HIGH SCHOOL STUDENTS IN THE NEW LEARNING ENVIRONMENT: A PROFILE OF DISTANCE E-LEARNERS

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ABSTRACT
The relative ubiquity of computer access and the rapid development of information and communication technology have profoundly impacted teaching and learning at a distance. Relatively little is currently known about the characteristics of those students who participate in distance e-learning courses at the secondary school level. In an effort to provide a better understanding of who secondary school distance e-learners are, this study utilized a logistic regression analysis to examine data from a survey of students at 35 public schools in the Eastern Canadian province of Newfoundland and Labrador. The survey sample included students who did and did not participate in distance e-learning courses. The results of the analysis suggest that secondary school distance e-learners are more likely to be females who are a) completing a demanding academic program, b) positively disposed toward school, c) not employed in a part-time job, and d) confident of their computer and reading abilities.

INTRODUCTION

While the origins of distance education may be traced back to the nineteenth century, the rapid evolution of information and communication technology (ICT) over the past two decades has significantly transformed distance education delivery in many jurisdictions (Abrami et al., 2006; Canadian Council on Learning, 2009; Shachar & Neumann, 2003). One of the resultant new paradigms for distance education, online e-learning, utilizes web-based ICT learning tools as the primary mechanism for mediating student-teacher communications and facilitating teaching and learning at a distance.

Online courses that integrate distance e-learning (DEL) technology tools have had a growing presence in Canada's secondary school systems since the mid-1990's (Barbour & Stewart, 2008). At present, 8 of the 10 Canadian provinces have developed some form of province-wide online DEL program for students in the Kindergarten to Grade 12 education system. In keeping with the dictum that necessity is the mother of all invention, many of these developments have taken place in order to provide students with access to courses that, for a variety of reasons, would not otherwise be available. This is particularly the case in rural and remote communities where schools are often challenged to offer a full range of course options because of low levels of student enrolment in certain courses or difficulty recruiting teachers with appropriate subject matter expertise (Barbour, 2007; Provasnik et al., 2007). This issue is of concern for education policymakers since limited course availability, especially with regard to courses required for secondary school graduation and subsequent admission to tertiary education institutions, can narrow the range of career options available to students. It is for these specific reasons that education authorities in Canadian province of Newfoundland and Labrador have had an extensive history of providing DEL courses to secondary school students, dating back to the late1980's. In fact, there is a growing population of rural students in the province who are completing a portion of their secondary-level education in DEL environments that differ substantively from the traditional classroom learning environment.

CHARACTERISTICS OF DISTANCE E-LEARNERS

Despite growth in the numbers of students engaged in secondary school DEL in recent years, there have been relatively few examinations of the characteristics of students who participate in this form of learning in secondary school. Much of the research examining the characteristics of distance e-learners has focussed on student learning outcomes, retention, attitudes (e.g., satisfaction), and technical issues (Dobbs, Waid, & del Carmen, 2009; Lofstrom & Nevgi, 2007; Wilkes, Simon, & Brooks, 2006). These studies have reported that students in DEL courses attain similar, and sometimes better, results compared to traditional courses but frequently fail to complete courses. Students in such courses report varied levels of satisfaction and frequently experience difficulties as a result of technical skill issues and limitations (Bernard et al., 2004).

While student characteristics are often identified as one of the key considerations in the quality of online education teaching and learning, until recently the vast majority of earlier research studies have focused on the experiences of adult learners and students at the tertiary education level as opposed to secondary school students (Barbour, McLaren, & Zhang, 2008; Barbour & Reeves, 2009; Kennedy, 2000). This growing body of research suggests that secondary-level students who participate in DEL courses are often very academically capable, highly motivated, self-disciplined, and independent. Studies have also found that these students are more likely to be highly literate and technologically adept and planning to study at university upon graduation from secondary school. Recently, following an extensive review of distance learning in Newfoundland and Labrador, Crocker (2007) suggested that secondary school students' choices to participate in DEL are influenced by a "selection factor, in which higher ability students self-select or are selected by the school as the best candidates to take distance courses" (p. 73).

In an effort to address current deficits in the research literature, the purpose of the current study was to further elucidate the role of background, academic, and socio-cultural characteristics and attributes that influence secondary school students' selection of DEL courses. This was accomplished thorough the analysis of the results of a survey of students who did and did not participate in these courses in secondary school. Through an analysis of a diverse array of student background factors, we sought to identity key factors that differentiate students who complete courses exclusively in traditional classrooms from those who complete secondary school course requirements in the DEL environment.

METHOD

Research Sample

At the end of the 2007-2008 school year, the researchers surveyed students in graduating classes at 35 public schools in the Canadian province of Newfoundland and Labrador. Students attending these schools, all located in rural areas, frequently access secondary school courses using DEL technology. The schools under study had a combined population of 496 students who were completing their final year of secondary school. In total, 324 students completed the online survey for an overall response rate of about 65%.

Variables

The survey questionnaire was designed to collect information about various student background characteristics, curricular and extra-curricular experiences in secondary school, as well as details of student participation in DEL courses. In addition to academic performance variables, students were asked to provide information about any plans they had for tertiary education participation following secondary school. Table 1 provides descriptions of the operational definitions used for each of the predictor variables in the regression model utilized for this analysis.

In addition to the variable indicating student enrolment in DEL courses, variables selected for this analysis were chosen because previous research has shown them to impact and/or reflect student performance in school. They included gender, socioeconomic status, academic characteristics, participation in extra-curricular activities, student self-efficacy, and the intention to pursue university-level studies.

Table 1 Description of Predictor Variables in Regression Model

Variable	Description
DEL course enrolment	yes = 1; no = 0
Gender	female = 1; male = 0
Parental Education Level	at least one parent university educated = 1; otherwise = 0
Overall Academic Average	80% or higher = 1; otherwise = 0
Rigor of Academic Program	advanced mathematics = 1; otherwise = 0
Homework Completion	2 or more days per week = 1; otherwise = 0
Attitude Toward School	like = 1; dislike = 0
Internet Use at Home	20 hrs or higher per week = 1; otherwise = 0
Works Part-Time	yes = 1; no = 0
Volunteers	yes = 1; no = 0
Extra-curricular Activities (School Organized)	yes = 1; no = 0
Extra-curricular Activities (Outside School)	yes = 1; no = 0
Computer Skills Self-Efficacy	not concerned = 1; concerned = 0
Reading Skills Self-Efficacy	not concerned = 1; concerned = 0
Writing Skills Self-Efficacy	not concerned = 1; concerned = 0
Mathematics Skills Self-Efficacy	not concerned = 1; concerned = 0

Plans to Attend University	yes = 1; no = 0

Parental education level was included in the model as a proxy for students' socioeconomic status (SES). The high SES group was comprised of students who had one or more parents who were university-educated while the lower SES group included all of the remaining students. Students' academic attributes were measured by four variables. Students' self-reported overall academic average was used to assess their level of overall academic achievement. The type of mathematics course they completed in their final year of secondary school (i.e., none, basic, academic, or advanced) was used as a proxy for the academic rigor of the secondary school curriculum they completed. The amount of time spent on homework and students' attitude toward school were also included. Student participation in after-school extra-curricular activities were assessed by responses to survey questions about the amount of time spent using the internet at home and time spent after school and on weekends working part-time, volunteering, and participating in extracurricular activities (e.g., sports, clubs). Student self-efficacy with respect to computers, reading, writing, and mathematics were derived from survey questions that asked students to indicate if they were concerned about their skills in each of these four areas.

RESULTS

Descriptive Statistics

Of the 324 completed surveys, useable data were available for a total of 317. Though a sizable portion (37.5%) of students did complete DEL courses in secondary school, a majority of the students (62.5%) did not. Descriptive statistics for each of the individual independent variables are provided in Table 2. As is indicated in Table 2, more females (67.0%) than males indicated that they had completed DEL courses. More than half of the students who took DEL courses had an academic average of 80% or higher (52.7%), completed homework assignment two or more days per week (87.4%), and held a positive attitude toward school (63.1%). Most of the students (79.5%) did not complete an advanced level of mathematics as part of their secondary school curriculum.

Table 2 Descriptive Statistics for Independent Variables

Variable	Description	Distance e-Learning (%)	All (%)
Gender	female 1	67.0	54.3
	male 0	33.0	45.7
SES (Parental Education Level)	higher 1	19.8	14.8
	lower 0	80.2	85.2
Overall Academic Average	80% or more 1	52.7	47.0
	less than 80% 0	47.2	53.0
Rigor of Academic Program	greater 1	20.5	19.2
	less 0	79.5	80.8
Homework Completion	greater 1	87.4	77.0
	less 0	12.6	23.0
Attitude Toward School	like 1	63.1	49.5
	dislike 0	36.9	50.5
Internet Use at Home	greater 1	38.7	32.8
	less 0	61.3	67.2
Works Part-Time	yes 1	21.4	31.2
	no 0	78.6	68.8
Volunteers	yes 1	91.1	87.7
	no 0	8.9	15.3
Extra-curricular Activities (School Organized)	yes 1	76.6	76.0
	no 0	23.4	24.0
Extra-curricular Activities (Outside School)	yes 1	58.9	56.1
	no 0	41.1	43.9
Computer Skills Self-Efficacy	greater 1	93.8	79.2
	less 0	6.1	20.8
Reading Skills Self-Efficacy	greater 1	99.1	85.0
	less 0	0.9	15.0
Writing Skills Self-Efficacy	greater 1	76.8	71.3
	less 0	23.2	28.7
Mathematics Skills Self-Efficacy	greater 1	63.4	57.4
	less 0	36.6	42.6
Plans to Attend University	yes 1	51.8	39.4

	no 0	48.2	60.6

With regard to after-school activities, most (61.3%) of the students who completed DEL courses used the internet for fewer than 20 hours per week. Most spent some of their time after school each week volunteering (91.1%) and participating in school-organized (76.6%) or other (58.9%) extracurricular activities. Students who worked part-time after school were among the minority (21.4%). The vast majority of the distance students were confident about their ability to use computer technology (93.8%) and almost all of them were confident about their reading skills (99.1%). Most of them also expressed a fairly high degree of confidence with their regard to their skills in the areas of writing (76.8%) and mathematics (63.4%). Slightly more than half (51.8%) of the distance students indicated that they were interested in enrolling in a university-level program of studies following their completion of secondary school.

Logistic Regression Analysis

A logistic regression analysis was carried to determine if there were relationships between DEL course participation in secondary school and selected student characteristics. In total, 16 independent variables were entered into the regression equation. The complete regression results are provided in Table 3. The regression model was statistically significant, $\chi 2$ (16) = 102.50, $p < .001$, indicating that the model was indeed able to distinguish between students who completed the secondary school DEL courses and those who did not (i.e., 41.5% of the variability in the outcome is explained by the model). Of the 16 independent variables included in the equation, 6 of them made unique statistically significant contributions to the model.

Females were more than twice as likely to participate in DEL courses in comparison to their male cohorts. The students who have completed these distance courses were over three times more likely to have completed a more academically rigorous program compared to those did not, and they were over three times more likely to hold a positive attitude toward school. The only after-school extra-curricular activity variable that was a significant predictor was working part-time. The odds that students who held part-time jobs would also participate in distance courses was only 0.28 the odds of those who did not engage in part-time employment. Two of the four student self-efficacy variables significantly differentiated between distance students and non-distance students. Students who expressed a greater degree of confidence with respect to their computer skills were over five times more likely to have completed DEL courses, and those who expressed a high degree of confidence in their reading ability were more than 30 times more likely to have completed the distance courses.

Table 3 Logistic Regression Results for Factors Predicting Secondary Students' DEL Participation

Predictor Variable	β	SE β	Wald	*df*	*p*	Odds Ratio
Gender	.788*	.352	5.014	1	.025	2.199
Parental Education Level	.490	.412	1.414	1	.234	1.632
Overall Academic Average	-.576	.369	2.434	1	.119	.562
Rigor of Academic Program	1.106**	.418	7.013	1	.008	3.023
Frequency of Homework Completion	.406	.432	.883	1	.347	1.500
Attitude Toward School	1.158**	.348	11.086	1	.001	3.183
Internet Use at Home	.412	.323	1.626	1	.202	1.510
Works Part-Time	-1.284***	.353	13.254	1	.000	.277
Volunteers	.618	.497	1.550	1	.213	1.856
Extra-curricular Activities (School Organized)	-.817	.429	3.630	1	.057	.442
Extra-curricular Activities (Outside School)	.524	.343	2.334	1	.127	1.688
Computer Skills Self-Efficacy	1.640**	.539	9.263	1	.002	5.155
Reading Skills Self-Efficacy	3.416**	1.092	9.779	1	.002	30.445
Writing Skills Self-Efficacy	-.590	.393	2.257	1	.133	.554
Mathematics Skills Self-Efficacy	-.449	.346	1.680	1	.195	.638
Planning to Attend University	.206	.354	.338	1	.561	1.229
Constant	-6.399	1.235	26.836	1	.000	.002

Note: Nagelkerke $R^2 = .415$. Model χ^2 (16) = 102.25, $p < .001$. * $p < .05$, ** $p < .01$, *** $p < .001$.

DISCUSSION

Overall, the results of this study are supported by the existing research literature; however, the findings are not universally consistent with those of earlier examinations of the characteristics of secondary school distance e-learners. One such example is the absence of a significant difference between the overall academic average reported by DEL and non-DEL students. Although the students who were engaged in DEL did not achieve

significantly higher academic averages than traditional classroom learners, they were more likely to be completing a more rigorous academic program. This would appear to be in line with earlier studies that have suggested that students choosing DEL courses are more academically capable than their peers (Barbour & Reeves, 2009).

Like Crocker (2007), the findings indicate that female secondary school students are more likely to enrol in DEL courses. This finding is consistent with the fact that females tend to perform better generally in Canadian schools, tend to be more engaged than males in secondary school, and are also more likely than young men to complete more academically-challenging secondary school programs (Educational Policy Institute, 2008). Distance e-learners were also shown to have a significantly more positive attitude toward school. This finding is important because it appears that a more positive school experience heightens the possibility that a student would be inclined to choose to participate in DEL.

Amongst the after-school activities included in the analysis, the only one that significantly differentiated distance e-learners from their peers was involvement in part-time employment. Students who did not engage in DEL were more likely to work part-time than those who did. The reason for this is not entirely obvious from the data but it is notable that earlier research studies have shown that part-time work can sometimes have a detrimental effect on secondary students' achievement. Research in this area has also shown that working students can often have difficulty balancing the demands of both school and work (Singh, Chang, & Dika, 2007).

The results highlight the importance of literacy and technology skills in determining who will participate in DEL courses. Consistent with the results of earlier investigations, students whose perceived self-efficacy with computer technology is higher relative to their peers are more likely to pursue DEL (Barbour & Reeves, 2009). Likewise, the results of our analysis also strongly support the contention that reading ability is a good predictor of student choice between DEL courses and traditional classroom courses. The results suggest that high reading ability is the best predictor of DEL course participation.

A notable unexpected result was the finding that, unlike earlier studies which found DEL students to be more inclined to choose to pursue university-level studies following secondary school (Barbour & Reeves, 2009), the DEL and non-DEL students who participated in the current study were equally likely to have plans to attend university. Because it is possible that this finding is a reflection of generally high levels of university participation amongst the population of students included in this study, this result should be interpreted with some degree of caution.

Implications of the Research

The findings of this study suggest that DEL students are likely to be females completing a demanding academic program who are positively disposed toward school and not employed in a part-time job. These are students who are also likely to report feeling highly efficacious with respect to their computer and reading abilities. Efforts to identify these predisposing characteristics of secondary school DEL students and to create a profile of their attributes are important for two reasons. First, a better understanding of the characteristics of students who do not chose DEL courses is useful in developing strategies to increase and diversify the secondary school population enrolled in DEL. This research also enables us to better support distance e-learners and to identify at-risk learners in order to increase their chances of success.

Limitations of the Research

The current investigation included students from rural communities in one Canadian province which possibly limits the generalizability of the findings to some extent. A more comprehensive sample that includes students in settlements from other parts of Canada could help to validate and clarify the findings further. It is also important to acknowledge that one of the limitations of the survey data used for this research is the possibility of a self-selection bias amongst the respondents. There is a possibility that students who did not participate in DEL courses could have been somewhat less inclined to complete the survey for some unforeseen reason(s). As with the majority of studies of this type, this investigation was limited by the quality and the quantity of the collected data. Thus, the potential for extraneous causes of the observed differences between students, while unlikely, cannot be ruled out with complete certainty.

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