (2009) observed, there have been many studies examining the effectiveness of K-12 online learning compared to the face-to-face classroom

¹ A term used to describe schools that cannot be closed because they are located so far from another school that it makes bussing the students not feasible due to distance.

environment. For example, in their evaluation of several Alberta-based programs, Ballas and Belyk (2000) found the performance of virtual and classroom students in Alberta were similar in English and Social Studies courses, but classroom students performed better overall in all other subject areas. Barker and Wendel (2001) examined the performance of students in six virtual schools in three different provinces, and concluded that these students performed no worse than the students from three brick-and-mortar schools (i.e., one school per province) used as a comparison point. In this synthesis of studies examining distance education programs spanning a kindergarten to adult audience, Shachar and Neumann (2003) found a statistically significant positive effect in favour of the distance education programs.

That same year, Ungerleider and Burns (2003) examined studies of student performance in only networked and online distance education program at both the secondary and post-secondary levels. They reported no statistically significant differences in student performance. In a research study with the Florida Virtual School (FLVS), Cavanaugh et al. (2005) found that FLVS students performed better on a non-mandatory assessment tool compared to students from the traditional classroom environment. In a similar study, McLeod et al. (2005) found that FLVS students performed better on an assessment of algebraic understanding than their classroom counterparts.

These types of results have been replicated in larger studies of student performance. Cavanaugh (2001), in her meta-analysis of studies related to student performance in K-12 online learning environments, found “a small positive effect in favor of distance education” at the K-12 level (p. 73). Meta-analysis is a statistical technique that combines the results from previous studies that examine the effectiveness of a particular tool or pedagogy (i.e., in this instance the use of K-12 distance education) to report an overall effect. In a follow-up meta-analysis three years later, Cavanaugh et al. (2004) found a small negative effect size for students enrolled in K-12 distance education environments. However, it should be noted that the studies included in the 2001 meta-analysis did not control for existing performance differences between students and the studies included in the 2004 meta-analysis had other methodological limitations (e.g., failure to adequately describe the treatment conditions).

Bernard et al. (2004) conducted a more restrictive meta-analysis using 232 studies comparing student performance in online and video-based distance learning environments at the K-12 and post-secondary levels. These authors found a small positive effect size in favour of the distance students, although the authors did note that the distance education group also had lower retention rates. In one of the most comprehensive, and methodologically rigorous meta-analysis, Means et al. (2009) examined the literature from 1996 to 2008 for “experimental and quasi-experimental [studies that] objectively measured student learning outcomes” (p. xii). This search identified 176 studies, of which only 46 were

sufficiently rigorous and detailed to be included in their meta-analysis. These authors found that students in online environments out-performed those who took the same course in a face-to-face environment. However, the authors also reported that the results were not statistically significant for the five K-12 studies included in the sample.

Methodological limitations of these studies

It is important to identify potential methodological limitations of these types of comparative studies, as Means et al. (2009) have tried to control for, because these limitations can potentially skew results from these comparisons. For example, both Cavanaugh et al. (2005) and McLeod et al. (2005) found FLVS students performed better than traditional classroom-based students. However, Cavanaugh et al. speculated that the virtual school students who took the assessment may have been more academically motivated and naturally higher achieving students. McLeod et al. indicated that student performance was due to the high drop-out rate in the virtual school courses, i.e., the lower performing students had already self-selected out of their virtual school course.

Similar limitations exist in relation to the findings reported by Barker and Wendel (2001). These authors noted that classroom students out-performed virtual school students in all but English and social studies; however, participation rates in the assessment among virtual school students ranged from 65%-75%, while 90% to 95% of classroom-based students participated. The potential for methodological limitations depends on which students complete these assessments and the nature of students enrolled in these distance education programs. This point is notable given that some virtual school programs report drop-out rates as high as 50% or more (Clark et al., 2002; Elluminate, 2006).

In their 1999-2000 evaluation of the FLVS, Bigbie and McCarroll (2000) reported that the online program had a 73.6% completion rate. However when taking into account students who dropped out during the 28-day trial period, completion rates fell to 53.5%. In the case of the FLVS, Bigbie and McCarroll also reported that over half of the students who completed FLVS courses scored an A in their course and only 7% received a failing grade. These findings have been similar to other evaluations where virtual school students have been described as typically A or B students, honors or college-bound, and advanced placement or academically advanced (Espinoza et al., 1999; Kozma, Zucker & Espinoza, 1998; Mills, 2003; Watkins, 2005).

Others have described virtual school students as independent, high achieving, motivated, self-directed, self-disciplined, technologically savvy, (Clark et al., 2002; Haughey & Muirhead, 1999; Roblyer & Elbaum, 2000). This difference in the type of student calls into question the validity of many of these no significant differences findings, as the K-12 students enrolled in the distance education programs appear to be naturally stronger students (and yet they often only do as

well as the classroom-based students, who include the full range of ability levels). This result has led some to speculate whether online distance education is suitable for all secondary-level students (Mulcahy, 2002).

Comparisons of K-12 face-to-face versus online learning in Newfoundland and Labrador

The province-wide virtual school in Newfoundland and Labrador, CDLI, was designed to provide online learning opportunities for K-12 students of all ability levels. In examining student performance in CDLI courses, Barbour and Mulcahy (2006; 2007; 2008) found no significant differences in the performance of classroom-based students and web-based students in both standardized end-of-course exams and final course marks. However, because the authors were unable to compare the overall grade point averages (GPAs) of classroom-based students and web-based students, they questioned whether their sample of web-based students contained students from the same range of abilities as would be found in the classroom. The authors observed that, unfortunately, the manner in which the provincial Government maintains the data (and the associated security concerns related to student identifications) makes it impossible for researchers like them to investigate that potential.

In a study of three face-to-face rural schools in coastal Labrador, Mulcahy, Dibbon and Norberg (2008) found that two of the schools had a higher percentage of students enrolled in basic-level courses. For the students in Mulcahy et al.'s study, the only choices offered through their course selection was between an academic-level course or a basic-level course, and the CDLI was the only option for many of the academic courses. These findings suggested one avenue to investigate the nature of students enrolled in CDLI courses was through an examination of the proportion of students enrolled in basic level courses at schools where the CDLI provides the only academic option.

Methodology

Using data published annually by the Ministry of Education in the *Education Statistics: Elementary-Secondary* and *K-12 School Profile System* (see Government of Newfoundland and Labrador 2008a; 2008b for an example), the researchers were able to obtain the enrollment on a school-by-school basis of students in each of the courses offered in the provincial curriculum. The researchers isolated the courses in English language arts and mathematics, as these are the only course sequences in the curriculum that have recognized basic, academic and advanced (in the case of the mathematics) course options. These subject areas were further coded based on the geographic location of their school. The geographic designation (i.e., urban, suburban, and rural) were based on the Statistics Canada definitions; which defined urban as a population of 5000, suburban as a census tract that partially falls into an urban area or if 50%

of the population in the census track works in the urban area or if 25% of the employees in the census track live in an urban area, and rural as all other jurisdictions (Government of Newfoundland and Labrador 2008a).

Isolating these variables allowed the researchers to determine the percentage of students enrolled in these three levels of courses and compared them based upon four variables:

1. the percentage of students enrolled province-wide;
2. the percentage of students enrolled through the CDLI; and
3. the percentage of students enrolled in rural schools;
4. the percentage of students enrolled in rural schools through the CDLI.

The focus was placed on schools in rural jurisdictions because, as Mulcahy et al. (2008) noted, for students attending rural schools, the CDLI was almost always the only means of enrolling in academic or advanced courses.

The data used in this study included the 2003-04 to the 2007-08 school year. The data from the 2008-09 school year were not available when the study began, and the scope of the study did not permit the inclusion of the 2002-03 school year. These data will be added to the study in the future. As the researchers had access to the complete population of data, the results were based upon a simply comparison of percentages. These results are presented in the following section.

Results and discussion

Mulcahy et al. (2008) noted that schools in their study had a higher percentage of students enrolled in basic-level courses, and hypothesized that this tendency might be due to the fact that the only option to take an academic-level courses was online through the CDLI and that students were opting for the basic-level courses to avoid taking courses online. Table 1 illustrates the percentage of students enrolled in basic-level math courses from 2003-04 to 2007-08.

Table 1

Percentage of Students Enrolled in Basic-Level Math Courses

Year	Province-wide	All Schools using CDLI	Rural	Rural Schools using CDLI
03-04	23	29	28	29
04-05	24	25	29	32
05-06	24	23	29	28
06-07	23	25	30	33
07-08	23	25	30	35

Interestingly, the percentage of students enrolled in basic-level math courses in rural areas was higher than the provincial average by 5% or more in each year. Additionally, with the exception of the 2005-06 school year, there was a further increase in the percentage of basic-level math students in rural schools that relied on CDLI for some of their academic-level offerings. Table 2 shows similar percentages of students enrolled in basic-level English courses from 2003-2004 to 2007-2008.

Table 2

Percentage of Students Enrolled in Basic-Level English Courses

Year	Province-wide	All Schools using CDLI	Rural	Rural Schools using CDLI
03-04	23	33	28	59
04-05	24	19	28	42
05-06	24	18	29	30
06-07	24	18	30	33
07-08	24	20	30	26

Again, the percentage of basic-level English enrollment in rural schools was higher than the provincial average by 4% or more in each year (and the gap had actually been increasing, as opposed to the mathematics, where it remained relatively constant). Further, while the percentage of students enrolled in basic-level courses in rural schools that relied on the CDLI for some of their academic-level curriculum began significantly higher than the proportions for the other categories. However, gap between these categories has decreased steadily. In fact, during the 2007-08 school year, the rural schools that relied on the CDLI for some of their academic-level programming had a lower percentage of students enrolled in basic-level English courses compared to the overall rural school average (although still a little higher than the provincial average).

These higher proportions of basic students in schools that relied upon the CDLI for the delivery of part or all of their academic-level programming potentially confirm the Mulcahy et al.'s (2008) hypotheses. Barbour and Mulcahy (2006, 2007, 2008) were unable to determine if they were comparing similar populations of students because they were not able to access the students' performance in their other courses. Similarly, it is impossible to attribute the results of this study to the delivery model (i.e., the trend of a higher percentage of basic level students in rural schools that relied upon the CDLI for part or all of their academic curriculum may not have anything to do with the CDLI).

Conversely, Table 3 illustrates the percentage enrollment for the advanced-level math courses from 2003-2004 to 2007-2008.

Table 3

Percentage of Students Enrolled in Advanced-Level Math Courses

Year	Province-wide	All Schools using CDLI	Rural	Rural Schools using CDLI
03-04	20	22	19	23
04-05	19	26	18	24
05-06	20	26	18	28
06-07	21	28	19	23
07-08	20	19	19	21

As may be expected, given that the percentage of rural students enrolled in basic-level courses is slightly higher than the provincial average, the percentage of rural students enrolled in advanced-level courses is lower than the provincial average. However, in rural schools where the CDLI provides the only option for advanced level courses, the percentage of students enrolled in advanced level courses is higher than the provincial average (although this percentage declined to an even level in 2007-08).

While rural schools that use the CDLI for part or their entire academic curriculum have slightly higher percentages of students enrolled in basic-level courses, those same schools also have a higher percentage of students enrolled in advanced-level courses. This should not be surprising; Haughey and Muirhead (1999) found that K-12 distance education in Canada has needed to provide equal educational opportunities to students in rural areas, particularly in advanced-level courses. In addition, the majority of literature also supports the use of online learning as a medium for students who would enroll in, and be capable of success in, advanced-level courses (Clark et al., 2002; Espinoza et al., 1999; Kozma, Zucker & Espinoza, 1998; Mills, 2003; Roblyer & Elbaum, 2000; Watkins, 2005).

Conclusions and implications

Schools in rural areas have slightly higher levels of enrollment in basic-level courses than the provincial average. Further, the percentage of students who attended rural schools that relied upon the CDLI for some or all of their academic programming had even higher levels of basic course enrollment (although this was decreasing in English language arts, but increasing in mathematics). While this finding does not confirm Mulcahy et al.'s (2008) hypothesis that students are taking basic-level courses to avoid the online academic-level courses, it does indicate that there is a difference in basic-level enrollment in these schools that is worthy of further investigation. Since we did not conduct any tests for significance, we do not know if these differences are significant or occurred by chance.

Analysis of the percentage of students enrolled in advanced courses revealed that the CDLI was fulfilling a mandate of providing access to advanced-level opportunities similar to many other virtual school programs. The percentage of students enrolled in advanced-level courses through the CDLI, both province-wide and in rural schools, was higher than the provincial average. This result was consistent with findings from numerous other studies that found that high-achieving students performed well in online learning.

As noted, further research is needed to investigate why rural schools in general, and specifically rural schools that used the CDLI for their academic-level courses, had higher percentages of students enrolled in basic-level courses. The original intention of the CDLI was to change the paradigm of K-12 distance education so that it was accessible to students beyond those who are naturally academically successful. Further, there is an increased reliance of rural schools on the CDLI to offer all of their academic-level programming through online learning. Given these realities, there should be concern that students who may be capable of moderate success in academic-level courses could be electing to take the basic-level courses to avoid online classes. If this is the case, then changes must be made to ensure that rural students are not limited to a non-college preparatory curriculum simply because they want to avoid online courses. More research is needed to determine if this is indeed the case.

However, beyond simply the issue of the nature of students being served by these distance education environments, the percentages showed that greater numbers of rural students were enrolled in basic-level courses and fewer numbers of rural students were enrolled in advanced-level courses. This two-tier education system; one of quality and opportunity for urban and suburban students, and a separate and lesser system for rural students needs to be addressed.

References

- Ballas, F. A., & Belyk, D. (2000). *Student achievement and performance levels in online education research study*. Red Deer, AB: Schollie Research & Consulting. Retrieved from http://web.archive.org/web/20051031044348/http://www.ataoc.ca/files/pdf/AOCresearch_full_report.pdf
- Barbour, M. K., & Mulcahy, D. (2006). An inquiry into retention and achievement differences in campus based and web based AP courses. *Rural Educator*, 27(3), 8-12.
- Barbour, M. K., & Mulcahy, D. (2008). How are they doing? Examining student achievement in virtual schooling. *Education in Rural Australia*, 18(2), 63–74.
- Barbour, M. K., & Mulcahy, D. (2009). Student performance in virtual schooling: Looking beyond the numbers. *ERS Spectrum*, 27(1), 23–30.

- Barker, K., & Wendel, T. (2001). *E-learning: Studying Canada's virtual secondary schools*. Kelowna, BC: Society for the Advancement of Excellence in Education.
- Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., Walseth, P. A., Fiset, M., & Huang, B. (2004). How does distance education compare to classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research*, 74(3), 379-439.
- Bigbie, C., & McCarroll, W. (2000). *The Florida high school evaluation 1999–2000 report*. Tallahassee, FL: Florida State University.
- Cavanaugh, C. (2001). The effectiveness of interactive distance education technologies in K–12 learning: A meta-analysis. *International Journal of Educational Telecommunications*, 7(1), 73–88.
- Cavanaugh, C., Barbour, M. K., & Clark, T. (2009). Research and practice in K-12 online learning: A review of literature. *International Review of Research in Open and Distance Learning*, 10(1). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/607>
- Cavanaugh, C., Gillan, K. J., Bosnick, J., Hess, M., & Scott, H. (2005). *Succeeding at the gateway: Secondary algebra learning in the virtual school*. Jacksonville, FL: University of North Florida.
- Cavanaugh, C., Gillan, K. J., Kromrey, J., Hess, M., & Blomeyer, R. (2004). *The effects of distance education on K–12 student outcomes: A meta-analysis*. Naperville, IL: Learning Point Associates. Retrieved from <http://web.archive.org/web/20081011075904/http://www.ncrel.org/tech/distance/k12distance.pdf>
- Clark, T., Lewis, E., Oyer, E., & Schreiber, J. (2002). *Illinois Virtual High School Evaluation, 2001-2002*. Carbondale, IL: TA Consulting and Southern Illinois University. Retrieved from http://web.archive.org/web/20070713065800/http://www2.imsa.edu/programs/ivhs/pdfs/IVHS_FinalRpt.pdf
- Elluminate Inc. (2006). *The impact of synchronous online learning in academic institutions: Customer experiences from K-12 and higher education*. Calgary, AB: Author. Retrieved from <http://www.illuminate.com/downloads/whitepapers/synchronous-impact-white-paper.pdf>
- Espinoza, C., Dove, T., Zucker, A., & Kozma, R. (1999). *An evaluation of the Virtual High School after two years in operation*. Arlington, VA: SRI International.
- Government of Newfoundland and Labrador. (2008a). *Education statistics: Elementary-secondary*. St. John's, NL: Queen's Printing for Newfoundland and Labrador. Retrieved from <http://www.ed.gov.nl.ca/edu/publications/k12/stats/index.html#0708>
- Government of Newfoundland and Labrador. (2008b). *K-12 school profile system: 2007-08*. St. John's, NL: Queen's Printing for Newfoundland and Labrador. Retrieved from http://www.ed.gov.nl.ca/sch_rep/2007/index.htm

- Haughey, M., & Fenwick, T. (1996). Issues in forming school district consortia to provide distance education: Lessons from Alberta. *Journal of Distance Education*, 11(1). Retrieved from <http://www.jofde.ca/index.php/jde/article/view/242/454>
- Haughey, M., & Muirhead, W. (1999). *On-line learning: Best practices for Alberta school jurisdictions*. Edmonton, AB: Government of Alberta. Retrieved on from http://web.archive.org/web/20030312122537/http://www.phrd.ab.ca/technology/best_practices/on-line-learning.pdf
- Kozma, R., Zucker, A., & Espinoza, C. (1998). *An evaluation of the Virtual High School after one year in operation*. Arlington, VA: SRI International. Retrieved from <http://web.archive.org/web/20080626110702/http://ctl.sri.com/publications/downloads/evalvhs1yr.pdf>
- McLeod, S., Hughes, J. E., Brown, R., Choi, J., & Maeda, Y. (2005). Algebra achievement in virtual and traditional schools. Naperville, IL: Learning Point Associates.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: U.S. Department of Education, Retrieved from <http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf>
- Mills, S. (2003). Implementing Online Secondary Education: An Evaluation of a Virtual High School. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2003* (pp. 444-451). Chesapeake, VA: AACE.
- Mulcahy, D. M. (2002). Re-conceptualizing distance education: Implications for the rural schools of Newfoundland and Labrador. *The Morning Watch*, 30(1-2). Retrieved from <http://www.mun.ca/educ/faculty/mwatch/fall02/Mulcahy.htm>
- Mulcahy, D. M., Dibbon, D., & Norberg, C. (2008). *An investigation into the nature of education in a rural and remote region of Newfoundland and Labrador: The Straits*. St. John's, NL: The Harris Centre, Memorial University of Newfoundland.
- Roblyer, M. D., & Elbaum, B. (2000). Virtual learning? Research on virtual high schools. *Learning and Leading with Technology*, 27(4), 58–61.
- Shachar, M., & Neumann, Y. (2003). Differences between traditional and distance education academic performances: A meta-analytic approach. *International Review of Research in Open and Distance Education*, 4(2). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/153>
- Ungerleider, C., & Burns, T. (2003). *A systematic review of the effectiveness and efficiency of networked ICT in education: A state of the field report*. Ottawa, ON: Council of Ministers of Canada and Industry Canada.
- Watkins, T. (2005). *Exploring e-learning reforms for Michigan: The new educational (r)evolution*. Detroit, MI: Wayne State University. Retrieved

from
<http://web.archive.org/web/20051208000848/http://www.coe.wayne.edu/e-learningReport.pdf>